MINISTRY OF AGRICULTURE
OROMIA BUREAU OF AGRICULTURE
OROMIA PASTORAL AREA DEVELOPMENT COMMISSION
SOMALI LIVESTOCK, CROP AND RURAL DEVELOPMENT BUREAU

RURAL RESILIENCE ENHANCEMENT PROJECT IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

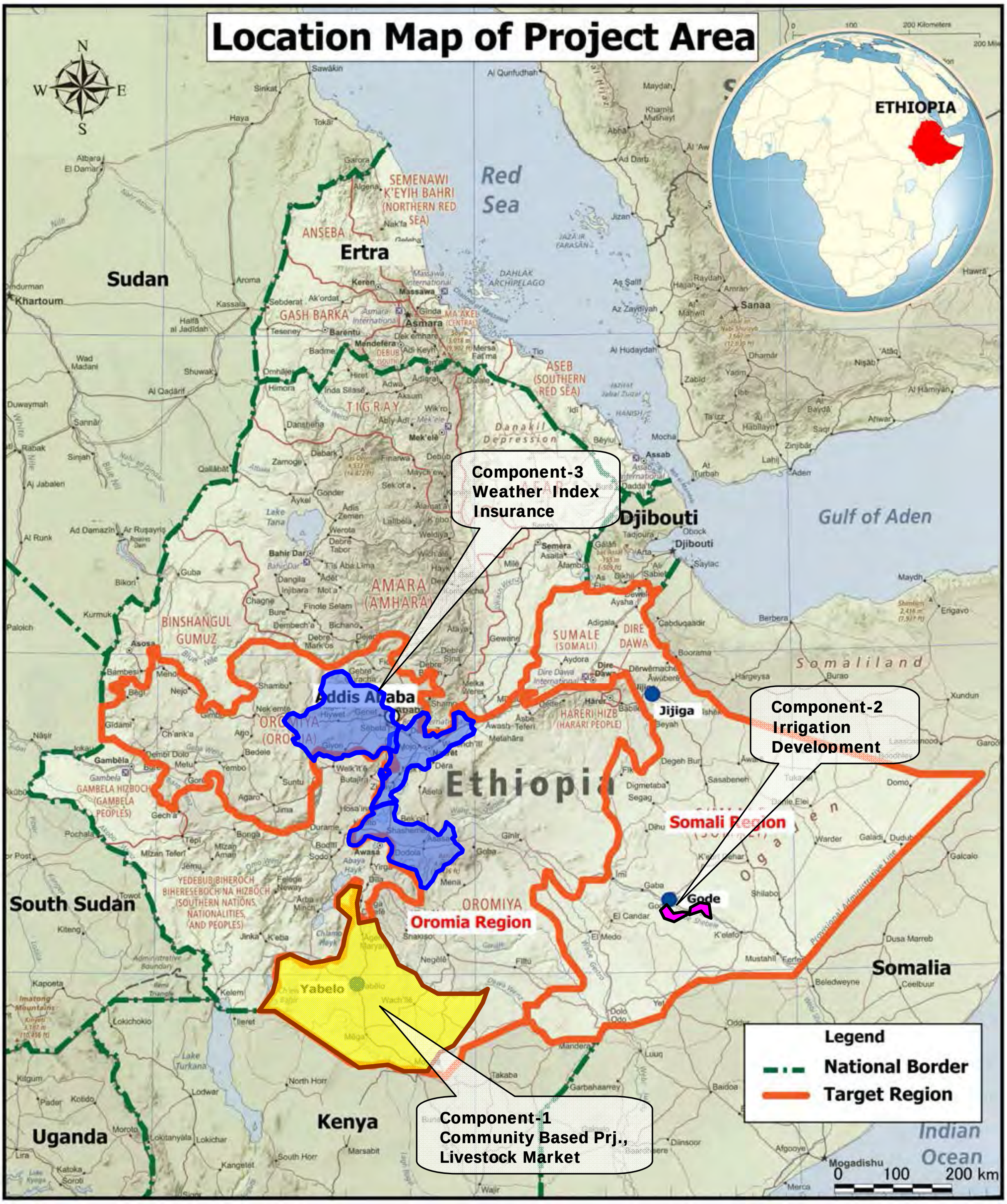
FINAL REPORT

JANUARY 2016

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
SANYU CONSULTANTS INC.

RD
JR
16-005

RURAL RESILIENCE ENHANCEMENT PROJECT



EXECUTIVE SUMMARY

PREFACE

0.1 Submitted herewith is the Final Report compiled according to the Record of Discussions (RD) on ñRural Resilience Enhancement Project (the Project, or RREP)ò signed between the Ethiopian authorities of Ministry of Agriculture (MOA), Oromia Bureau of Agriculture and Somali Livestock, Crop and Rural Development Bureau, and JICA on 28th March 2012. Based on the RD, JICA dispatched a technical cooperation team to Ethiopia at the beginning of April 2012, and had an inception meeting. Thereafter, the Team started a series of surveys and studies, based on which the Team designed project activities, and put them into implementation.

0.2 This Report covers all the issues and activities that the JICA Team has undertaken since the inception of the Project up until the completion of the Project in December 2015. The issues incorporated in this Report are, among others, past drought assessments, vulnerability assessments in relation to climate change, results of situation analyses of project target areas, outputs of a series of workshops, identification of priority project components, planning and designing of pilot project implementation modalities, outputs of the pilot projects, lessons learnt, and finally the conclusions and recommendations to the concerned authorities.

1. RATIONALE AND GOALS OF THE PROJECT

1.1 South Eastern and Eastern parts of Ethiopia fall into so-called the Horn of Africa where there is only meager rainfall presenting arid and semi-arid landscape. Cycles of droughts have taken place so far, resulting in acute food shortage. The area is one of the really vulnerable areas in the world. The Ministry of Agriculture, Ethiopia, together with development partners reported that as many as over four and a half million population fell into food crisis due to the prolonged drought having taken place in 2010/2011. Of them, about 80% live in southern parts of Oromia region and also in Somali region where a lowland area stretches.

1.2 The measures so far put into implementation were basically emergency reliefs; every time they were hit by a drought, they were urgently supported chiefly in the form of food and water assistance. For sustainable future, however, the focus needs to be extended from such urgent measures to resilience building in the societies bridging over to mid- and even long-term solutions. In Ethiopia, therefore, a linkage is now sought between emergency reliefs and measures to establish resilience.

1.3 Given above background, the Government of Ethiopia whereby requested the Government of Japan to undertake a project titled ñRural Resilience Enhancement Project (RREP)ò, and JICA, based on an agreement, dispatched a team of experts at the beginning of April 2012 to commence the Project. This Project has a 3-year and 9-month term, during which it tries to respond to the needs of those vulnerable people, who were hit by drought, through the implementation of pilot projects, as well as tries to deliver guidelines on the development interventions of establishing resilience in drought prone societies.

1.4 The objective of this Project is to ñcontribute to enhancing the resilience for those people dwelling in drought prone areas such as southern parts of Oromia region and Somali region through a series of surveys/studies and implementation of pilot projectsò. Towards this objective to be fulfilled, there are five outputs that the Ethiopian counterpart organizations and the JICA Team shall achieve;

1) To clarify the positioning of this Project in relation to; i) the current strategies on the resilience enhancement by Oromia and Somali regions, ii) on-going government programs/projects, and iii) relevant donor assistance programs/projects,

2) To enhance resilience for the pastoralist and agro-pastoralist people and their societies in the pastoral dominant areas, for which pilot project of Component-1 with improvement of accessibility to water, livestock market establishment, livestock and pasture management is implemented in the Borena zone of Oromia region,

3) To enhance resilience for those people who were once pastoralist but now engaged in agriculture; namely, ex-pastoralists, for which Component-2 pilot project establishing irrigated agriculture is implemented in Gode area of Somali region,

4) To enhance resilience for those farmers who practice agriculture in the low rainfall areas of Oromia region, in which Component-3 pilot project targeting basically high-input-high-return oriented farmers is implemented, and

5) To present recommendations/suggestions on the enhancement of resilience for those target population based on the lessons learned through the implementation of pilot projects, whereby aiming at improving the current strategies and programs relevant to enhancing the resilience at both regional and woreda levels.

2. THE PROJECT AREA

2.1 The Project targets parts of Oromia and Somali regions. The former region, Oromia, encompasses vast area extending from central part of Ethiopia to Southern and South Eastern parts of the Country. In fact, Oromia is the biggest region in terms of both population and area coverage amongst Ethiopian 9 regions. The area spreads over about 350,000 sq.km while the population marks about 27 million, giving a population density of 77 persons/sq.km (2007 Census). Somali, one of the two target regions, is located at the Eastern direction of Oromia, covering 280,000 sq.km. The Somali region has about 5 million inhabitants, whereby only 18 persons as average reside in one-km square area.

2.2 There are 3 specific target areas by component as agreed in the RD. One is Borena zone where Component-1 activities are carried out. The zone is located at the most South Eastern part of Oromia region bordering Kenya at its southern edge. The zone is composed of total 13 woredas with 256 kebeles, of which 10 woredas are located in lowlands where pastoralists are the dominant population. According to the 2007 Census, population of the zone reaches 962,489 persons living in an area of 45,435 sq.km. The population density therefore comes to 21 persons per sq.km, which is quite low as compared to, for example, the Oromia region's average density of 77 persons/sq.km.

2.3 With regard to Somali region, there is a specific target area for the Component-2 pilot project implementation; the existing and to-be-irrigated farmlands in vicinity of Gode town, basically within a radius distance of 20 km. Irrigated agriculture promotion is piloted within the Gode woreda, utilizing water from the Wabe Shebele River. There are resettlement areas in the Shebele (formerly Gode) zone as well as in the Gode woreda given to ex-pastoralists, who had already quitted the pastoral lifestyle. Irrigated agriculture aims at providing new livelihood by means of irrigation to those settlers.

2.4 For the Component-3, which is weather index insurance promotion, the target areas are selected out of the small rainfall areas within Oromia highlands. It means that the target areas should basically come from some Eastern part to around mid part of the region. In fact, the most Eastern part of the region should be excluded for this insurance promotion pilot project since the area is so dry that potential insurance companies can hardy undertake the risks incurred by drought. Therefore, the target areas for the pilot project are primarily set to cover such zones of West Shewa, East Shewa and West Arsi spreading from Addis Ababa towards Western side, South Eastern side and Southern side respectively.

3. DEVELOPMENT CHALLENGES AND OPPORTUNITIES

3.1 GDP growth rate at constant prices for Ethiopia has been fluctuating very much between as low as minus 12% and as high as plus 12 % on an annual basis from 1980 to 2010. The standard deviation thus reaches as high as 7% while the average growth ratio is estimated at 4.7%. The annual GDP growth rate has sharply dropped in those years of 1985, 1992, 1998, 2003, which are all correspondent to drought. Thus, Ethiopian GDP has been affected by drought to a large extent.

3.2 Agriculture shares the most in the GDP composition in Ethiopia. Till year 1998, the share of agriculture GDP had been more than 50% as a matter of fact. Though the share of agriculture GDP has decreased year by year replaced by service sector GDP, it still shares more than 40% even at year 2011. This is the major reason why the national GDP has been so much affected by drought. When a drought takes place, agriculture production decreased leading to even negative GDP growth rate, a typical characteristics pertinent to Ethiopian economic growth.

3.3 GDP per capita had dropped to less than US$ 150 in 1993 from about 250$ in 1991 due to drought occurrences during 1990-1992. After year 1993, the GDP per capita hovered in the range of only US$ 100 to US$ 150 till year 2004, which is one of the least GDP per capita in the world. Then, the GDP per capita started growing to a peak of US$ 350 in 2009. During those years from 2004 to 2009, the GDP per capita in fact increased by more than 250% (US$ 138 to US$ 351). This continuous increase implies that should there have been no drought, Ethiopianõs GDP per capita could have been much higher than the present.

3.4 In Central Eastern Ethiopia where the target areas are located, average annual rainfall ranges from 600 to 1,000 mm with some exceptional years. Low rainfall amounts for drought years of 1977/78, 1984/85, 1993/94, and 2002/03 are noted in the rainfall records. The annual rainfall is very much fluctuated by year and it implies that the climate-induced risk in Central Eastern Ethiopia is mainly not only the scarcity in total annual rainfall but also the inter-annual rainfall variability and unpredictability of rainfall. However, on the long-term trend, there is no clear increasing or decreasing pattern for the annual rainfall across the Central and Eastern parts of Ethiopia.

3.5 In terms of temperature, there is an increasing trend across the regions. The increasing ratio per decade arrives surprisingly high at 0.5 to 0.8 degree Celsius. According to IPCC Assessment Report, there is a consensus that the temperature increase should be limited to less than 2 degree Celsius after the Industrial Revolution having taken place in 1760s. In fact, though, there is already about 0.6 degree Celsius increase since the Revolution to date. It means that if the temperature increases by more than 1.4 degree Celsius in coming years, there would be irreversible impact on the globeõs environment. Then, with the increase ratio recoded in the Central Eastern region of Ethiopia, the threshold year would come within about 30 years.

3.6 Historical documents reveal that more than 18 major drought episodes were registered in Ethiopia between 1900 and 2011. Leaving out many drought events, which happened long time ago; about 7 drought events were reported during the last 30 years alone. These major drought episodes include those happened during the years of 1983/84, 1991/92, 1999/2000, 2003/04 2005/06 and 2011. The drought of 1983/84 affected almost about 20 % of the then population. This was a case that the drought event coincided with widespread disease outbreaks, political instability and conflicts. The most recent crisis, which is the 2011 drought, is reported to have affected about 6 % of the population.

3.7 There have been continuous food relief beneficiaries in Ethiopia ranging from 1.36 million to as many as over 13 million people. Over the last 22 years recorded, there have been twice when more than 10 million people were supported by food relief; and 10 times when more than 6 million people were supported. It is also important to note that relief intervention had changed in Ethiopia since 2005 due to the introduction of PSNP. In fact, the actual needy figures become masked as PSNP appears to have begun to replace relief beneficiaries. The actual needy population for food relief may have exceeded 12 million for each year from 2008 through 2011, had it not been for the PSNP packages.

3.8 In order to reach the drought affected population with humanitarian aid, Ethiopia spends a lot of money every year. A report recently published by Tenna Shitarek and others indicates that drought has cost Ethiopia over US$ 509 million per annum in responding to its emergency crises in the last 10 years (2002-2011) alone (Tenna Shitarek and et al., 2012). On top of the US$ 509 million per annum, some donors e.g. USAID/OFDA provided assistance to whole Eastern Africa including Ethiopia, and with this addition Ethiopia's average annual emergency cost may come to more than US$ 732 million.

3.9 In predominantly pastoral areas of Oromia, Afar and Somali regions, for example, the 1983/84 drought that affected the entire pastoral areas created a tragedy that extremely hampered livestock growth in Borena by devastating calves with outsized mortality rate of 90% (Helland, 2000). Generally, due to mortality, slaughter and sales associated with drought of 1983/84, a 60 percent decrease in cattle population was reported from the worst affected parts of Borena. During the same drought, Afar region had experienced 72% decrease in cattle, 45% decrease in sheep, 35% decrease in goats and 37% decrease even in camels.

4. COMPONENT 1: BORENA ZONE

4.1 STATUS OF BORENA ZONE

4.1 Component 1 deals with Borena zone, Oromia region. In this zone, community-based projects and secondary livestock market construction are implemented. As a zonal administrative entity, the Borena encompasses the total area of about 45,435 sq.km (CSA, 2011), equivalent to approximately 200 km square area. Most areas of Borena lie below 1,500m altitude, especially in the Eastern part bordering Somali region and southern part bordering Kenya. It is an arid and semiarid area with pockets of sub-humid zones. Of the area, grazing/browsing land covers about 18,712 sq.km (41%), bush and woodland about 1,551 sq.km (3%), and cultivated land about 3,421 sq.km (8 %).

4.2 Borena is one of the areas in Ethiopia frequently hit by drought. Rainfall in Borena varies significantly both spatially and temporally. Particularly, the lowland areas are severely affected by recurrent droughts. The rainfall pattern is highly erratic. Rainfall in the area is bimodal with about 50% occurring in the long rainy season (*Gana*), which occurs from March to May, and about 30% occurring in the short rainy season (*Hagaya*) from September to November. The long dry season (*Bona*) occurs from December to February, and the short dry season (*Adolessa*) occurs from June to August in between the two rainy seasons.

4.3 The data from NMA indicates that currently the mean annual temperature of Borena marks around 21 degrees Celsius. The hottest period in the year is from January to March while the lowest annual temperature shows up between the months of June and August. However, fluctuation of the temperature is relatively moderate throughout the year in Borena. The average annual rainfall ranges between 592 and 984 mm by station with considerable spatial and temporal variability in quantities and distribution. *Gana* is more important rainy season than *Hagaya* in the area. On average, about half of the annual precipitation concentrates on 3 months, March to May.

4.4 According to the last census in 2007, the population of Borena zone was 962,489, sharing 3.6% only of the whole Oromia region's population. Given the total land area of 45,435 sq.km of Borena zone, the population density reaches 21 persons per sq.km. In addition, according to Finance and Economic Development Bureau of Borena zone, there is a population of 1,113,538 in 2012, which is increased by 116 % as compared with the last census population of 2007. The inter-annual population growth over the 5 years thus arrives at 3% per year. The 3% growth ratio means the population will double over the period of 24 years.

4.5 Borena zone's major livelihood is, no doubt, agriculture and livestock, and the latter part plays greater role especially in the lowland 10 woredas. Agriculture is dominantly practiced in the Northern 3 woredas of Abaya, Gelana, and Bule Hora. Those 3 woredas with high altitude are blessed with richer rainfall than the lower lands, whereby varieties of crops including coffee are cultivated. In the lowland areas, the people have been practicing pastoral lifestyle, and in recent years agriculture is sharing an ever important role, whereby so-called agro-pastoralists have been increasing.

4.6 In lowland areas, cultivated crops are maize, sorghum, wheat, barley, teff, haricot bean, chickpea, groundnut for local variety, and maize, sorghum, wheat and teff for improved variety, which are mostly short maturity and drought tolerant variety. The cropping season starts in mid March, soon after the long rainy season has started. In lowland area, not losing the cropping season, most crops are planted almost simultaneously after the onset of rain. Most crops are planted not only during long rainy season but also during short rainy season except for maize, sorghum and chickpea. Maize and sorghum need longer growing period, so that they can hardly be cultivated during the long rainy season only.

4.7 Per-capita crop production from year 2005/06 to 2008/09 averaged at only 42 to 77 kg for the lowland woredas and 77 to 149 kg for the whole Borena. In general, per-capita requirement for cereal is supposed to be around 150 to 200 kg per annum depending upon where the people reside and what dietary composition they access. From this general indicator, it is known that between 2005/06 and 2008/09 not only lowland area but also the whole Borena had been in shortage of cereals from the production point of view. In 2010/2011, there was a critical food shortage due to drought, when the production in the lowland was only 92 kg per-capita.

4.8 On the livestock number for the lowland 10 woredas, it is clearly understood that the number of cattle is far greater than the others, followed by goat and sheep, and then camel except for poultry. Number of cattle arrives at over 1.37 million heads for the 10 lowland woredas while numbers of goat and sheep are about 707,000 and 414,000 respectively as of 2012. It is also found that the average number of cattle per household could be about 13 heads, and those of sheep and goat are 4 and 7 respectively. Dugda Dawa woreda has the greatest number of cattle, which is about 300,000, followed by Yabelo, Teltele and Dhas woredas. The trend has been more or less the same except for the year 2010/11 when Borena zone was hit by drought.

4.9 There was livestock loss during 2010/11 drought including various diseases. During the 2010/11 drought, many cattle died reaching as many as about 131,000 losses, equivalent to about 13 % of the whole cattle before the drought. On the other hand, camel is very resistant to drought for which only less than 1% perished due to the drought. Zonal diagnostic veterinary laboratory indicated that major animal diseases in Borena zone are: Anthrax, Contagious Bovine Pleuro-Pneumonia (CBPP), Contagious Caprine Pleuro-Pneumonia (CCPP), Trypanosomes, Pest Petitis Ruminant (PPR), Foot and Mouth Disease (FMD), Black leg, Bovine and Ovine Pastereolosis, Lumpy Skin Disease (LSD), internal parasite (including Cysticircus Ovis) and external parasite.

4.10 Borena Zone is generally located within Genale river basin in its Northern part and within Dawa river basin in the southern part. Groundwater tables are generally deep in this area. Water scarcity therefore belongs to among the major critical problems in Borena pastoral areas. Ponds and *ellas* (shallow big traditional well in Borena) are the most important water source in lowlands of Borena zone. A great number of ponds, called *halo*, have been constructed, and 761 ponds are operational as of year 2011 according to the report by the Borena Zone Emergency Coordination Taskforce. Ponds are to collect rainwater, so that it tends to dry up towards the end of dry season.

4.11 On the other hand, *ellas* are supported by permanent source; either spring water or stable groundwater. *Ellas* are established by local communities on shallow aquifers. FAO carried out a survey on the *ellas* for the woredas of Arero, Dhas, Dire and Yabelo where there are relatively many number of *ellas*. The survey found out a total of 247 *ellas* from 14 sites (areas, or cluster of *ellas*) visited. Most of them are located in Dhas and Dire woredas. Dubluk, Borbor and Gorilie sites have very high numbers of *ellas* as compared to other areas.

4.2 PROJECT DESIGN FOR BORENA (COMPONENT I)

4.12 Participatory situation analysis with the purpose of feeding forwards into project planning started at the zone level. There followed woreda level workshops, and then community level workshops. The objectives were to; 1) learn about the Project, i.e. objective & outputs required, institutional setting-up, modus operandi, work schedule, etc., 2) analyze the situation of the areas from which the participants select key issues and rank, 3) analyze the problems the people are facing in the area, 4) identify best practices on the peopleõs resilience against the priority problems, and 5) identify priority development projects for them.

4.13 At the zone level workshop, a total of ten key issues were identified; crop productivity, water infrastructure, water shortage for livestock and human, bush enclosure, livestock marketing, etc. Upon this identification of the key issues, the participants went to the ranking in a scale of 1 to 5 for all the key issues. The scoring for the situation analysis was; 1) almost all the situation in the lowland woredas were very severe as indicated by many score-1s, 2) such woredas as Arero, Teltele, Dillo and Miyo did not have any more than score-2, indicating harder environmental situation in those woredas, and 3) particularly, the condition for the low scores attributed to the lack of water, and drought.

4.14 At the woreda level workshops, priority sectors were firstly identified by kebele level. The livestock sector was given the first priority by as many as 86 kebeles out of 151 lowland kebeles in total. Then, 47 kebeles ranked the crop sector as the top priority. With respect to the income sector, only 9 kebeles gave the 1st priority, while 8 kebeles gave the top priority to the health sector. From this counting, the livestock sector is given a very high priority for the 10 lowland woredas as expected, followed by the crop sector. The woredas, which gave higher priority to the crop sector than the livestock as a whole, are Teltele, Dugda Dawa, Dire, and Miyo.

4.15 During the woreda level workshops, three priority project approaches were also identified by kebeles. As was well expected, shortage of pasture was given the top priority by the highest number of kebeles (51 kebeles), followed by water shortage for livestock (24 kebeles for top priority), both of which fall under the livestock sector. Then, the workshop participants proposed priority projects with reference to the priority project approaches. What came first was bush clearing, to which as many as 41 kebeles gave the top priority, 12 kebeles did 2nd priority and 11 kebeles 3rd priority. Pond construction and/or pond & *ellas* rehabilitation came to the 2nd priority position as a priority project.

4.16 Problem analysis conducted at woreda level identified; 1) Under the livestock sector, 2 major issues were always raised; shortage of pasture and shortage of water, which were followed by livestock diseases, variety (species) deterioration, forced walking over long distance, etc., 2) Under the crop sector, there were more diversified problems than the area of livestock; which were shortage of water for crop, little use of improved seeds and fertilizers, infertile soil and/or deteriorating lands, mono-cropping, pest/disease infestation, poor extension services, soil erosion, etc., and 3) Under the income sector (or weak purchasing power), there were 2 main areas such that commodity prices were low whereby they could not get enough income, and cash saving culture not existent.

4.17 The Team further went down to community level workshops. The community workshops took one day each, and covered 4 communities. Problem analysis identified that 1) Major sectors they are interested are, as expected, livestock and crop, and health issues were raised with high priority in the 2 communities of Arero woreda. In these communities, participants claimed that livestock need to move long distance during the dry season, which is due mainly to the shortage of water whereby they have to move around searching for water. The water problem is also associated with the health sector, and therefore they raised the health sector as a priority issue. In Dhaka Araba community, Malka Soda woreda, crop issues were much raised since the people in this area practice substantial agriculture.

4.18 Pilot project, especially community based projects, during Phase I (Jan. 2013 - Sep. 2013) targeted such woredas as; Malka Soda, Yabelo, Arero, and Dhas, which have relatively less ethic conflict. Four PAs (kebeles) were selected from each of the 4 woredas, making the target PAs to be 16 in total. For the Phase II (Nov. 2013 to Oct. 2014), another 16 PAs were added from the 4 woredas of Phase I; and also from Teltele and Dillo woredas which were included as new woredas. Taking into account security condition, logistics arrangement, number of the PAs allocated per one woreda, etc., 2 PAs each were selected from the Phase I woredas of Dhas, Arero, Malka Soda and Yabelo, and 4 each from the newly added Teltele and Dillo woredas. There are therefore a total of 32 PAs for the pilot project implementation in Borena zone.

4.19 Major development challenges identified through a series of workshops are to ensure water and pasture during the dry season. In order to deal with these challenges, such development activities were planned for priority projects in Borena zone; 1) construction/rehabilitation of ponds/*ellas*, 2) rehabilitation and establishment of rangelands including fencing and bush clearing, 3) production of forage for the dry season, and 4) construction/ rehabilitation of infrastructure and buildings. In addition, farming would be one of the important livelihoods in Borena zone in future, and residue of crops can also be utilized as forage for livestock. Therefore, 5) improvement of dryland farming was planned as one of the components. In the end, 6) capacity development of government officers (DA and Zonal & Woreda expert/engineer) was planned.

4.20 In Borena zone, aside from above community based pilot projects, livestock market is also designed and constructed. Summing up all examination results, this Project plans to construct 2 secondary livestock markets; one each at Soda Town (center of Malka Soda woreda) and Elwaye (located in the West of Yabelo woreda, on the way to Teltele woreda). This is because; 1) A primary livestock market located at Elwaye (Yabelo woreda) near the proposed secondary site shows the greatest livestock dealing number on market day, and then followed by Malka Soda, 2) Primary markets in Elwaye and Malka Soda, located near the proposed secondary market sites, show very dense linkage with other primary markets, bush markets and areas from which pastoralists come for selling their livestock, etc.

4.3 PROJECT IMPLEMENTATION IN BORENA

4.3.1 COMMUNITY BASED PROJECTS (CBPs)

4.21 RREP basic approach of community based projects is that the JICA team supports the community activities initiated, determined and agreed by the communities rather than they participate in the projects planned by outsiders. Here, the ones who participate are the JICA team as well as government officers in charge. Therefore, the JICA team has firstly tried to identify communitiesô projects initiated or planned by their traditional units such as *olla, gare, rera* and *gosa*. Here, it is meant that the Team intends to facilitate and strengthen their own collaborative works, through which their sense of solidarity and also social ties are to be strengthened.

4.22 DAs are centered at the institutional setup for the project implementation. With the DAs deployed to the communities, major interventions from the JICA team are; 1) provision of hand tools, and 2) technical guidance. As for the hand tool provision, the tools provided are shovels, pickaxes, hand-carts, sledge hammers, nail hammers, axes, saws, rakes, machetes, hoes, diggers, and sickles. The Team distributed the hand tools to all the communities; namely to *gares* if already established or *ollas* (natural villages) in the target PAs directly. 22,880 tools in Phase I and 19,080 tools in Phase II, approximately 42,000 tools in total were distributed. Management and maintenance of the tools were entrusted to each community.

4.23 From November 2013 to October 2014, while all the 32 PAs of Phase I and Phase II were active, number of *gares* covered was 734 (see Table 4.1 below), and as many as 21,311 households participated and were benefited. Total number of activities had been around 400 depending upon the period, and the contents of the activities are; rehabilitation and construction of *haro* (pond) for human being, *haro* and Guji *ella* (pond) for livestock, Borena *ella* (well) for livestock, *kalo* (rangeland) management such as establishment of fences, rehabilitation of rangeland, farming mostly with irrigation, infrastructure such as road and bridge construction, and construction of buildings such as school, health post, etc. It is noted that all these activities are community based ones; namely no cash-for-work is applied.

Table 4.1 Summary of Community Based Projects for 32 PAs from Period III to Period V

Activities	Period III (Nov. 2013-Feb. 2014)			Period IV (Mar. 2014-Jun. 2014)			Period V (Jul. 2014-Oct. 2014)		
	No. of Activities	No. / Indicators		No. of Activities	No. / Indicators		No. of Activities	No. / Indicators	
Actual number of Gare		734			734			734	
Total No. of Participated Gare		1,548			1,923			1,279	
No. of Community Activities / Gare		2.11			2.62			1.74	
Actual Number of HHs		21,311			21,311			21,311	
Total Number of Participated HHs		42,727			52,852			37,211	
No. of Community Activities / HH		2.06			2.55			1.80	
1. *Haro* for Human Beings	129	23,292	m^3	111	39,158	m^3	100	16,692	m^3
Total excavated volume, m^3								79,143	m^3
2. *Haro* and Guji *Ella* for Livestock	123	21,991	m^3	93	38,783	m^3	99	23,093	m^3
Total excavated volume, m^3								83,866	m^3
3. Borena *Ella* for livestock	20	4,778	m^3	23	8,439	m^3	14	2,706	m^3
Total excavated volume, m^3								15,923	m^3
4. *Kalo* (Rangeland) Management	96	11,188	ha	133	18,595	ha	99	6,693	ha
5. Farming / Irrigation	5	34	ha	1	81	ha	3	12	ha
6. Infrastructure (Road / Bridge)	54	278	km	44	596	km	46	191	km
7. Construction (School etc.)	20	60%		9	20%		13	72%	
Total	447			414			374		

Source: JICA Project Team

4.24 Community people put high priority on water and then pasture, therefore they usually start *haro* rehabilitation/ construction for human beings and livestock first, and then move to rangeland (*kalo*) improvement. In fact, the share of water related CBPs (No. 1 to No. 3 activities in above table) is 58% of all the activities, followed by rangeland (*kalo*) rehabilitation and establishment with 27%. These water and rangeland related activities total as much as 85 % of the whole activities. On the other hand, the share of farming is only 1%, infrastructure related activities constitute 12%, and lastly construction did only 3%.

4.25 Since the CBPs are of continuous development activities, it is difficult to say how many projects have been completed. Instead, JICA team has followed up the change in their participation, for example, in terms of person-days they work. In fact, given tools and technical guidance, beneficiary communities have increased their collaborative works in participating of their community based activities dramatically. The rates of increase of Phase I PAs are 187 % and 247 % for the year of Period I to III (from March 213 to February 2014) and for that of Period IV and V (from March 2014 to October 2014) respectively over the before-the-project year (see Table 4.2 below). On the Phase II PAs, the increase over the before-the-project year came to 139%, which is lower than 187% of the first year's increment for Phase I PAs,. This may be attributed to the impacts of drought, which took place in 2014.

Table 4.2 Change of the Participation in Person-days over Periods

Year	2012	2012	2012/13	2013	2013	2013/14	2014	2014
Phase I PAs Period	Before Period I Mar - Jun	Before Period II Jul – Oct	Before Period III Nov - Feb	Period I Mar - Jun	Period II Jul - Oct	Period III Nov - Feb	Period IV Mar - Jun	Period V Jul - Oct
Total Person-days	83,283	33,349	99,648	95,397	113,627	194,571	138,303	149,712
Increase, %	-	-	-	**115%**	**341%**	**195%**	**166%**	**449%**
Increase, %	-	-	-	**187%**			**247%**	
Phase II PAs Period	-	-	Before Period III Nov - Feb	Before Period IV Mar – Jun	Before Period V Jul - Oct	Period III Nov - Feb	Period IV Mar - Jun	Period V Jul - Oct
Total Person-days	-	-	113,163	84,606	74,274	147,045	107,692	122,582
Increase, %	-	-	-	-	-	**130%**	**127%**	**165%**
Increase, %	-	-	-	-	-	**139%**		

Source: JICA Project Team

4.26 The trend of increase by type of activity may not be so clear; however it can be said that as time passes by, numbers of activities for infrastructure (mainly road rehabilitation) and construction (e.g. school construction, health post rehabilitation, etc.) increased. It is probably because water and pasture are more urgent than infrastructure and construction. At the same time, since these activities cover wider area and therefore need wider participation, there may be a tendency that the people start those activities after they have finished *haro, ella* and *kalo* which need smaller range of participation. It may therefore imply that as time passes by, their range of cooperation would become wider whereby their social ties becomes wider.

4.27 Participants for the final workshop conducted conventional 5-aspect evaluation. By aspect, it can be said that relevant and sustainability were given very high marks such as 4.7 each while efficiency and effectiveness by a bit lower marks such as 3.5 and 3.6 respectively. Since the RREP approach supports the people's ordinary activities, it would automatically entail high relevance and sustainability in line with what the communities have been doing on their own. It is also understandable that the evaluation on efficiency and effectives are a bit low, though they are still more than 3, because the RREP approach does not provide any cash.

4.28 In addition, the participants carried out comparison between RREP approach and conventional project approach, specifically in the context of cash-for-work. The result showed that the RREP approach is given high marks in terms of relevance and sustainability in comparison with cash-for-work approach as expected. In fact, some participants said that cash-for-work approach, especially carried out in pastoralist areas, would rather lead to weakening social ties or sense of collaboration, and thus result in lower relevance and sustainability. However, on the other hand, the evaluation result indicated that the RREP approach would perform less efficient and less effectively as compared with cash-for-work.

4.3.2 RANGELAND IMPROVEMENT

4.29 In parallel with the implementation of community based projects, a pilot project of pasture production has been implemented in relevant communities. This pasture development activity was carried out by the Team directly and also through woreda PDO offices. The Team together with woreda PDOs provided a series of training to the DAs and target communities, and distributed several varieties of forage seeds suitable to each of the target PAs. The DAs and target communities selected the sites for pasture production and determined types of the forage seeds to be tried.

4.30 In Phase I, it was estimated that the pilot activity covered a total of 404ha of rangeland and 264 communities (7,920 HHs), composed of 61ha and 343 ha with 49 communities (1,470 HHs) and 215 communities (6,450 HHs) for Team directly supported ones and woreda PDO office supported ones respectively. The activity in Phase II targeted 572ha and 502ha of rangeland for the team directly supported ones and woreda PDO office supported ones respectively. However, due to the drought having taken place in 2014 *Gana* season (main rainy season), the area covered by the Team came only to 177ha with 126 communities (3,780 HHs). For the achievement done by the PDO offices, the area was not recorded while the beneficiary communities who at least received pasture seeds reached 314 (9,420 HHs).

4.31 Through implementation of the pasture production pilot project, the Team identified such social related issues as lack of ownership leading to unattended pasture lands, late timing of sowing forage seed coupled with the time of searching water and pasture, weak agreement to close the areas sown which allowed cattle to graze, absence of male training participants and little collection of seeds. There were also technical related issues observed such as intensive rainfall (observed in Phase I) which partly washed away the sown seeds, shortage of rainfall (observed in Phase II) which negatively affected the pasture growth, excessive density of seed sown, etc. On the suitable forage varieties, Rhodes grass and Pigeon pea were found the most recommended ones in lowland areas of Borena zone. They are drought tolerant perennial grass/legume species and can be easily established.

4.3.3 DRYLAND FARMING IMPROVEMENT

4.32 A pilot activity of dryland agriculture improvement was also jointly implemented with community based projects. The Team organized a series of practical training of good agriculture practices together with distribution of improved varieties targeting agro-pastoralists and farmers in Borena zone. The target areas covered 22 PAs in 5 woredas of Yabelo, Arero, Dhas, Teltele and Malka Soda in Phase I and Phase II. 45 participants each were selected and registered beforehand per PA by DAs based on the agricultural experience, and motivation towards improving agriculture. A total of 903 agro-pastoralists (514 participants in Phase I and 389 participants in Phase II) participated in the training and received improved variety seeds.

4.33 Monitoring and evaluation of the dryland agriculture improvement activities were done by beneficiaries and DAs. According to the results, more than 60 percent of the beneficiaries employed deep plowing and early weeding method. On the other hand, the percentage of the beneficiaries applied intercropping was relatively lower than the others, e.g. less than 20% only. For Though intercropping of maize with haricot bean is common in other ethnic groups around Borena zone like Konso, Burji or Guji, it is still not well adapted among the beneficiary agro-pastoralists in this lowland area. For the line planting which is due required with improved seed introduction, the adaption in Phase I was low, only 33%, while the adaption in Phase II increased to 69% with intensive dissemination.

4.34 On advantage of the improved varieties compared to local varieties, all the participants answered that early maturing is the typical merit for maize (approximately 30 days and 2 weeks earlier for Melkasa-I and Melkasa-IV than local varieties). High productivity was the most advantageous point of the haricot bean (Nasir). Sweeter taste of maize and haricot bean was also considered as an advantage over local ones. Some agro-pastoralists said that they usually eat boiled maize with haricot bean; however they can eat the improved maize alone easily because of the sweet taste.

4.3.4 SECONDARY LIVESTOCK MARKET CONSTRUCTION

4.35 For the construction of secondary livestock markets, a pre-qualification and the tendering carried out from November 2012 to March 2013. Out of the 8 companies who received pre-qualification documents and submitted the required forms of the documents, 6 were allowed to participate in the tendering. Based on the bidding results, JICA Team agreed with 2 contractors, one for Elwaye market and the other one for Malka Soda market. The JICA Team concluded agreements with two contractors at the contract prices of 2,757,014 ETB and 2,737,585 ETB for the markets of Elwaye and Malka Soda respectively.

4.36 The site for the construction of Elwaye livestock market was handed over to the contractor on March 23, 2013. Most of the construction works for the Elwaye market had been completed by August 25, 2013. Based on the contractorǿs request, the JICA Team conducted temporary handing-over inspection at the presence of relevant government officers on September 9, 2013. The inspection finished successfully and provisional hand-over was accepted. After one year passed since the provisional hand-over, final inspection was conducted on September 30, 2014, and with minor repairs done, the Elwaye market was finally handed over to the Elwaye municipality.

4.37 The site for the construction of Malka Soda livestock market was handed over to the contractor on March 22, 2013, and the contractor started the construction works. Most of the construction works had been completed by mid September 2013. The JICA Team conducted temporary handing over inspection on September 21, and based on the result the site was temporarily handed over to the relevant government office. After one year, final inspection was conducted on October 24, 2014, and the final acceptance was agreed by the concerned officers with minor repairs.

4.38 After operation of the two markets started, it was found that the trading of livestock became much active in terms of increase of the service fees collection, the livestock dealing number as well as market participants as compared to before construction. Concerning Elwaye secondary market, weekly number of livestock sold, which was recorded at the most nearby primary market, was 483 (242 cattle and 241 shoats) on average before the construction of the secondary market, while the number recorded at the secondary market after it had started operation became 759 (453 cattle and 306 shoats). The increase was by 157 % for both cattle and shoat, consisting of 187% for cattle and 127% for shoats.

4.39 For the Malka Soda secondary livestock market, trading of livestock became much active like Elwaye market did. Before the construction of the secondary market, weekly number of livestock sold was 405 (126 cattle and 279 other animals) on average, which was recorded at the most nearby primary market. The number increased to 550 (289 cattle and 261 shoat) after the construction, which marks 136% as overall increase. The number of traded cattle per week became more than double, e.g. from 126 heads to 289 heads. On the other hand, that of shoat slightly decreased and kept almost at the similar level. Note that the figure of the shoat before the construction in fact included the numbers from other animals such as donkeys, therefore actual increasing rate of shoat could be more than that.

4.4 CONCLUSION

4.40 This Project, taking the points below into account, concludes that the RREP approach, tried out through the implementation of pilot activities in Borena zone, can be an essential means amongst measures in improving the peopleǿs livelihood currently at the mercy of unstable weather, especially droughts, and thereby enhancing the peopleǿs resilience against droughts. The Government of Ethiopia should therefore embark, at her own cost or with assistance from donor country(ies), on implementing and expanding the RREP approach over the drought prone Borena area as well as to other areas where similar natural conditions prevail.

1) The major intervention by the RREP approach is to provide only tools and technical guidance, with both of which the people accelerate their own community based development activities.

The approach does not provide any cash or subsidy in supporting their activities; namely, neither cash-for-work nor food-for-work is a part of the RREP approach. With this simple approach, it was found that the people have increased their participation in the communal development activities to 187% to 247% for the Phase I PAs (kebeles) undertaken in 2013 and 139% for the Phase II PAs in 2014. With the increased participation, their essential means of life, e.g. *haro* (pond), *kalo* (rangeland), *ella* (well), etc., have been rehabilitated and enlarged in a very sustainable way.

2) The RREP approach can, and if necessary, should be implemented supplementing other donorsô programs, which frequently follow cash-for-works. Cash-for-work, if applied in sound environment, can protect the people from falling into a vicious cycle of poverty. One thing noted here is that such people in due need of cash-for-work usually reside around township areas, e.g. just surrounding areas of kebele and woreda centers, because they are the people who have lost their livestock and no longer able to make livelihood in their rural village and accordingly, they have lost their traditional social ties and they have to rely upon daily wage labor. Cash-for-work, if any, can work on improving those peopleọs livelihood while the RREP approach can uplift the rural populationọs livelihood.

3) There are a great number of examples which enhanced the peopleọs resilience through the implementation of the RREP approach. For example, after the tools provision, a community worked very hard to reduce the problem of water shortage through *haro* construction and rehabilitation. As a result, three old *haros* were rehabilitated and one was newly constructed, and frequent movement for search of water was reduced. In another community, bush was cleared from their enclosed rangeland, and then pasture started regaining successfully, which enables to save the life of calves which are more vulnerable to pasture shortage. The movement in search of pasture also decreased. These examples are just a fraction of the stories realized on the ground, leading to enhancing the peopleọs resilience especially against drought.

5. COMPONENT 2: GODE IRRIGATION DEVELOPMENT

5.1 STATUS OF SHEBELE ZONE AND GODE WOREDA

5.1 The project target area is in Gode woreda, Shebele (formerly Gode) zone in Somali region. The Somali region occupies a large geographical area in the Eastern and South Eastern parts of Ethiopia. It lies between 4 -11^{o}N and 48^{o}E. It is bounded by Kenya and Somalia to the south, the Republic of Djibouti and Afar region to the North, Somalia to the East and South East and Oromia region to the West. This area falls under the arid and semi-arid agro-ecological and climatic zone. Its altitude ranges from 200 m in the South East to about 1,000 m in the North.

5.2 According to the Ethiopian Statistical Agency 2007 Census survey, Somali region accounts for 6 % of the overall population which takes account of 4.4 million. Somali region is divided into 9 administrative zones, and Shebele zone has 8 woredas, Gode woreda has 27 kebeles and such 8 kebeles (settlements) can been seen within the target area as; Degno, Kayane, Kunka, Barsan, Godiray, Badilaid, Hididole, and Ilan. It was identified that 20,800 of people live in those settlement areas, with the average population of 2,600 in each settlement. It was also found that there are on average 398 households in each settlement area with family size of about six people.

5.3 The project target area is located in Wabe Shebele basin. It is limited to the North by the Awash basin and the depression of the Rift valley, to the East by the Ganale Dawa basin and to the West by a desert region stretching to the Bay of Aden. Its total surface to the frontier of Somalia occupies about 202,220 km^2 and it is in fact the largest drainage basin in Ethiopia. In terms of land use, most of it is allocated for crop production as the crop production in Somali region constitutes 67% (76,668 ha) of the land use. On the other hand, fallow land, grazing land and other land use constitute the difference, i.e. 33%. Fallow land takes up 11.8% (13,542 ha), grazing land takes up 10.7% (12,231 ha) and other land use takes up the rest 10.4% (11,897 ha).

5.4 The local climate belongs to the equatorial semi-arid type climate, which provides high temperatures, e.g., mean temperature being about 30^{o}C, whereby drives high evaporation. It is characterized by annual rainfall of only about 260 mm distributed in two rainy seasons; the first is called ñ*Gu*ò between March to May and the second is ñ*Der*ò taking place between October to November. The annual rainfall decreases from the North West to the South East. Rain usually falls in a form of heavily localized storms, which form grey columns and are blown by strong winds. This is considered due to an effect by ñinter tropical convergence zoneò.

5.5 It was found that the majority of the settlers around Gode area are agro-pastoralists that take about 46% share, followed by almost pure farmers (about 40 %) and almost pure pastoralists (14 %). Likewise, on employment, a field survey has found out that a total of 1,153 people are employed in different forms for those 8 kebeles located within 20 km radius from Gode center. Thus, these employments are mainly geared towards agricultural laborer (45%), followed by pastoral laborer (24%) and construction laborer (19%). The survey has also identified 3,855 (19 %) unemployed person in the settlement areas.

5.6 Somali region is often considered as nomadic region, where the households are predominantly pastoralists. It constitutes a substantial share of livestock holdings, especially in selected livestock types like camels. According to the recent estimates of 2011/12 CSA, camel holding of the region amounts about 30 % (290,000) of the nation. Following camels, the regionõs main livestock holdings are goats and sheep, where for the year 20011/12 estimates they constitute 6 % (1.3 million) and 4.7 % (1.1 million), respectively of the national counts.

5.7 Agricultural production in Somali region is mainly characterized by the production of selected cereals including barley, maize, sorghum and wheat. Additionally, pulse like haricot bean, chickpeas and oil seeds like linseed and groundnuts and also some fruits are produced in the area. Chat production has also been undertaken consistently. The mere observation of the trend of production of the crops over the last three years indicates unstable trend of production, which possibly attributes to the recurrent drought in the area.

5.8 To assess the existing situation in the project area, two workshops were held at Gode town. The workshops were organized for irrigation beneficiaries and ex-pastoralists who are currently considered as non-irrigation beneficiaries. In the two workshops held, about 90 participants from the different eight kebeles attended. Problem analysis on the current irrigation schemes found that motor pump related problems, maintenance problems, fuel related problems, and machinery related problems are the major causes that resulted in low irrigated agriculture production. During the situation analysis, lack of motor pumps was mentioned as a primary problem by all schemes considered. Lack of fuel for motor pumps is also one of the three key problems of all the schemes.

5.9 On the non-current irrigation beneficiaries, the major problems are lack of access to irrigation, lack of experience in farming and livestock diseases in that order. Although they emphasized the problem of social services such as roads and transportation, those problems of: far distance from Wabe Shebele river and lack of high capacity water pumps indicate the need and interest of the workshop participants to engage in irrigation farming. The major mishap that commonly took place in the participant kebeles whose majority members are not beneficiaries of irrigation schemes is drought, untimely rainfall, locust damage, flooding and migration of community members across borders due mainly to drought.

5.2 DESIGN OF IRRIGATION SYSTEM

5.10 There are 7 candidate sites (kebeles) where irrigation scheme is to be established within 20 km radius from the Gode town. Note that due to security issue, the activity of the Project is limited within the radius. As the entry point of selecting the candidate sites, a situation analysis was carried out. Of the 7 sites, 2 were supported by FAO with a provision of pumps and one is as of 2013 supported by a national NGO putting up a pump irrigation system. Excluding the 3 sites, the Project has decided to select such 4 kebeles as; Godiray, Badilaid, Hididole, and Ilan for the irrigation scheme to put up. Two of the sites, Godiray and Badilaid, need mainly rehabilitation while the remaining sites need almost new construction.

5.11 Topographic surveys were carried out in June 2012 in order to examine the feasibility of gravity irrigation system for the selected sites. It was found that gravity irrigation in Gode area is not feasible to establish from the view point of; 1) it requires very long conveyance canal running over 20 km without giving any use along the reach, 2) it requires over 7 m excavation depth at the beginning of the conveyance canal, 3) both conditions for aforementioned 1) & 2) would raise the constriction cost over US$ 10 million as well as entail difficulties in operation and specially in maintenance due to sand and silt to be deposited in the canal. It was therefore concluded that the establishment of gravity irrigation scheme with a new diversion weir near Gode town is not feasible.

5.12 Therefore, it is necessary to select other irrigation method which is adaptable to the area. The options are; 1) Extension from the West Gode Irrigation Scheme via siphon on the Wabe Shebele river, and 2) Pump irrigation from the Wabe Shebele river. On the 2) pump irrigation option, there are further selections in terms of power such as diesel generator power driven, diesel engine direct connection, solar power operation, etc. This Project proposes the Option 2) pump irrigation with diesel generator power driven system. In fact, national grid power is supposed to arrive at Gode town by year 2015, after which the main power source can be sifted to the national grid whereby the generator system can be a stand-by.

5.13 JICA Team proposed 2.32 l/s/ha under 20-hour irrigation as the design water requirement. According to field surveys, 1.20 l/s/ha irrigation water is in most cases applied to irrigate an area, which is quite low as compared to the designed irrigation water requirement afore-mentioned. Here, field observations revealed that the crops irrigated were narrowly growing, indicating definite water stress in the field. It is therefore concluded that the above requirement, 2.32 l/s/ha under 20-hour irrigation should be applied in this Project as the design water requirement according to the design criteria provided by Crop Water Requirements No.24 FAO Irrigation and Drainage Paper.

5.14 It is designed that the standard unit irrigable area should be 100 ha with reference to the existing practices, for which we can find the present maximum irrigated area being approximately 100 ha. It is further designed that the 100 ha irrigation unit shall be divided into 4 sub-irrigation units, and if 4 pumps are to be provided for the irrigation system, each group can be responsible for emergency evacuation of each of the 4 pumps when hit by flood. In fact, the pumps are to be installed on the slope of the river bank where suction head can be kept within less than 7 meter. With this situation, the motors and pumps shall be evacuated to a higher ground free from the flood during the flood season. If the pump system is sub-divided into 4 units, they can be moved for evacuation by the beneficiary farmers manually.

5.15 A mix of basin and furrow surface irrigation is proposed for the project area. Basin irrigation is the simplest method for smallholders with little or no irrigation experience and is suitable for all crop types, including row crops, vegetables and orchards, except those crops that cannot stand a very wet soil for more than 12-24 hours. Besides the current beneficiary farmers in and around the Gode area are more familiar with this method. An important factor in irrigated agricultural development is dissemination of improved agricultural practices and technologies to the farmers. Dissemination of these improved agricultural technologies relies on the regional, zonal, woreda and kebele agriculture and rural development offices.

5.16 The Team has completed the basic design of pump irrigation scheme by September 2012. The Team had completed detail design and prepared for the bidding document by the end of February 2013. Scheme alignment starts from suction pipe, pump, delivery pipelines, discharge sump, main canal and field canals, and then field channels to be constructed by the beneficiaries, and on-farm irrigation. Pump is driven by motor powered by diesel generator. Dimensions of the facilities are more or less same among the 4 schemes. Total head of the pumps ranges from about 16 m to 19 m while actual head from around 14 m to 16 m by site. A Volute type pump is employed with a 20 KW motor per set. The length of main canal ranges from 1.6 km to 2.7 km by site while the total length of the field canal per site reaches 5.2 km to 6.2 km.

5.17 Cropping patterns should aim primarily at producing maize to surpass the own consumption per household, taking into consideration the fact that self-sufficiency of grain is yet to be attained. For cash crops, attention is given to sesame which has the highest reliability in marketing aspect at present. In addition, consideration shall also be given to other crops such as haricot beans, onion, tomatoes, etc. depending on changing situation of the market. In this Project, 1.0 ha each of irrigable farmland plot is distributed to each beneficiary household in accordance with a government policy. The 1.0 ha farmland given shall be divided into 4 sub-plots, to which different crops are to be introduced under rotational cropping patterns including fallow-plot in case.

5.18 After the completion of the construction works, the Gode woreda Livestock, Crop and Rural Development office will handle the irrigated agriculture related extension activities. Thus, in order to facilitate the dissemination process and information transfer for the improved agriculture aforementioned, one to three development agents (DAs) should be assigned by woreda Livestock, Crop and Rural Development office in each target kebele. The assigned extension workers, namely DAs, will be trained in irrigated agriculture as well as in the field of farmer organization establishment, and further responsible for the whole activities carried out in the project sites.

5.3 TENDERING AND CONSTRUCTION OF IRRIGATION SCHEMES

5.19 First bid tendering of Gode irrigation scheme was held on April 4, 2013 at the JICA Ethiopia office. The result of the tender opening was not successful, and therefore with some modifications on the design to reduce the construction cost, re-bid tendering was held on June 17, 2013. At the bidding, only one company offered the price below the ceiling price. Based on the evaluation by JICA team, contract negotiation was held on July 4, 2013. On July 19, both sides agreed and finally signed the contract of the Gode irrigation development project. The contract period was set from July 19, 2013 to March 5, 2014 (total 230 days), approximately 7.7 months.

5.20 Due to several issues, the construction has been much behind the schedule. Faced with the delay, the contractor, as instructed by the RREP team, has submitted 5 revised plans in total by the end of the contract period (March 5, 2014). The overall progress percentage of the 4 sites as of end of the contract period came only to 40%. By work item, the progresses were only 52%, 12%, 0% for construction work, procurement work, and installation work respectively. Accordingly, the contract period was extended by 4 months, so that the original contract deadline of March 5, 2014 was revised to July 5, 2014. Due to external factors on the delay, no penalty was enforced.

5.21 In spite of the extension of the contract period, however, the contractor could not complete the works by the revised completion date of July 5, 2014. The overall progress percentage of the 4 sites as at the end of the revised contract period of July 5, 2014 reached 81%, but still leaving 19% of the contract works unfinished. By work item, the progresses were 95.2%, 50%, and 0% for construction work, procurement work, and installation work respectively. As indicated, though construction came to completion stage, equipment such as pumps, motors, generators and pipes, etc. had not yet arrived at the sites, and accordingly installation work progress was nil.

5.22 Given much delay and also a contract breach for which the contractor did not obey the country of origin on the generators procured, the JICA office finally notified the contractor to complete all the works by the end of October 2014 including the replacement of the procured generators to new ones in accordance with the contract, or otherwise to terminate the contract. The contractor could not fulfill this instruction, and accordingly the contract was terminated at the end October 2014. The total progress percentage as of the end October 2014 came to 89.27%. By work item, the progresses were 96%, 78%, 0% for construction work, procurement work, and installation work respectively.

5.23 Concerning generators, a part of procurement works, the contractor proposed Cummins Power Generation UK C150D5. Regarding the technical specifications, this model was in conformity with the requirements specified in the technical specifications. However, the generators actually procured were not in accordance with the country of origin specified in the contract, and therefore the four generators procured were rejected. The JICA office ordered the contractor to replace them, and two of the four generators were replaced by genuine ones since there were two genuine generators available in a dealer in Addis Ababa. However, the contractor failed to procure the remaining two generators, and accordingly the two generators were cancelled from the contract. Instead, JICA Ethiopia office directly procured the remaining two generators.

5.24 Regarding the pumps and motors, there was no certificate of country origin issued by the chambers of commerce in Italy. The pumps were manufactured by CAPRARI; the motors were manufactured by SEIPEE and assembled by Green Power System s.r.l according to the information provided by the contractor. These companies have offices and factories in Italy. Therefore, the Team inquired Green Power System s.r.l whether the procured products were genuine by serial numbers of the products. According to the reply from them, all the products were found to be genuine products. Therefore, the pumps and motors were accepted.

5.25 After the termination of the contract with the contractor, the JICA Team started direct construction works to complete the remaining works. The construction works started on 11th December 2014 after preparation. The key works of remaining construction was pump and pipe installation work. During water running test in Ilan in March 2015, the embankment canal seriously collapsed at Division Box (DB) No.1 due to big water leakage underneath the DB. In order to avoid same problem at the other DBs in Hididole and Ilan, strengthening works for all the DBs, such as grouting to the foundation of DBs, cut-off concrete at edge of stone pitching were implemented.

5.26 On 23rd March, 2015 the Wabe Shebele River was flooding. At Godiray and Badilaid the pump facilities were evacuated safely; however, at Hididole and Ilan the pump facilities were submerged. The waterlogged motors were removed from the pumps, then washed by clean water, dried up, coated with grease and reassembled. Regarding the pumps, only oil for shaft was replaced. After finishing the maintenance, all the motors smoothly started functioning. From the lessons learnt from this flood, the way of evacuation has been changed from all pump facilities to only motors, and the access roads were paved with concrete and mechanical winches were also set for smooth evacuation.

5.27 All works had been completed until 25th July 2015, and final inspection was conducted and issues related to handover of the project schemes were discussed from 27th to 31st July 2015 by Ministry of Agriculture, Somali Livestock Crop & Rural Development Bureau, JICA Ethiopia Office and other concerning organizations. The quality of the schemes has been approved by the stakeholders. JICA Ethiopia office has launched procedures of the handover and finally, Ministry of Agriculture, Somali Livestock Crop & Rural Development Bureau signed the document on 14th August 2015 and thus the handover of the project schemes has been achieved.

5.28 The beneficiaries in Godiray and Badilaid had started the land preparation from the beginning of August 2015 after the final inspection under the strong leadership of the government. JICA Team provided 3,600 liters of fuel to each scheme to make a good start of the irrigation. The WUAs took into account the amount of fuel provided and irrigated 41ha of the farm land in Godiray and 38ha in Badilaid. It is estimated that when the four pumps are operated, it takes one and half hours to irrigate 1ha of farm land and consumes about 50 liters of fuel. The beneficiaries mainly have cultivated maize in the irrigated farmland. Some farmers showed an interest in intercropping sesame, haricot beans, etc. with the maize, which was introduced by a training. In addition, some farmers actually tried furrow irrigation and application of fertilizer learnt from the training.

5.4 BENEFICIARY SELECTION & INSTITUTIONAL DEVELOP'T

5.29 After having completed the registration of each household at the four sites, the JICA Team drafted criteria for selecting the beneficiary households. The criteria were; 1) farmers who are members of the kebele, 2) villagers who are unemployed (either self or the spouse) at present, 3) poor households, 4) the householdós head basically be in a range of aged 18 to 55 years, physically fit and potentially able to make productive use of the land allocated, and 5) farmers who show interest and willingness to make productive use of the farmland and to be a member of the water users associations to be organized. The criteria were approved by Gode woreda administration office.

5.30 The Gode woreda administration office established a committee consisting of 11 persons designated from GKIDP (Gode Kelafo Irrigation Development Project) office, LCRD (Livestock, Crop and Rural Development) office, Gode woreda cabinet office and rural kebele administration. The established committee selected 100 irrigation beneficiary households each per target kebele according to the criteria above-mentioned. The Gode woreda administration office approved the list of the beneficiaries selected, and finally collected the consent signs from all the villagers of the four kebeles in the list.

5.31 To organize the Water Users Association (WUA), the Team held consultative meetings as the first step inviting relevant government officers and kebele administration on 1st and 5th July 2014. Following this consultative meetings, four subsequent meetings were held with the communities in each of the target kebeles. During the meetings, the Team explained such issues as; 1) purpose of establishing the association, 2) how the association will/should be managed, 3) key responsibilities of the association, 4) major bodies (organs) of the association, 5) importance of management committee and other sub-committees under WUA, and how these committees would be formulated, 6) gender sensitive on the selection of management committee members, and 7) sources of finance of the WUA and its management mechanism.

5.32 After above explanations, the beneficiaries were asked to reflect on the issues raised and any other concerns they have. The participants said they were willing to have an association to manage the irrigation scheme, and further said they need development and they contribute whatever the project and the association demand for the completion of this project. Then, election of the members of the management committee was held, followed by the election of members of sub-committees, and in fact all the participants to the general assembly actively participated in the selection process in all kebeles. WUAs were thus officially established.

5.5 TRAINING FOR OFFICERS AND BENEFICIARIES

5.33 The JICA Team carried out training for the government officers and also for the beneficiary farmers. The government officers came from Jijiga regional office and also from the offices located in Gode town. The government officers were mainly composed of 1) irrigation expertise officers and 2) agriculture expertise officers including extension workers so-called DAs (development agents). The beneficiary farmers came from the four target kebeles, which are Godiray, Badilaid, Hididole and Ilan. The training was basically composed of in-house lecture type and also field practice. In fact, the construction site was referred to as a real practice arena.

5.34 The Team undertook three training sessions for government officers. The first training was held on May 17, 2013, and focused on technical aspects of how to design irrigation schemes with special emphasis on pump irrigation system. The second and third training sessions for governmental officers aimed at achieving sustainable operation of the irrigation facilities. Topics with respect to operation and maintenance of irrigation schemes as well as irrigated agriculture were undertaken in order for the government officers to support the irrigation beneficiary farmers. The second and third training sessions have been conducted in middle of April and late August 2014 respectively.

5.35 To introduce irrigated agriculture to the beneficiaries, the Team has provided three training sessions in 2014. The objective of the training was to teach basic irrigated agriculture knowledge and techniques to the beneficiaries of the irrigation schemes in order to make them start irrigated agriculture smoothly and continue. The training was carried out in May and June for the 1st session, August for the 2nd one, and October to December 2014 for the third training. The target participants were the entire irrigation beneficiaries. Due to the large number of the beneficiaries, same topics were undertaken twice per one site.

5.36 In order to show practical agricultural techniques to the beneficiaries, a 1.0 ha demonstration farm was prepared for each of the 4 irrigation sites. The demonstration farms were designed to show advanced irrigated agriculture techniques such as furrow irrigation, cultivation of feed crops, maize and haricot bean intercropping, Sudan grass and groundnuts mixed cropping, sesame cultivation with thinning method, introduction of onion as cash crop, etc. Irrigated agriculture needs more cost such as fuel, facility maintenance fee, etc. than rain-fed agriculture. Therefore, cash crops were introduced with higher priority in demonstration farms in order to sustain the high cost irrigated agriculture.

5.37 In order to make sure proper operation of the pump facilities, the team has provided three training sessions for the pump operators in February, July, and August 2015. Each WUA selected five pump operators. The 1st training covered a wide range of topics about how to operate the generators. The 2nd training focused on pump operation consisting of topics; 1) inspection on the facilities, 2) preparation for pump operation, 3) operation procedure, 4) assignment of the pump operators and their roles, and 5) cautionary instruction and handling errors. The training included on-site practical operation. The 3rd training was carried out to learn how to evacuate motors at flood.

5.6 CONCLUSION

5.38 Gode area is under extremely severe environment where food aid and other emergency assistance are continuously provided. On the other hand, Gode area maintains high development capacity for irrigated agriculture in terms of temperature, soil fertility and topographic condition coupled with the plentiful water resources from Wabe Shebele River, a perennial stream. The irrigation systems developed through this project provides a new type of livelihood, irrigated agriculture, for the beneficiary farmers. It is expected that approximately 100 households per site, totaling to 400 farmer households can benefit from a total of four irrigation systems.

5.39 Essentially, the project is to support beneficiary households to become independent from the food aid in the long run. To achieve this end, Ethiopian government and Somali regional government should promote irrigated agriculture in the area where requested by the people, especially for those who have lost their livestock due to droughts, and thus they can become independent fully from the food aid. In this regard, two major issues should be considered:

1) The irrigation schemes were handed over to Ministry of Agriculture (MOA) and Somali Livestock, Crop and Rural Development Bureau (SLCRDB) from Japan International Cooperation Agency (JICA) in August 2015. On 7th of December 2015, it was further handed over to Gode Kelafo Irrigation Development Project Office (GKIDPO) from SLCRDB. GKIDPO should maintain the structures for operation and management of the irrigation scheme at the Gode site level, so that the irrigation scheme will be used properly for the coming irrigation season starting from March 2016 as well as future operation .

2) Due to delay of the transfer of the irrigation schemes to the Gode site level, the irrigation schemes have not unfortunately been operated by GKIDPO during the project period. MOA, SLCRDB and Somali Basin Development Coordination Bureau, which are higher authorities of GKIDPO should give necessary technical support to GKIDPO, and must monitor and support GKIDPO until it will be able to operate and manage the irrigation schemes properly.

6. COMPONENT 3: WEATHER INDEX INSURANCE(WII)

6.1 PROJECT TARGET AREA SELECTION

6.1 WII is introduced to low and erratic rainfall highland areas in Oromia region. Therefore, the Team firstly selected five zones such as East Shewa, West Shewa, West Arsi, Arsi, and North Shewa for the potential target areas based on the interview results with the counterparts. Then, the Team proceeded to the selection of potential woredas from these zones based on the following criteria; 1) agricultural production conditions, 2) rainfall conditions, 3) environmental conditions, 4) capacity of agricultural cooperative unions or primary cooperatives (PC), 5) existence of weather station(s) proxy to the target woredas and also availability of the necessary data, and 6) WII experience.

6.2 Based on the information from Oromia Bureau of Agriculture, zonal / woreda agricultural offices, and relevant survey results, 20 woredas were short-listed, and potential of each woreda for the introduction of weather index insurance was examined based on the above-mentioned criteria. Five woredas in three zones; namely, Boset (East Shewa), Arsi Negele (West Arsi), Bora (East Shewa), Adami Tulu (East Shewa) and Ilfata (West Shewa), were finalized for the target areas of the Phase I (year 2013) WII introduction. Then, a series of ñworeda level situation analysis workshopsò were conducted in September and October 2012. As a result, 15 kebeles in the 5 woredas were identified as pilot kebeles for the Phase I (year 2013) WII implementation.

6.3 Expansion of the target areas is a key factor for ensuring the sustainability of the WII program. Since the target of selling WII policy is ñindividualò farmers, not organizations or groups, benefit that the insurance company can get from each individual farmer is quite limited. In addition, risk hedge for the insurance company becomes difficult if the activity areas remains limited, and therefore, insurance company which sells WII product intends to expand the areas for their own business risk hedge. The JICA Team, therefore, expanded target areas up to 45 kebeles in Phase II (year 2014) and follow-up Phase (year 2015) by selecting kebeles adjacent to the Phase I targeted kebeles for ensuring the sustainability of WII promotion activities.

6.4 In the Phase I, three kebeles were selected from each of the target 5 woredas equally, while the number of the kebeles from the woredas of the Phase II was decided through the discussion with the Oromia Insurance Company (OIC), which is the partner insurance company in this WII promotion pilot project, with reference to the result of the 1st year experience. For example, take-up rates of the target kebeles in Adami Tulu woreda exceeded 30% in the Phase I implementation, showing higher possibility for further sales. Twelve kebeles were therefore identified as higher potential kebeles for the Phase II implementation in addition to the existing Phase I target kebeles in Adami Tulu woreda. Thus, another 30 kebeles were added, totaling to 45 kebeles for the Phase II implementation.

6.5 The WII promotion was conducted in the 3rd year of the Project as the follow-up phase. Target areas of the follow-up phase were exactly the same areas as the phase II; namely, 45 kebeles in 8 woredas. One of the main reasons of this selection is that many DAs, woreda officers, and key farmers in these target areas already learned about the WII product and experienced in a WII promotion activity from the phase II. It was easier for the insurance company to promote the WII product in such areas.

6.2 WEATHER INDEX INSURANCE (WII) DESIGN

6.6 The main key players in WII promotion are; 1) an insurance company, 2) intermediaries, and 3) DAs (Development Agents). The insurance company plays the role of risk taker and designs insurance products, while intermediaries such as agricultural cooperative unions and/or MFIs (microfinance institutions) collect premium and distribute payout to the farmers who purchased the policies. DAs are to raise farmersôawareness for agricultural risk management and to introduce the basic concept of the WII to the farmers.

6.7 OIC (Oromia Insurance Company S.C.) was selected as the local risk taker. The main reason of selecting OIC was that OIC is one of the most experienced insurance companies with regard to WII. Furthermore, their main shareholders are agricultural cooperative unions, so that they have a strong relationship with the agriculture sector. OIC has a big potential advantage for delivering the WII product to rural areas through the agricultural unions. The coverage area of the OIC is Oromia region and this is also preferable for the pilot project implementation. Besides, reinsurance is an important arrangement for the local insurance company. OIC decided to deal with Swiss Re, which is one of the leading reinsurance companies in the world.

6.8 There are five main steps to develop the WII product; namely, 1) data gathering, 2) focus group discussion with the target farmers, 3) analyzing past drought years, 4) quality checking of the data and product development, and 5) pricing and marketing. For simplicity of marketing the WII product and also communication with farmers, the JICA Team made the price of the product same in all target kebeles. One policy was set at 100 birr, and the maximum payout was designed at 5 times of the policy; namely, if a farmer purchases one policy, he/she can receive maximum 500 birr depending on the payout frequency. To account for differences in drought frequency, severity, and difference in past rainfall patterns, rainfall triggers and exits were set differently by kebele.

6.9 WII related projects frequently remained stuck in their pilot stages due to the high cost (and technical impossibility) of acquiring additional ground-based weather station data with sufficient quality and historical longevity to be useful for designing insurance index. Typically, reinsurance arrangement requires 30 years of data, which are seldom available in African rural areas. The RREP WII products were therefore developed with satellite data only. The use of freely available ARC2 satellite rainfall data with 30 years data history allows the weather indices to be tailored to each of the target kebeles without the need for expensive or tamper-prone ground-based weather stations.

6.10 The payouts will be based on rainfall data as measured by the satellite, the ARC2 from the United States National Weather Service, for the latitude and longitude of each kebele. This type of satellite rainfall information has been adjusted according to an algorithm based on historical ground station data in order to increase accuracy. In each weather index, rainfall is capped at a maximum of 10mm per day. This is to provide extra protection against lengthy dry spells and to eliminate the scenario where one large rainstorm could overwhelm the weather index and cancel a possible payout in an otherwise drier than normal season.

6.11 Based on the interview results with farmers, the Team has chosen to offer insurance for such coverage period as; 1) the planting phase, and 2) the flowering phase. The dates of insurance coverage for each kebele were set differently since each kebele receives different rainfall and has different historical drought patterns. The amount of rainfall needed to trigger a minimum payout is also different for each kebele ï depending on the respective historical rainfall patterns of each kebele. The maximum payout (exit) was set to the most severe historical drought event, which has occurred in the last 30 years. During the contract window, the insurance company, OIC, uses satellite measurements to count the rainfall.

6.3 WEATHER INDEX INSURANCE (WII) IMPLEMENTATION

6.12 To promote WII effectively and efficiently, the JICA Team conducted training for both the DAs and the intermediaries. The purpose of the training is to strengthen capacity of the DAs and the intermediaries in conducting awareness creation. One of the key findings from the training is that the WII is still complicated for the DAs, the intermediaries, and farmers. They need to understand the terms ñTrigger Pointò, ñExitò, and ñCapò to calculate the payout amount properly. These are unique technical terms only for index insurance and usually they are not familiar with these terms. In addition, there was a big capacity gap among the intermediaries. This is because some of the intermediaries already have experience in implementing WII project, but some others do not have any experience.

6.13 One of the most frequently asked questions by the farmers during the awareness creation meetings was about the premiums. Many farmers asked the DAs and the intermediaries if the insurance company will return the premiums to the farmers in case that there is no drought. Also, some farmers frequently asked if premiums will be transferred to the next year if there is no payout in the year. These questions indicate that most farmers are not familiar with insurance services in general. The DAs and the intermediaries had to emphasize that the insurance company would never pay back their premiums if there is no drought.

6.14 Another frequently asked question was how the insurance company measures damage on crops. This question also indicates that farmers have difficulty in understanding the WII. The RREP WII product is designed based on the satellite weather data and OIC monitors the rainfall amount which is estimated by the satellite only. OIC does not measure damage on crops on the ground either, but simply monitor the rainfall amount based on the satellite data. The basic concept of weather index insurance is simple; however, it turned out to be difficult for the farmers to understand how the insurance company can decide whether they give payout or not without measuring damage.

6.15 Following table shows the summary of the WII sales of Phase I implementation. The number of registered farmers reached up to 1,286 farmers with 146,350 birr premiums that the farmers paid. The overall average premium amount per farmer household was 114 birr. This means that most farmers purchased the WII with the minimum premium amount; 100 birr. The largest number of registration was 535 farmers in Adami Tulu woreda. The take-up rate in Adami Tulu reached more than 30% of the total households estimated in the target kebeles. One of the reasons behind this was that Meki Batu Cooperative Union, the intermediary in Adami Tulu woreda, was a very active and large cooperative Union in that area.

Table 6.1 Summary of the WII Sales for Phase I Implementation

Zone	Woreda	Kebele	Estimated Farmer HHs	No. of Insured Farmers	Take-up Rate (%)	Insured Amount (Birr)	Average Premium/ HH (Birr)
East Shewa	Boset	Borchota Buta Wagare Gari	2,319	136	5.9%	20,800	153

Zone	Woreda	Kebele	Estimated Farmer HHs	No. of Insured Farmers	Take-up Rate (%)	Insured Amount (Birr)	Average Premium/ HH (Birr)
	Bora	Dalota Mati	1,521	125	8.2%	14,900	119
		Tube Suti					
		Bite Daba					
	Adami Tulu	Walin Bula	1,650	535	32.4%	56,900	106
		A/Germama					
		G/W/Boramo					
West Arsi	Arsi Negele	Alge	2,745	318	11.6%	32,950	104
		Mudi Arjo					
		Shala Bila					
West Shewa	Ilfata	Sato Luku	2,230	172	7.7%	20,800	121
		A/Godeti					
		H./Sendi					
Total			**10,465**	**1,286**	**12.3%**	**146,350**	**114**

Source: JICA Project Team

6.16 For the Phase I WII implementation, the insurance contract period for the planting phase covered from April to June in most kebeles. The triggering rainfall millimeters were set ranging from 25mm to 72mm. The rainfall amount in the planting contract period was beyond the triggering amount in all the kebeles. Hence, there was no payout at all in the beginning of the 2013 season. In fact, comparing the actual rainfall amount with 10mm daily cap and the trigger millimeters, the actual rainfall amount was more than double in the 8 kebeles out of the target 15 kebeles of Phase I. This indicates that there was enough rainfall between April and June in most of the target kebeles.

6.17 For the flowering stage of Phase I WII implementation, the insurance contract covered from August to October in most kebeles. The triggers were set between 22mm to 77mm during this flowering phase. The insurance was not triggered in the flowering phase either. The actual rainfall amount overtook the triggering millimeters in all the kebeles. However, the actual rainfall amounts in some kebeles were very close to the triggers. For example, in Sato Luku and Hidabu Senti kebeles of Ilfata woreda, and Abine Germama kebele of Adami Tulu woreda, there were only around 10mm gap between the actual rainfall amounts and the triggers. From the results of both planting and flowering phases, there was enough rainfall in the target kebeles in the 2013 season as a whole.

6.18 For the Phase II WII implementation, the number of insured farmers reached 5,623 as shown in the following table. The take-up rate is approximately 20% of the total estimated farmer households in the target areas. This take-up rate is far higher than the take-up rate in the Phase I with around 12%, Collective sum insured amount is 572,500 birr, and this is almost 4 times as that of the last season with 146,350 birr. The overall average premium amount per farmer household was 102 birr. This means that most farmers purchased the WII with the minimum premium amount; 100 birr, which is similar tendency of that of Phase I farmers.

Table 6.2 Summary of the WII Sales for Phase II Implementation

Cooperative Union	Woreda	No. of Target Kebeles	Estimated Farmer HHs	No. of Insured Farmers	Take-up Rate (%)	Insured Amount (Birr)	Average Premium/ HH (Birr)
Meki	Adami Tulu	15	9,989	2,250	22.5%	229,300	102
Bora	Bora	5	2,263	447	19.8%	46,800	105
Lume	Boset	5	3,148	569	18.1%	57,900	102
Uta	Arsi Negele	10	6,571	1,201	18.3%	120,100	100
Ambo	Ilfata	3	2,163	97	4.5%	10,100	104
	Dano	3	1,918	605	31.5%	62,900	104
Becho	Dawa	2	1,679	231	13.8%	23,100	100
	Elu	2	1,231	223	18.1%	22,300	100
Total		**45**	**28,962**	**5,623**	**19.4%**	**572,500**	**102**

Source: JICA Project Team

6.19 For the Phase II WII implementation, the insurance contract period for the planting phase covered from March to June for maize and sorghum, and May to July for teff. The triggering rainfall millimeters were set ranging from 25mm (Gari in Boset woreda) to 74 mm (Galefi Kelo in Arsi Negele woreda) for maize and 118 mm (Keta and Kule Gefesrsa in Elu woreda) to 199 mm (Nano Gabriel in Dawo) for teff, respectively. The total rainfall amounts in the planting contract period in 8 kebeles were below the triggering amounts. Therefore the 8 kebeles are entitled to receive a payout. As for the flowering stage, total rainfall amounts in all 45 kebeles showed more than the triggering amounts. Difference from the triggering amount varied from 117% (Buta Wegere kebele in Boset Woreda) to 466% (Welinbula kebele of Adami Tulu woreda).

6.20 Although there were 8 kebeles, for which total rainfall amounts of the contract periods were below the triggering amounts, many other farmers showed strong anxiety about the small amount of rainfall in the year 2014. OIC conducted field observations and found that a total of 29 kebeles indicated ñsparsely populatedò, ñwiltingò, and ñfailed to germinateò in 2014 seasonôs agriculture mainly because of untimely rainfall or shortage of rainfall. OIC decided to make a payout for these 29 kebeles inclusive of the 8 kebeles for the planting phase. In order to simplify the procedure, the payout amount was not calculated by each kebele separately, but OIC decided to pay for the insured farmers 50% of the sum-insured equally and discharged 773,250 birr in total.

6.21 For the follow-up phase, the number of insured farmers reached 2,845 farmers in total. These insured farmers account for 9.8% of the total households in the target area. The highest take-up rate reached 21.0% in Elu woreda; whereas the lowest take-up rate was 5.8% in Adami Tulu woreda. Collected premium came up to 313,500 birr in total. The total average premium per farmer is just 10 birr over the minimum premium: 110 birr. The highest average premium was 124 birr per farmer in Adami Tulu and Arsi Negele woreds; yet, it is still just around 100 birr in the most woredas.

Table 6.3 Summary of the WII Sales for the Follow-up phase

Woreda	Union	No. of Kebele	No. of Estimated HH	No. of Insured	Take-up Rate	Total Premium (birr)	Average Premium (birr)
Adami Tulu	Meki Batu	15	9,989	577	5.8%	71,600	124
Bora	Bora Denbel	5	2,263	400	17.7%	40,600	102
Boset	Lume Adama	5	3,148	450	14.3%	45,000	100
Arsi Negele	Uta Wayu	10	6,571	511	7.8%	63,400	124
Ilfata	Ambo	3	2,163	232	10.7%	23,200	100
Dano	Ambo	3	1,918	250	13.0%	25,000	100
Dawa	Bacho Waliso	2	1,679	167	9.9%	17,500	105
Elu	Bacho Waliso	2	1,231	258	21.0%	27,200	105
Total		45	28,962	2,845	9.8%	313,500	110

Source: JICA Project Team

6.22 One of the most severe rainfall shortage areas is Arsi Negele woreda in the 2015 planting season. The rainfall amounts of the four kebeles in Arsi Negele were below their triggering amounts; Gale fi Kelo, Rafu Haragesa, Gubata Arjo, and Hada Bossa kebeles. In these four kebeles, the rainfall amounts were around 10 mm to 15 mm below the triggering amounts. As such, if the insurance contract had covered the planting season, insured farmers in these kebeles could have gotten the payouts of approximately 240 birr to 330 birr. In addition, the rainfall amounts of the other six kebeles in this woreda were also close to the triggering amounts. Thus, farmers in Arsi Negele woreda seemed to have suffered from rainfall shortage the most among the target woredas.

6.23 The rainfall amounts in the flowering period were rather low throughout the target woredas. Particularly, Arsi Negele woreda got the small amount of rainfall just same as the planting season. In fact, there are 10 target kebeles in Arsi Negele and half of the target kebeles triggered payouts. Three kebeles out of these five kebeles triggered payouts even in the planting season. This situation shows that farmers in Arsi Negele suffered from shortage of rainfall throughout the season in 2015. The average gap between the rainfall amounts and the trigger amounts in these five keeles was around 13 mm and the average payout amount reached approximately 360 birr with one policy.

6.4 CONCLUSION

6.24 This Project, taking the points below into account, concludes that the Weather Index Insurance (WII), tried out through the implementation of pilot project, can be a very essential mean amongst remedial measures in improving risky agriculture being practiced under meager and erratic rainfall, especially in drought prone areas, and thereby enhancing the rural resilience against droughts. The Government of Ethiopia should therefore embark, at her own cost or with assistances from donor country(ies), on implementing and expanding the WII program over the drought prone agricultural areas of the Country wherever there are needy farmers:

1) There are a great number of farmers who need a mean of making risk-hedge over their unstable rain-fed agriculture very much affected by meager and fluctuating rainfall. The Phase I pilot project had enrolled 1,286 farmers in 15 kebeles while the Phase II pilot project did 5,623 farmers in 45 kebeles. Also, the follow-up phase enrolled 2,845 farmers even in the limited time of period in 45 kebeles. With this just 3 years trial, it was found that there are lots number of farmers who need such WII to protect their unstable rain-fed agriculture from small rainfalls, especially from droughts.

2) The WII pilot project tried under RREP has not introduced any subsidy for the farmers to buy WII policy, 100 birr per policy, meaning that those farmers who were insured had paid the premium out of their pockets. It is therefore found that WII could go as one of business models run by a private insurance company. It is, however, noted that the first time promotion at rural agricultural areas would need logistics supports including capacity building trainings from outside since such burden could go beyond a private companyös financial capacity.

3) Farmers voices endorse the need of WII quoted as; ñIf we are not buying WII, we cannot get chance to be paid even if we face drought. And, even if there is no payout in our kebele, the money we paid will be used for other farmers in other areas that faced difficulty than us. So I will continue to buy.ò, ñIf we donöt face any rainfall problem, no money will be paid for us because we can harvest good produce instead. And, if we can get payout, we do not have to resort government aid anymore, able to standò.

CONTENTS

COMPSITION OF THE REPORT

MAIN REPORT (ENGLICH, JAPANESE)

APPENDIXES (ENGLISH)

TECHNICAL MANUALS FOR COMMUNITY BASED PROJECTS IN BORENA ZONE

TECHNICAL MANUALS FOR IRRIGATED AGRICULTURE IN GODE AREA

LOCATION MAP OF THE PROJECT AREA

EXECUTIVE SUMMARY

CONTENTS

ACRONYMS AND ABBREVIATIONS

ACM	Awareness Creation Meeting
ADB	African Development Bank
AIC	Africa Insurance Company
CBPWD	Community Based Participatory Watershed Development
CCE	Crop Cutting Experiment
CFSTF	Community Food Security Task Force
CIDA	Canadian International Development Agency
DFID	UK Department for International Development
DPPFSC	Disaster Prevention and Preparedness and Food Security Coordination
DA	Development Agent
DRM	Disaster Risk Management
DRMFSS	Disaster Risk Management and Food Security Sector
DRMWG	Disaster Risk Management Working Group
EFSRA	Emergency Food Security Reserve Administration
EIA	Environmental Impact Assessment
EIC	Ethiopia Insurance Corporation
EPA	Environmental Protection Authority
EVI	Enhanced Vegetation Index
EWRCP	Early Warning Core Process
EWS	Early Warning System
EWTF	Early Warning Task Force
FMTF	Food Management Task Force
FRG	Farmers' Research Groups
FSCD	Food Security Coordination Directorate
FSP	Food Security Programme
GKIDPO	Gode Kelafo Irrigation Development Project Office
GOE	Government of Ethiopia
GoPARI	Gode Pastoral and Agro-Pastoralist Research Center
ICT	Information Communications Technology
IFPRI	International Food Policy Research Institution
ILRI	International Livestock Research Institute
IRI	International Research Institute for Climate and Society at Columbia University
JICA	Japan International Cooperation Agency
LCRDO	Livestock, Crop and Rural Development Office of Gode woreda,
LAFCU	Lume Adama Famers' Cooperative Union
M&E	Monitoring and Evaluation
MDG	Millennium Development Goal
MFI	Microfinance Institution
MOWR	Ministry of Water Resources
MOA	Ministry of Agriculture
MOFA	Ministry of Foreign Affairs
MOFED	Ministry of Finance and Economic Development
MOLSA	Ministry of Labor and Social Affairs
MPCI	Multiple Peril Crop Insurance

NGO	Non-Government Organization
NISCO	Nyala Insurance Company S.C.
NMA	National Meteorological Agency
NRMCP	Natural Resource Management Core Process
NRMD	Natural Resources Management Directorate
OCSSCO	Oromia Credit and Saving Share Company
OIC	Oromia Insurance Company S.C.
OPADC	Oromia Pastoral Area Development Commission
PSNP	Productive Safety Net Programme
PRSP	Poverty Reduction Strategy Paper
PWCU	Public Works Coordination Unit
PWFU	Public Works Focal Unit
PWJTC	Public Works Joint Technical Committee
PWSG	Public Works Support Group
PWTC	Public Works Technical Committee
RREP	Rural Resilience Enhancement Project (this Project)
SNNP	Southern Nations, Nationalities and Peoples (Region)
SoRPARI	Somali Region Pastoral and Agro-pastoral Research Institute
TOT	Trainers of Training
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WFP	World Food Programme
WFSD	Woreda Food Security Desk
WFSTF	Woreda Food Security Task Force
WII	Weather Index Insurance
WNRMD	Woreda Natural Resources Management Desk
WOARD	Woreda Office of Agriculture and Rural Development

GLOSSARY

Belg: The small rains of the highlands falling from February through May, referring to the second most important sowing season of the region.

Meher: The long rains of the highlands falling generally from June to September, providing the main agricultural season.

Gana: The long rains of the Borena zone falling generally from February to May, providing the main agricultural season. It is called *Gu* in Somali region, especially in Gode area.

Hagaya: The small rains of the Borena zone falling generally from September to November, providing the second important agricultural season. It is called *Der* in Somali region, especially in Gode area.

Gada system: It is an Oromo term used to refer to a system making groups/persons (invariably males) of the same generation (rather than age) into sets. The sets are ordered hierarchically and assigned a range of social, military, political, and ritual rights and responsibilities. Generation-set systems are found in varying forms among the Oromo and other groups, e.g., the Konso and Sidama.

Kebele: It is the smallest unit of local government in Ethiopia (highland area), equivalent to a part of woreda.

PA (Peasant Association): It is the smallest unit of local government in Borena zone, same as Kebele in highland area, equivalent to a part of woreda.

Woreda: A woreda is an administrative division in Ethiopia (managed by a local government), equivalent to a district with an average population of approximately 100,000. Woredas are composed of a number of kebeles, or neighborhood associations.

Ethiopian calendar year: The Ethiopian year consists of 365 days, divided into twelve months of thirty days each plus one additional month of five days (six in leap years). Ethiopian New Year's falls on September 11 and ends the following September 10, according to the Gregorian (Western) calendar. From September 11 to December 31, the Ethiopian year runs seven years behind the Gregorian year; thereafter, the difference is eight years.

Ethiopian fiscal year (EFY): Based on the Ethiopian calendar year, it corresponds to July 8 to July 7, seven years behind the Gregorian (Western) calendar through December 31, and eight years behind thereafter.

CURRENCY EQUIVALENTS (AS AT JANUARY 2016)

1 US$ = 20.878 Ethiopian Birr (TTB)
1 US$ = 120.30 Japanese Yen (TTB)
1 ETB = 0.0505 US$
1 ETB = 5.762 Japanese Yen
1 Japanese Yen = 0.1811 ETB

ETHIOPIAN FINANCIAL YEAR

July 8 to July 7

UNIT CONVERSIONS

1 meter (m)	=	3.28 feet
1 kilometer (km)	=	0.62 miles
1 hectare (ha)	=	2.47 acres
1 acre	=	0.405 ha
1 foot	=	12 inches (30.48 cm)
1 inch	=	2.54 cm

LIST OF TABLES:

PART I INTRODUCTION AND OVERVIEW

PART II COMPONENT I (BORENA ZONE, OROMIA)

PART III COMPONENT II (GODE ZONE, SOMALI)

LIST OF FIGURES:

MAIN
REPORT

PART I
INTRODUCTION AND OVERVIEW

CHAPTER 1 INTRODUCTION AND PURPOSE

Submitted herewith is the Final Report compiled according to the Record of Discussions (RD) on "Rural Resilience Enhancement Project (the Project)" signed between the Ethiopian authorities of Ministry of Agriculture (MOA), Oromia Bureau of Agriculture and Somali Livestock, Crop and Rural Development Bureau, and the Japan International Cooperation Agency (JICA) on 28th March, 2012 and the attached relevant documents.

This final report covers all the issues that the JICA team has undertaken since the inception of the Project up till the completion. The issues incorporated in the report are introduction and purpose of the Project, implementation arrangement and modus operandi of the Project, development challenges and opportunities related to the Project components, results of situation analysis of the Project area, and design, progress, outputs and lessons learnt for the pilot projects, and conclusion and recommendations.

1.1 Rationale of the Project

South-eastern and Eastern parts of Ethiopia fall into so-called the Horn of Africa where there is only meager rainfall presenting arid and semi-arid landscape. Droughts have taken place so far, resulting in acute food shortage. The area is one of the really vulnerable areas in the world. The Ministry of Agriculture, Ethiopia, together with development partners reported that as many as over four and half million population fell into food crisis due to the prolonged drought having taken place in 2010/2011. Of them, about 80% live in southern parts of Oromia region and also in Somali region where low altitude landscape prevails.

In the southern parts of Oromia region, people have been facing drought frequently taking place, leading them to much more vulnerability than ever before. As dry season goes into its mid to end term, presenting severer environment, people have no way but have to move around and move far away from their homestead looking for water and pasture. Under this situation if once they are hit by drought, they tend to scramble on the precious resources; water and pasture, leading to conflict especially amongst different ethnic groups.

In Somali region, natural environment is harsh as represented by little rainfall, scorching temperature and whereby desert like landscape. In this area, therefore, people are always at risk. The people are traditionally pastoralist but nowadays there are already many numbers of population who have abandoned their traditional life style due to severe droughts having taken place in the past. They are called ex-pastoralist and there are many such people just depending on relief food. Accessibility to water and food, which are the essential stuff for the people's survival, is getting oppressed than ever before.

One may say that measures so far put into implementation were of emergency assistance; namely every time when they were hit by drought, they were urgently assisted chiefly in a form of food and water assistances. This has been working and now one may say that on top of such urgent measures resilience itself should be built in the societies bridging over to mid and even long term sustainable future. In Ethiopia, therefore, a linkage between emergency assistance and measures establishing resilience in their societies towards sustainable future is now sought.

Given above background, JICA carried out a preliminary survey in December 2011 to identify needs for those people hit by drought. The findings from the survey made both sides, Ethiopian authority and JICA side, recognize a need of piloting a project able to establish resilience for those vulnerable people. The Government of Ethiopia whereby requested the Government of Japan to undertake a project, and both sides concluded the implementation of the Project as in the RD signed on March 28, 2012. JICA, based on the agreement, dispatched a team of experts at the beginning of April 2012, and accordingly a series of activities had started.

1.2 Objective, Target Areas and Responsible/Implementing Organizations

1.2.1 Objective of the Project

The objective of this Project is to "contribute to enhancing the resilience for those people dwelling in drought prone areas such as southern parts of Oromia region and Somali region through a series of surveys/studies and implementation of pilot projects". Towards this objective to be fulfilled, there are five outputs that the Ethiopian counterpart organizations and the JICA team shall achieve;

1) To clarify the positioning of this Project in relation to; i) the current strategies on the resilience enhancement by Oromia and Somali regions, ii) on-going government programs/projects, and iii) relevant donor assistance programs/projects,

2) To enhance resilience for the pastoralist and agro-pastoralist people and their societies in the pastoral dominant areas, for which a pilot project (Component-1) with improvement of accessibility to water, livestock market establishment, and livestock and pasture management is implemented in the Borena zone of Oromia region,

3) To enhance resilience for those people who were once pastoralist but are now engaged in agriculture; namely, ex-pastoralists, for which Component-2 pilot project establishing irrigated agriculture is implemented in Gode area of Somali region,

4) To enhance resilience for those farmers who practice agriculture in low rainfall highland areas of Oromia region, in which Component-3 pilot project, i.e. introduction of weather index insurance, targeting basically high-input-high-return oriented farmers is implemented, and

5) To present recommendations/suggestions on the enhancement of resilience for those target population based on the lessons learned through the implementation of pilot projects, whereby aiming at improving the current strategies and programs relevant to enhancing the resilience at both regional and woreda levels.

To attain above outputs, there are agreed activities in the RD as summarized in the following table that the counterpart organizations together with the JICA team are to implement;

Table 1.2.1 Activities agreed upon in the Record of Discussions

No.	Activities	Relevant Output
1	Reviewing of the contents and actions of the current strategies for the community watershed/ rangeland and resilience enhancement in Oromia and Somali Regions,	1
2	Surveying of the actual situations of the Project area,	1
3	Exchange of knowledge with other area's previous activities regarding to pastoralist, ex-pastoralist and agro-pastoralist,	1
4	Selection of potential target woredas for pilot projects (selecting communities from each of the pastoral and low rainfall areas),	2, 3, 4
5	Formulation of technical packages (such as manuals and training materials related to infrastructure design and construction, agricultural techniques, and marketing of livestock),	2, 3, 4
6	Facilitator training for technical staff of Natural Resource Bureaus at the regional, zonal, and woreda levels,	2, 3, 4
7	Detailed design and training on mobilization, operation and maintenance, cultivation techniques and others depending on pilot project components,	2, 3, 4
8	Construction works of small scale water ponds, livestock markets, and feeder roads if necessary,	2
9	Training on utilization of water to be availed with small scale rural water facilities,	2
10	Introduction of innovative scheme such as weather index insurance for reducing risks in combination with training of appropriate cultivation techniques,	4
11	Construction of irrigation scheme and training on irrigation farming,	3

No.	Activities	Relevant Output
12	Compiling of the results and experiences of the pilot projects, and	5
13	Suggestion of ideas to update strategies for improving the community watershed/ rangeland and agricultural resilience, based on the results of the pilot projects.	5

Source: Record of Discussions, signed on March 28, 2012

1.2.2 The Project Area

The Project targets parts of Oromia and Somali regions. The former region, Oromia, covers huge area extending from central part of Ethiopia to southern and south-eastern parts of the Country. In fact, Oromia is the biggest region in terms of both population and area coverage amongst Ethiopian 9 regions. The area spreads over about 350,000 sq.km while the population marks about 27 million, giving a population density of 77 persons/sq.km (2007 Census). On the other hand, Somali, one of the two target regions, is located at the eastern side from Oromia, covering 280,000 sq.km. The Somali region carries about 5 million population, whereby only 18 persons as average reside in one-km square area.

There are 3 specific target areas by component as agreed in the RD. One is Borena zone where Component-1 activities are carried out. The zone is located at the most south-eastern part of Oromia region bordering with Kenya at its southern part and Somali region at its eastern part. The zone is composed of total 13 woredas with 256 kebeles, out of which 10 woredas are located in lowlands where pastoralist are the dominant population. According to the 2007 Census, population of the zone arrives at 962,489 persons living in an area of 45,435 sq.km. The population density therefore comes to 21 persons per sq.km, quite low as compared to, for example, the Oromia region's average density of 77 persons/sq.km (2007 Census).

With regard to Somali region, there is specific target area for the Component-2 pilot project implementation; that is existing and to-be-irrigated farmlands located near Gode town, Gode woreda, Shebele zone of Somali region. Irrigated agriculture promotion utilizing water from the Wabi Shebele River is piloted within the Gode woreda[1]. There are resettlement areas in the Shebele zone as well as in the Gode woreda given to ex-pastoralists. The irrigated agriculture aims at providing new livelihood by means of irrigation to those settlers.

For the Component-3, which is weather index insurance promotion, the target areas are selected out of the small rainfall areas within Oromia highland. It means that the target areas should basically come from some eastern part to around mid part of the region. However, the most eastern part of the region should be excluded for this insurance pilot project since the area is so dry that the potential insurance companies can hardy undertake the risk. Therefore, preliminary target areas are set to cover such zones of West Shewa, East Shewa and West Arsi. Out of the preliminary targeted zones, actual woredas/ kebeles which are to introduce weather index insurance will be identified at the beginning of the pilot project implementation.

1.2.3 Responsible and Implementing Organizations

The responsible agency of this Project is the Ministry of Agriculture, and the Director of Natural Resource Management Directorate takes the charge, as the Project Director, of overall administration and implementation of the Project. Under the auspices of the ministry, Oromia Bureau of Agriculture and Somali Livestock, Crop and Rural Development Bureau are designated as the implementing agency for the Project respectively in each of the 2 regions.

[1] Gode woreda is located mostly at the left bank side of the Wabi Shebele River, and it extends to a narrow part of right bank side along the river. Though at the most right side bank of the river Adadle woreda lies, the woreda does not cover the river line areas of the Wabe Shebele river, whereby the narrow part of right bank side is under Gode woreda.

There is one more organization responsible at the regional level, though it is not specified in the RD. Oromia Pastoralist Area Development Commission (OPADC) is the responsible agency, in lieu of Oromia Bureau of Agriculture, for those lowland woredas of Oromia region where pastoralist reside. Specifically to Borena zone, 10 woredas out of total 13 woredas of the zone are located in lowlands whereby commanded by the commission. Therefore, those pilot activities carried out in the 10 lowland woredas should be placed under the responsibility of the Commission.

For the implementation of the Project, JICA has organized a Project Team, which is composed mainly of SANYU Consultants Inc. The counterpart organizations of the Project, Natural Resource Management Directorate of Ministry of Agriculture and relevant regional bureaus such as Oromia Bureau of Agriculture and Somali Region Livestock, Crop and Rural Development Bureau, and Oromia Pastoralist Area Development Commission arrange counterpart personnel and implement the Project with the JICA team. Figure 1.2.1 above shows the implementation arrangement of the Project:

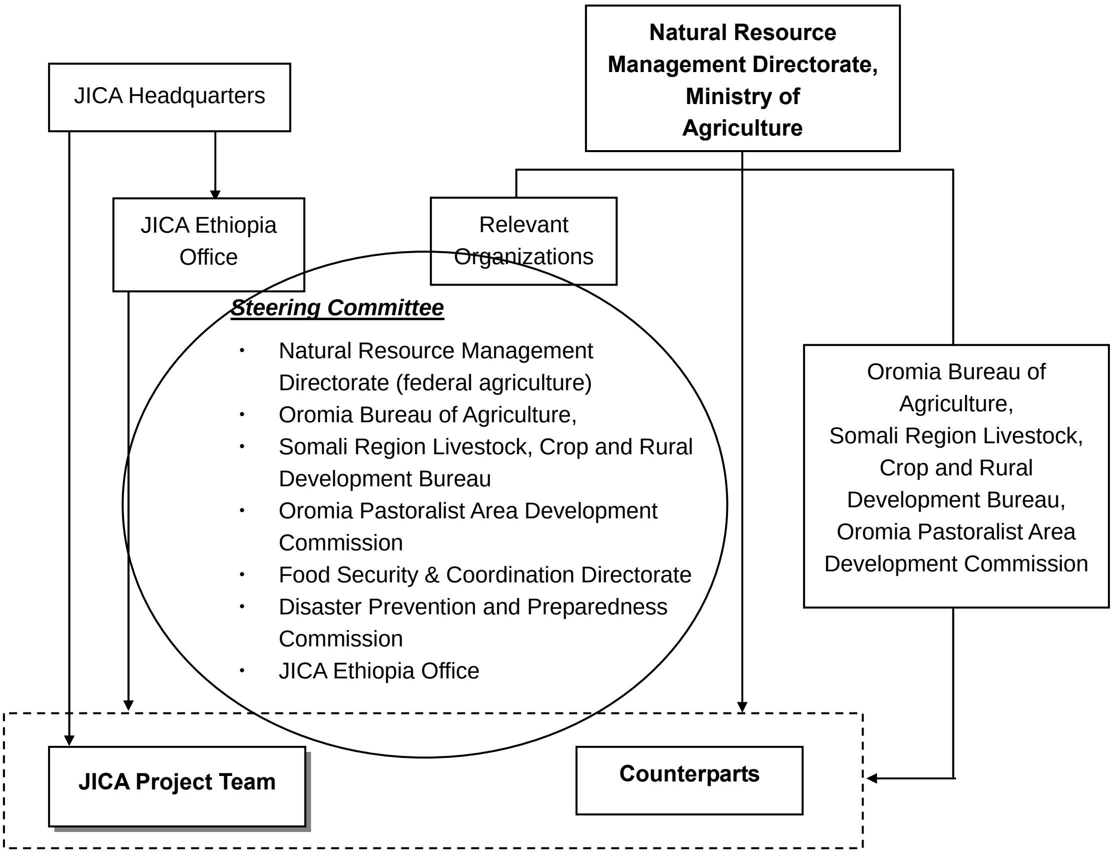


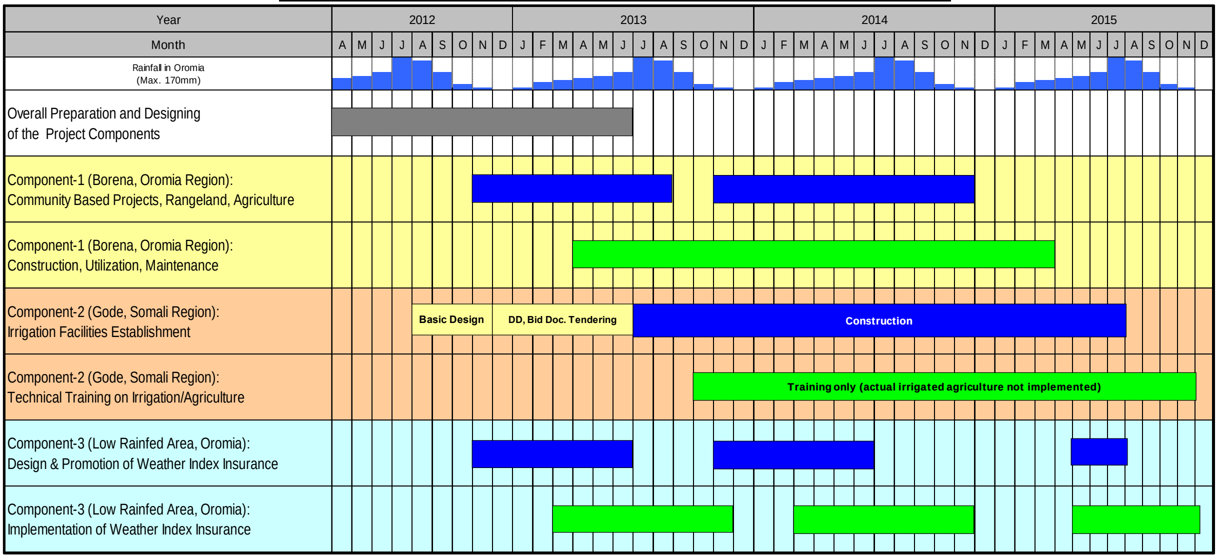
Figure 1.2.1 Implementation Arrangement of the Project

1.3 Implementation Schedule

This Project was commenced at the beginning of April, 2012 upon arrival of the JICA team to Ethiopia. The Project was to cover 3-year term period from April 2012 to March 2015 at the beginning, however, the project period was extended until December 2015 due to not-completion of the construction in Gode. From the commencement to October 2012 necessary surveys and designing of the pilot projects were conducted; from November to early part of year 2013 preparation of the pilot project implementation on the ground was carried out; and then from early part of year 2013 and onwards, pilot projects have been implemented on the ground.

Component-1 pilot project in Borena zone started in some selected kebeles in early 2013 and has been extended towards the following year 2014. Component-2 pilot project, irrigated agriculture establishment in Gode area, needed more than two-year period for detail design, tendering and construction of the facilities, and therefore irrigated agriculture came into sight just at the end of this Project[2]. For the Component-3, weather index insurance was firstly designed till early part of year 2013, and put on market from March 2013, and it has been extended in the following year 2014 and 2015.

Table 1.3.1 Implementation Schedule of Three Components



Source: JICA Project Team

[2] In fact, the construction completion for Gode irrigation scheme was firstly targeted by March 2014, and extended till July 2014; however due to a bleach of the Contract by the Contractor, the construction could not be finished as planned and finally completed in July 2015. Therefore, actual irrigated agriculture practice was started from end of August 2015.

CHAPTER 2 DEVELOPMENT CHALLENGES AND OPPORTUNITIES IN ETHIOPIA

This chapter discusses challenges and opportunities in the development context of Ethiopia. Long term trend of Ethiopiaǒs economic growth is firstly examined in relation to drought. Droughts which have hit Ethiopia as well as the Horn of Africa in a broader spectrum are elaborated, from which broad vulnerability for Ethiopia against drought is examined. Policies and national level strategies to tackle natural disasters, especially drought, are also briefed in this chapter, and a research result predicting the future trend of climate is lastly presented.

2.1 Past Trend of the Economic Growth

Figure 2.1.1 shows the long term trend of GDP growth ratio at constant prices for Ethiopia on an annual basis adjusted for inflation and expressed as a percent. As well seen, the growth ratio has been fluctuating very much as indicated between as low as minus 12% and as high as plus 14 % during the years of 1980 - 2010. The standard deviation thus arrives at as high as 7% while the average growth ratio is estimated at 4.7%.

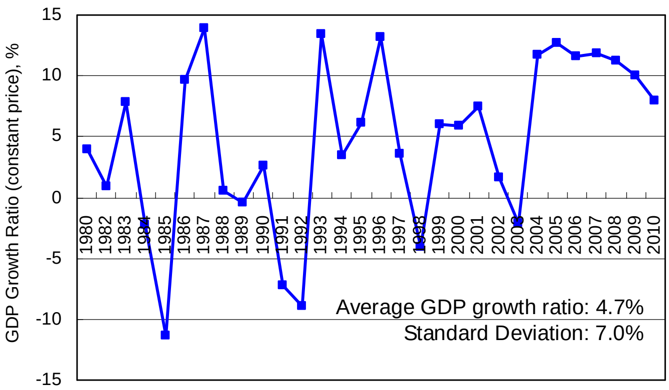


Figure 2.1.1 Long Term Trend of GDP (constant price)
Source: International Monetary Fund - 2011 World Economic Outlook, CSO of Ethiopian Government

The annual GDP growth ratio, as is seen in the figure, has sharply dropped in those years of 1985, 1992, 1998, 2003, which are all related to drought. Ethiopia has, however, achieved around 8 - 10% growth ratio for the consecutive 7 years from 2004 to 2010. It implies that should there have been no drought; Ethiopia could have been one of the high economic growth achievable countries in the world.

Figure 2.1.2 shows GDP composition of Ethiopia starting from year 1991 to year 2010. As is well illustrated, agriculture shares the most in the GDP composition. Till year 1998, the share of agriculture GDP had been more than 50% as a matter of fact. Though the share of agriculture GDP has been decreasing by year replaced by service sector GDP, it still shares more than 40% even at year 2011. This is the major reason why the national GDP is so much affected by drought. When drought takes place, agriculture production is decreased whereby leading to even negative GDP growth ratio.

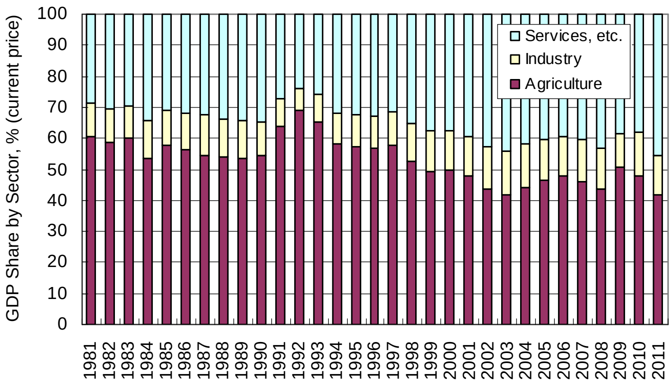


Figure 2.1.2 Long Term Trend of GDP Structure (current price)
Source: International Monetary Fund - 2011 World Economic Outlook, CSO of Ethiopian Government

Figure 2.1.3 shows the trend of GDP per capita at current price expressed as US$ after year 1990. The GDP per capita had dropped to less than US$ 150 in 1993 from about 250$ in 1991 due to the drought having taken place from 1990 to 1992, during which estimated 4,000,0000 people were reported suffering from food shortage[1]. After year 1993, the GDP per capita had hovered in a rage of US$ 100 to US$ 150 only till year 2004 which is one of the least GDP per capita in the world. The low GDP per

[1] Source: Markos (1997), Webb et al. (1992), Cochrane (2011) & Messay (2012).

capita during the period is corresponding to the fluctuation in the GDP growth ratio recorded during the same period.

Then, the GDP per capita started growing to a peak of US$ 350 in 2009. During those years from 2004 to 2009, the GDP per capita had in fact increased by more than 250% (from US$ 138 to US$ 351). This continuous increase again implies that should there have been no drought, Ethiopianȇs GDP per capita could have been much higher than the present.

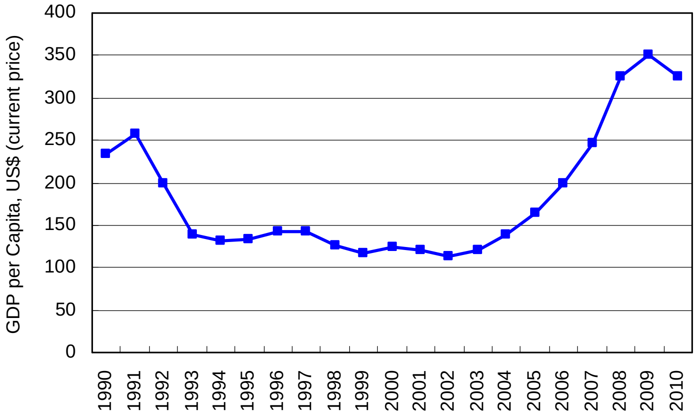


Figure 2.1.3 Long Term Trend of GDP per Capita (current price)
Source: International Monetary Fund - 2011 World Economic Outlook, CSO of Ethiopian Government

2.2 Weather Trend in Ethiopia and Eastern – Southeastern Parts of Ethiopia

2.2.1 Annual Rainfall Distribution and Variability Trend in Ethiopia

In Ethiopia, the western highlands have particularly high rainfall, averaging more than 1,200 mm annually in many areas. Rainfall is, however, becoming lower with loss of elevation, especially toward the east as shown in Figure 2.2.1. Most of the eastern lowland areas of Afar and Somali regions are unsuitable for crop production because of lack of rainfall. The annual rainfall in those areas marks very frequently less than 400 mm, and sometimes even less than 200 mm. South-eastern part of Oromia region is not the exception with a little more than those rainfalls, ranging from 400 mm to 800 mm. In those areas, pastoral lifestyle has been the mainstay.

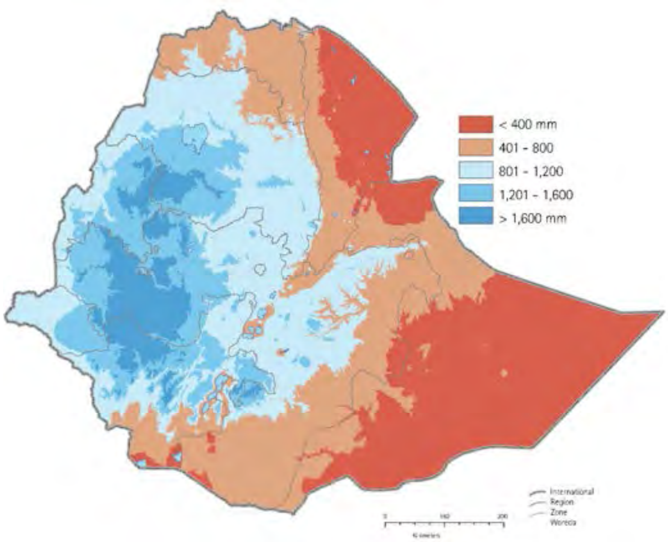


Figure 2.2.1 Distribution of Annual Rainfall in Ethiopia
Source: Atlas of the Ethiopian Economy

Figure 2.2.2 shows rainfall variability in Ethiopia. According to Aguilar et al. (1998) and Odekunle et al. (2007), value of coefficient of variability (CV) less than 20%, CV from 20 to 30%, and over 30% indicate less, moderate and high rainfall variability, respectively. National Meteorology Agency (NMA) also notes that areas with over 30% are vulnerable to drought-induced agroclimatic hazards.

Given the indicators, most of the Somali region falls in an area where the CV ranges from 50% to 100% and the southern part

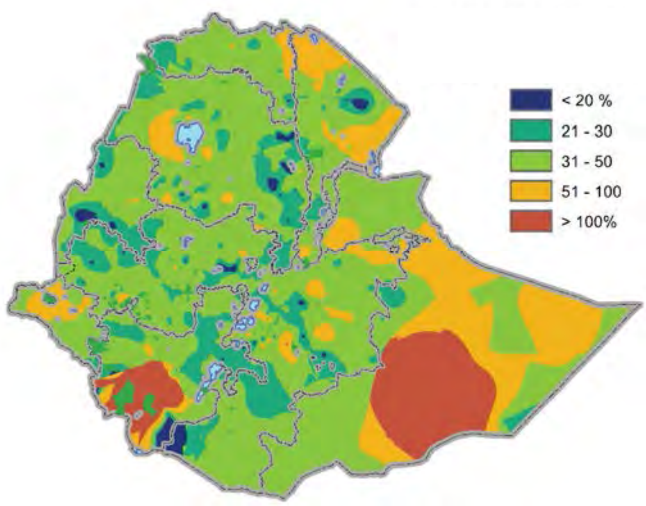


Figure 2.2.2 Rainfall Variability (Coefficient of Variation)
Source: Atlas of Agricultural Statistics, 2006/07 ï 2010/11

of the region shows even more than 100% rainfall variability. Rainfall in Somali region is in fact meager and it is furthermore of high variability. A fact is that area showing more than 30% CV extends almost allover the central to eastern part of the country. This high rainfall variability coupled with meager rainfall as shown in Figure 2.2.1 makes the coutnry very much drought prone.

2.2.2 Monthly Rainfall Distribution in Ethiopia

In Ethiopia, there are two rainy seasons; *Meher* and *Belg*. In general, *Meher* is defined as long rains taking place roughly from June to September (October) while the short rains occur from March (February) to May which is called *Belg*. This is however applicable to most of the highlnad, and in lowland areas of south-eastern part of Oromia region and Somali region, rainfall from March to May usually carries more amount than that of *Meher*. In fact, the rainy seasons in Borena zone are called; *Gana* meaning long rains from March to May while *Hagaya* being short rains from September to October. In between *Gnana* and *Hagaya*, there is a dry season during which temperature is low due to the cloudy climate.

The seasonal rainfall in Ethiopia is driven mainly by the migration of the Inter-Tropical Convergence Zone (ITCZ). The exact position of the ITCZ changes over the course of the year, oscillating across the equator from its northern most position over northern Ethiopia in July and August, to its southern most position over southern Kenya in January and February. Due to the ITCA migration, the southern regions of Ethiopia experience two distinct wet seasons which occur as the ITCZ passes through this more southern position, whereby the March to May ó*Belg'* season becomes the main rainfall season yielding 100-200 mm per month.

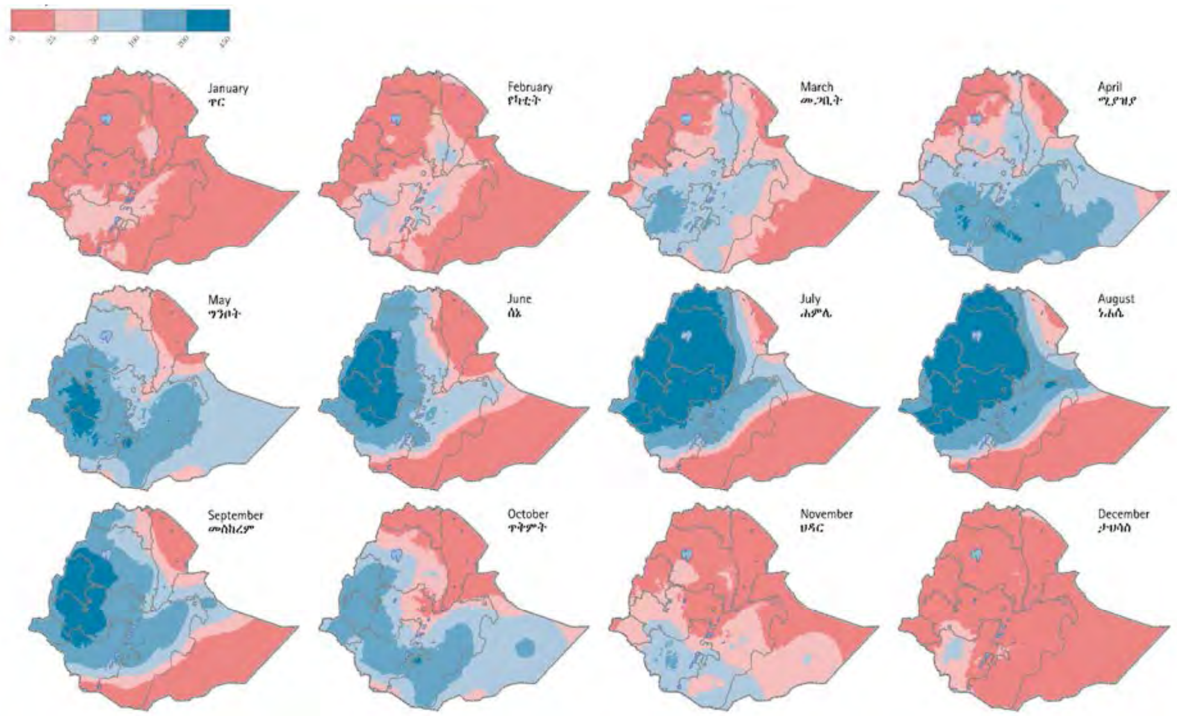


Figure 2.2.3 Mean Monthly Rainfall Distribution over Ethiopia

Source: Atlas of the Ethiopian Rural Economy, Data source; WorldClim, University of California, Berkley.

Figure 2.2.3 shows mean monthly rainfall over Ethiopia. Looking into the southern part of the country including Borena zone, the rainfall starts from March and presents certain amount of between 50 and 200 mm per month in April and May extending into Somali region. Coming to June, there is almost no rainfall in Borena. During the months from June to August, on the other hand, highland receives much amount of rainfall called *Meher* (long rains). Rainfall in the southern part of country including Borena zone again starts from as early as late September but ends in November called *Hagaya*, short rains.

2.2.3 Long Term Annual Rainfall Trend in Central – Eastern Ethiopia

In Central ï Eastern Ethiopia, rainfall and temperature data at seven meteorological stations were collected such as 1) Adama, 2) Ziway, 3) Chiro, 4) Arba Minch, 5) Dire Dawa, 6) Jijiga and 7) Gode (for the location, see Figure 2.2.4). Figure 2.2.5 indicates the average inter-annual rainfall trend for the seven stations in the central-eastern Ethiopia. The average annual rainfall ranges in most of the years from 600 to 1,000 mm with some exceptional years when the rainfall went down to less than 400 mm while reached as much as over 1,100 mm. In fact, the relatively low rainfall during drought years of the 1977/78, 1984/85, 1993/94, 2002/03 is clearly visible from the figure.

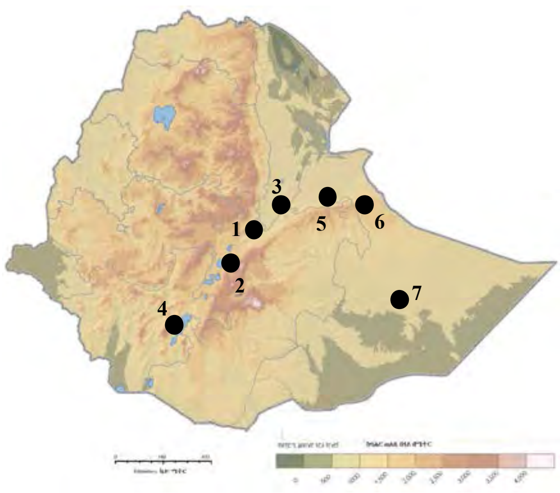


Figure 2.2.4 Location of the Seven Stations

Source: National Meteorological Agency

As is shown, the annual rainfall is very much fluctuated by year and it implies that the climate-induced risk in central-eastern Ethiopia is mainly not only the scarcity in total annual rainfall but also the inter-annual rainfall variability and unpredictability of the rains. Figure 2.2.6 attempts to show the inter-annual rainfall differences in the central-eastern Ethiopia. As was predicted, the inter-annual rainfall difference is quite large reaching as much as minus 400 mm and over 300 mm. This fluctuating nature of rainfall, no doubt, adversely affects the agricultural practices and livelihoods systems of the people.

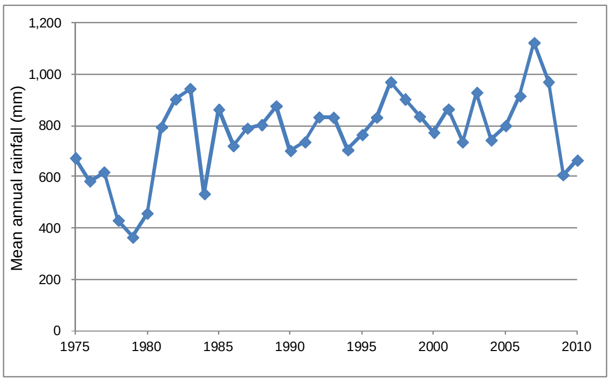


Figure 2.2.5 Long-term Annual Rainfall in the Central-Eastern Ethiopia

Source: National Meteorological Agency

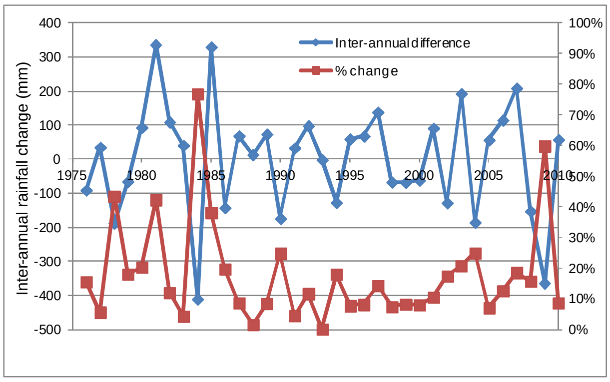


Figure 2.2.6 Inter-annual Rainfall Difference in Central-Eastern Ethiopia

Source: National Meteorological Agency

2.2.4 Long Term Annual Rainfall and Mean Temperature Trend by Station

Following section discusses the trends of annual rainfall and temperature at the seven meteorological stations located in central-eastern parts of the country. An attempt is made to look into the trends of rainfall and temperature at each station over long period.

1) Adama Metrological Station

Adama meteorological station is located in the central Ethiopia at about 8 degree 35 minutes N latitude and 39 degree 16 minutes E longitude. The altitude of Adama town varies from about 1,600 m to 1,970 m above mean sea level. The long-term annual rainfall values at Adama station do not show a clear pattern of increase or decrease. Average temperature values at Adama show a steady increase over years after late 1980s. The lowest value was recorded in 1993 (20.8 Celsius degree) while the highest value was documented in 2002 (22.6 Celsius degree).

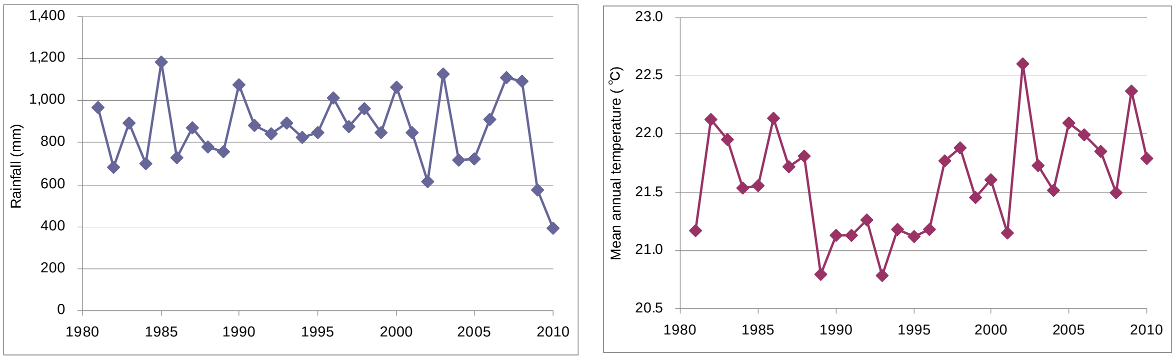


Figure 2.2.7 Rainfall and Temperature Patterns of Adama Meteorological Station

2) Ziway Metrological Station

The Ziway meteorological station is located in the Ethiopian Rift Valley. It is found located near major Rift Valley lakes of Ziway, Abijata and Langano. The area is characterized by low-lying flat terrain and hot climatic conditions. The long-term mean annual rainfall at Ziway station ranges from about 517mm (in 1994) to about 959 mm (in 1993). There is no clear trend of the rainfall going up or going down over years. The mean annual temperature has, on the other hand, sharply increased over years with a rate of about 0.7 Celsius degree per decade.

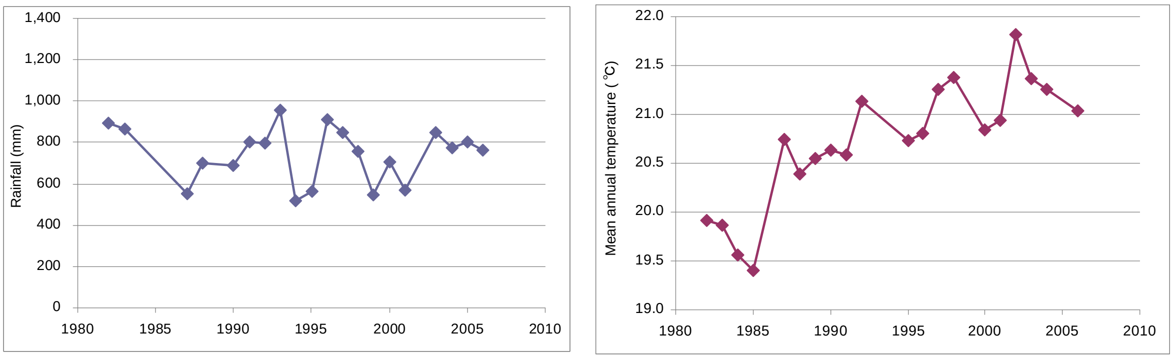


Figure 2.2.8 Rainfall and Temperature Patterns of Ziway Meteorological Station

3) Chiro Metrological Station

Chiro meteorological station is located in eastern Ethiopia at about 1825 meters above sea level. Situated in the Amhar mountains, it has a latitude and longitude of 9 degree 5 minutes N and 40 degree 52 minutes E, respectively. The rainfall condition is highly erratic ranging from as low as about 400 mm to over 1,200 mm. In terms of long term trend, there is no clear upward or downward trend. The temperature values, on the other hand, have steadily increased over years. The average temperature value at Chiro increased to 22 Celsius degree in 2010 from 20.4 Celsius degree in 1991. Rate of temperature increase at Ciro is computed to be about 0.8 Celsius degree per decade.

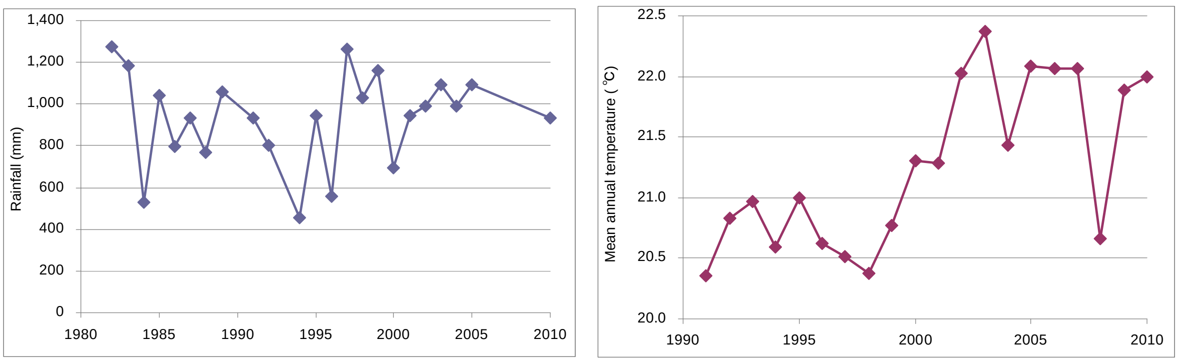


Figure 2.2.9 Rainfall and Temperature Patterns of Chiro Meteorological Station

4) Arba Minch Metrological Station

Arba Minch is a city in southern Ethiopia at an elevation of 1,285 meters above sea level. Its topography is known for its numerous springs and forests in close proximity. The annual total rainfall values over years have no defined pattern of increase or decrease. It ranges between 600mm and slightly over 1200mm, indicating very high inter-annual variations. The average temperature values over years do not show a definite pattern of increase or decrease either, ranging between 23.2 Celsius degree and 24.8 Celsius degree during the period of 1985 to 2010. The highest value of average temperature was recorded in 2009 as shown below:

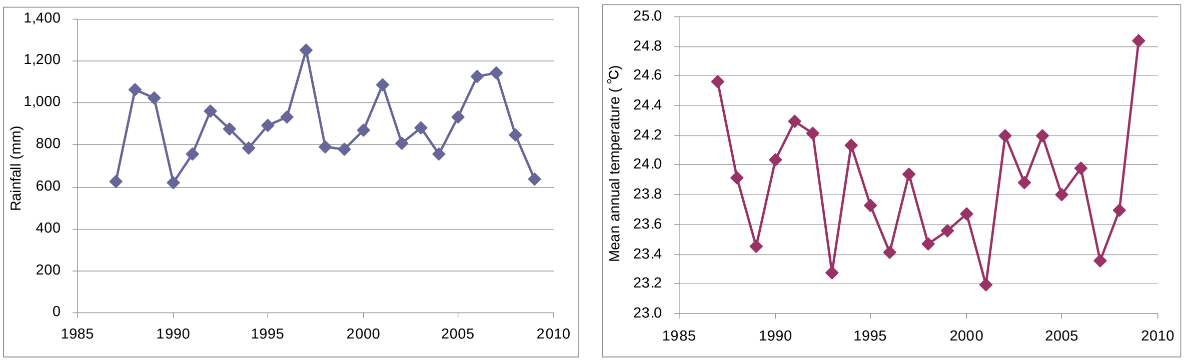


Figure 2.2.10 Rainfall and Temperature Patterns of Arba Minch Meteorological Station

5) Dire Dawa Metrological Station

Dire Dawa station is located at about 1,260 meters above mean sea level. It is located in the eastern part of Ethiopia within the eastern margin of Awash River Basin. The climate is warm and dry with relatively low precipitation. The long-term mean annual total rainfall is only 624 mm, and does not show any clear trend of increasing or decreasing. The mean annual temperature has sharply increased. The 25 Celsius degree average temperature value in 1981 was sharply increased to 26.4 Celsius degree in 2009. This increase is computed to be about 0.47 Celsius degree per a decade.

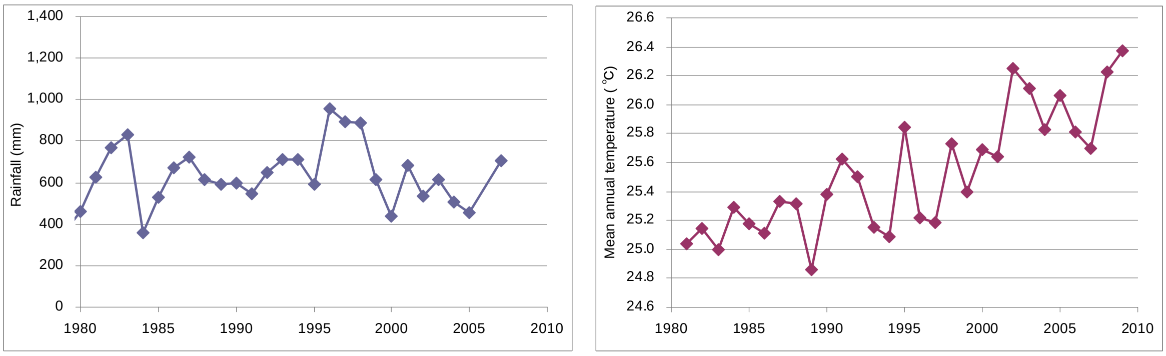


Figure 2.2.11 Rainfall and Temperature Patterns of Dire Dawa Meteorological Station

6) Jijiga Metrological Station

Jijiga station is located in eastern Ethiopia at 9 degree 21 minutes N and 42 degree 48 minutes E and the elevation is about 1609 meters above sea level. The long-term mean annual rainfall amount is computed to be about 710mm. The lowest rainfall years were 1955 (398mm), 1984 (401mm), 1985 (516mm), 2001 (553mm) and 2008 (432mm). The highest annual total amount of rainfall was recorded at this station in 1976 (1825mm). Values of average annual temperature condition at this station have increased over years. The highest average annual temperature was recorded in 2010 (21.1 Celsius degree) whereas the lowest value was that of 1974 (17.7 Celsius degree).

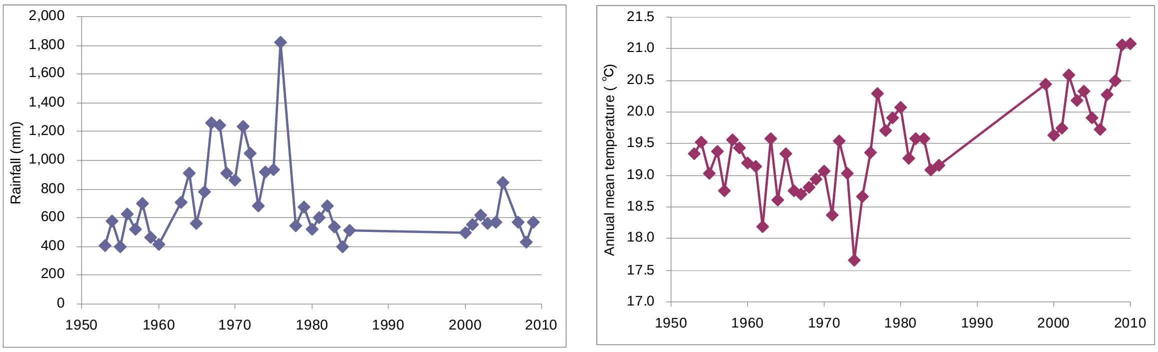


Figure 2.2.12 Rainfall and Temperature Patterns of Jijiga Meteorological Station

7) Gode Metrological Station

Gode station is located in Ogaden dry land (eastern Ethiopia) at a latitude and longitude of 5 degree 57 minutes N and 43 degree 27 minutes E, respectively. Ogaden plain is mostly characterized by arid environment. The trend of rainfall in this area is highly erratic. The long-term average annual rainfall of the station is about 218mm. Values of mean annual temperature at this station have sharply increased over years as do other stations. The highest average annual temperature was recorded in 2003 (30.2 Celsius degree) whereas the lowest value was that of 1985 (28.1 Celsius degree). Increasing rate from 1985 to 2009 comes to around 1.7 Celsius degree, equivalent to 0.7 Celsius degree per decade.

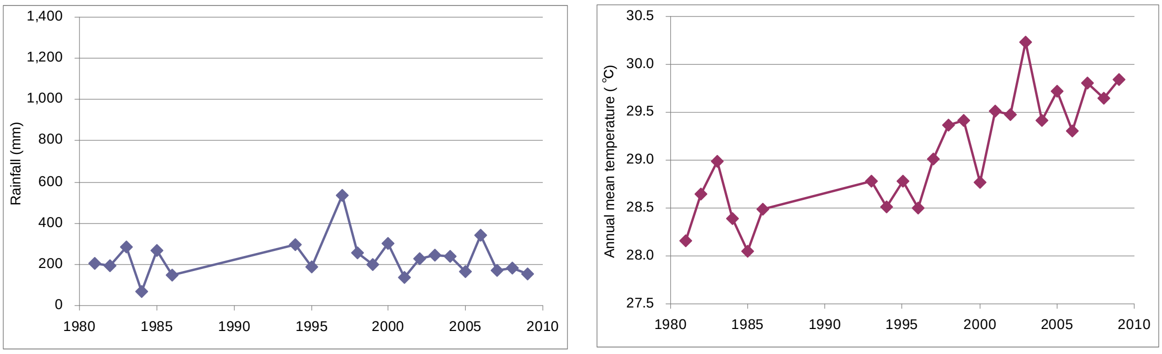


Figure 2.2.13 Rainfall and Temperature Patterns of Gode Meteorological Station

8) Summary of the Seven Meteorological Stations

The analysis of long-term rainfall conditions in central and southeastern shows a scant and erratic rainfall though there is no clear trend increasing or decreasing across the seven stations. This region of the country receives mean annual total rainfall ranging from about 219 mm at Gode station to 935 mm at Chiro station as shown below. The analysis also shows that this region of the country is characterized by drought hazard occurring almost every 10 years or even less than 10-year interval especially in recent years.

In terms of temperature, there is a sharp increasing trend across the region. The increasing ratio per decade arrives surprisingly high at 0.5 to 0.8 Celsius degree. According to IPCC Assessment Report, there is a consensus that the temperature increase should be limited less than 2 Celsius degree after the Industrial Revolution in 1760s. In fact, though, there is already about 0.6 Celsius degree increase since the Revolution till to date. It means that if the temperature increases by more than 1.4 Celsius degree in the coming years, there would be irreversible impact on the globeȏs environment. Then, with the increase ratio recoded in the central-eastern region of Ethiopia, the threshold year would come just within 30 years.

Table 2.2.1 Long-term Mean Annual Rainfall and Temperature Values at Seven Stations

Climatic conditions	Meteorological Stations							Average
	Adama	Arba Minch	Ciro	Dire Dawa	Gode	Jijiga	Ziway	
Mean annual rainfall (mm)	859.9	889.7	934.3	623.6	218.4	709.7	743.0	711.2
Mean Max Temp (^{0}C)	28.5	30.4	28.0	32.0	34.8	27.5	27.0	29.7
Mean Min Temp (^{0}C)	14.7	17.3	14.0	19.1	23.5	11.3	14.0	16.3
Average Temp (^{0}C)	21.6	23.9	21.3	25.5	29.8	19.4	21.0	23.2

Source: National Meteorological Agency

A further key finding of the analysis is that the central and southeastern parts of the country have been more severely affected by recurrent droughts and sharply increasing temperature conditions. Rainfall condition recoded at most stations in this region is inadequate and highly erratic. Particularly, the eastern most extreme areas (such as Gode and Jijiga) are characterized by insufficient and erratic rains. The average annual total rainfall for Gode station, for instance, is computed to be only about 218 mm, which is very low compared to the average annual total rainfall of Ethiopia. i.e. over 1000 mm.

2.3 Past Drought Impact and Assessment

Recorded instances of famine and food insecurity in Ethiopia indicate that persistent famine incidents affected millions of people making Ethiopia by far the most severely affected country in Africa. Over 25 major famine cases have been recorded from 1800 to 2012 and about 12 such cases have been documented to have occurred since 1950 alone in the country. The humanitarian famine-induced crises of 1958, 1973, 1984-86 and 2002, for instance, are among the most grievous recent cases. This sub-chapter reviews droughts, which have taken place in Ethiopia from different angles:

2.3.1 Major Drought Incidences in Ethiopia

Historical documents reveal that between 1900 and 2011, 16 major drought episodes were registered in Ethiopia (see Table 2.3.1 below). Leaving out many drought events which happened long ago; about 6 drought events were reported during the last 30 years alone. These major drought episodes are those happened during the years of 1984/85, 1991/92, 1999/2000, 2003/04, 2008/09 and 2011. The drought of 1984/85 affected almost about 20 % of the then population. This was a case that the drought event was coincided with recorded widespread disease outbreaks, political instability and conflicts. The most recent crisisð the 2011 droughtð still affected large segments of the population.

Table 2.3.1 Chronology of Drought Incidences in Ethiopia

Drought Years	Drought/famine periods	Regions affected
1911-1912	1913-1914	Northern Ethiopia
1918-19	1920-22	Ethiopia
1930-32	1932-34	Ethiopia
1953	1953	Tigray and Wollo
1957-58	1957-58	Tigray and Wollo
1965	1964-66	Tigray and Wollo
1972-73	1973-74	Tigray and Wollo
1982-83	**1984-85**	**Ethiopia**
1986-87	1986-87	Ethiopia
1991-92	**1990-92**	**Ethiopia**
1993	1993-94	Tigray, Wollo, Central Ethiopia
1999-2000	**1999-2000**	**Ethiopia**
2003-04	**2003-04**	**Ethiopia**
2006	2006	South, South East, and N/East Eth
2008-09	**2008-09**	**South and South East Ethiopia**
2011	**2011**	**Ethiopia**

Source: Quinn and Neal, 1987; Degefu, 1987

The above table shows an increase in the frequency of droughts from 1 drought event for each decade of the 20th century to 5 drought events only within the first decade of the 21st century. Thus, there is one major drought events every two years since the beginning of the 21st century. In general, the intensity, frequency and the effects of droughts are believed to have increased since the mid 1990s. Major droughts are briefed below:

2.3.2 Impacts of Drought Hazards

The effects of drought are often combined with other hazards such as migratory pest infestation (locust), prevalence of crop diseases and pests, malaria outbreak and livestock diseases. Because of such compounded effects, the number of people in need of food in Ethiopia has been millions. Depletion of assets due to recurrent droughts has increased the vulnerability of households and decreased their ability to cope with climatic risks and other natural hazards. Following discussions refers to the impacts caused by drought:

1) Affected Population by Droughts

The repeated droughts that occurred in Ethiopia over the last three decades have led to serious food shortages and malnutrition. As summarized in the following table, drought affected population has ranged from a high of about 18 percent of the whole population in 1983/84, a time of famine, to a low of about 6 percent in 2011. In 4 of the 6 major drought episodes recorded over the last three decades, more than 10 percent of the population was affected by such drought (DRMFSS, 2011).

Table 2.3.2 Affected Population by Historical Drought Events in Ethiopia

Major Drought events	Total Population (Million)	People Affected (Million)	Per-year affected (million)	Percentage affected
1983-84	41.21	14.75	7.30	18%
1991-92	50.10	15.05	7.50	15%
1999-2000	61.67	17.75	8.87	14%
2003-04	69.47	20.29	10.13	15%
2008-09	76.50	11.37	5.68	7%
2011	78.20	4.80	4.80	6%
Average	63.00	14.00	7.40	13%

Source: DRRFSS, Federal Ministry of Agriculture.

Figure 2.3.1 summarizes the beneficiary number for relief in Ethiopia since 1990 to 2011 according to WFP and FDRMFS. As is well shown, there have been continuous food relief beneficiaries in Ethiopia ranging from 1.36 million population to as many as over 13 million population. Over the last 22 years recorded, there has been 2 times when more than 10 million population were supported by food relief, and 10 times when more than 6 million population were supported. This graph shows how great extent food relief has been provided to Ethiopian people to cope with drought.

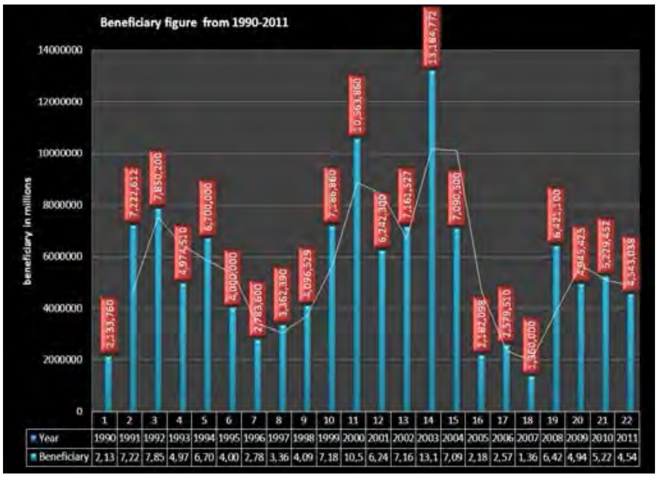


Figure 2.3.1 Relief Food Beneficiary Numbers
Source: WFP, DRMFSS, Ministry of Agriculture

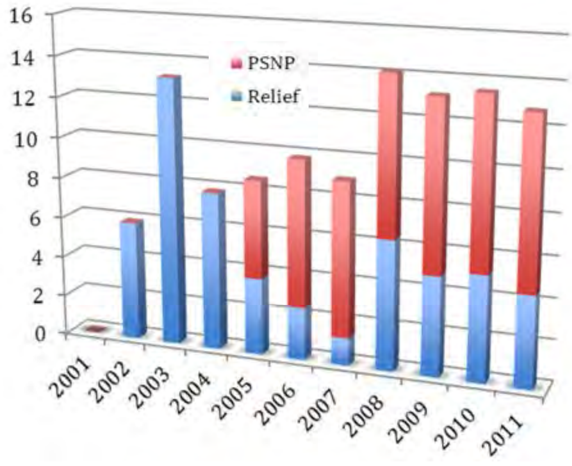


Figure 2.3.2 Beneficiary Numbers – PSNP versus Relief
Source: DRMFSS, Ministry of Agriculture

Here, it is important to note that relief intervention has changed in Ethiopia since 2005 to date due to the introduction of the Productive Safety Nets Programme (PSNP). As clearly depicted in the Figure 2.3.2, a part of the actual needy figures become engaged as PSNP beneficiaries who appear to have begun to replace relief beneficiaries. The figure shows that the actual needy population could exceed 12 million for each year from 2008 through 2011, had it not been for the PSNP packages.

2) Death Toll

It is in fact very difficult to get an officially recorded death cases. Most of the literatures on such sensitive issues are mere guesses based on estimations. Few of the existing data is based on estimated death figures for some of the drought happened during the reign of his majesty emperor Hailessillase and the Derg military regimes. It is in fact very difficult to come across with any evidences citing death cases directly connected to famine due to drought. The following table, adopted from the report by UNEP, indicates the impact of drought on humanity in Ethiopia from 1972ï 2011 (UNEP, 2011).

Table 2.3.3 Some of the Worst Drought Disasters in Ethiopia, 1972–2010

Year	Number of affected	Number killed	Reason
1972	no data	600,000	Drought and Famine
1973	no data	100,000	Drought and Famine
1974	no data	200,000	Drought and Famine
1983	7,000,000	No data	Drought and Famine
1984	7,750,000	300,000	Drought and Famine
1987	7,000,000	367	Drought and Famine
1990	6,500,000	No data	Drought and Famine
1991	6,160,000	No data	Drought and Famine
1993	6,700,000	No data	Drought and Famine
1999	7,767,594	No data	Drought and Famine
2000	10,500,000	No data	Drought and Famine
2003	13,200,000	No data	Drought and Famine
2006	2,600,000	No data	Drought and Famine
2009	4,900,000	No data	Drought and Famine
2011	4,500,000	No data	

Source: UNEP, 2011

The data in the above table indicates at least more than 1.2 million Ethiopians were killed in relation to drought induced famine over the last four decades and about an average of 4 million to as many as 13 million people were affected every drought year. The poor households that are affected by drought do not have adequate resources to deal with food shortages leading to food insecurity and hunger. For instance, in the northern regions of Ethiopia severely hit by the drought of 1984/85, famine claimed the life of people in hundreds of thousands. Thus, the most severe consequence of drought could be said to be famine.

3) Impact to the Food Production

Over the last three decades, Ethiopiaœ relief food need has been fluctuating between the maximum of 1.8 million tons in 2003 and the minimum of 41,310 tons in 1998. As we can clearly understand from the table below, since the middle of 1980s, the relief food aid due to drought has accounted nearly for 11 percent of the locally produced food items as average. In 1985, Ethiopia depended on the largest food aid accounting as much as for 26% of its home production.

Table 2.3.4 Food Aid vs. Production, 1985-2011

Year	Food Aid ('000 MT)	Food Production ('000 MT)	Food Aid as % of Production
1985	**1,272**	**4,855**	**26.2**
1986	926	5,404	17.1
1988	1,096	6,902	15.9
1990	657	6,579	10.0
1991	925	7,078	13.1
1992	840	7,055	11.9
1998	417	8,103	5.2

Year	Food Aid ('000 MT)	Food Production ('000 MT)	Food Aid as % of Production
1999	511	8,868	5.8
2000	980	9,405	10.4
2003	1,800	14,294	14.0
2004	744	11,380	6.5
2005	1,112	12,896	8.6
2006	737	14,458	5.1
2008	975	16,461	6.0
2011	451	20,349	2.2
Average	910	10,272	10.5

Source: Food Aid from WFP and Federal DRMFSS and Food Grain Production from CSA

4) Impact on the Cash Spending

In order to reach the drought affected population with humanitarian aid, Ethiopia spends a lot of money every year. According to the data in the table below, the average number of people affected by drought per annum is about 5.85 million, while the average emergency aid flow per annum comes to US$ 509 million. If we divide the total emergency aid flow by the number of people affected, we get an estimate of per capita of nearly US$ 107 for each year.

Table 2.3.5 Number of People Affected by Drought and Resource Flow

Year	No. people affected (million)	Emergency Aid Flow (US$ m)	Cost per Beneficiary (US$)
2002	8.74	92.33	10.56
2003	13.46	496.41	36.88
2004	2.59	58.92	22.75
2005	3.61	544.67	150.88
2006	7.49	393.12	52.49
2007	1.51	276.00	182.78
2008	6.42	1,077.82	167.86
2009	4.95	707.75	143.11
2010	5.23	616.69	117.93
2011	4.50	822.52	182.78
Average	5.85	508.62	106.80

Source: Beneficiary from FDRMFSS and Aid Flow from Tenna Shiarek, 2012

Apart from the above estimate for aid flow in monetary value, OCHA has been publishing and disseminating status reports of humanitarian situations including resource allocation and utilization by sector from 2006 to 2011. According to the annual reports, the cost of drought related humanitarian response was on average US$ 352 million per year (ochaonline.un.org/ Ethiopia/). However, it was also observed that the figures obtained from OCHA did not include the value of emergency response interventions funded by other donors like USAID/OFDA and ECHO.

USAID recently published the results of its humanitarian assistance effort made from 2002 to 2011 to eastern and central Africa for drought. According to the report, from the total $11.6 billion funding to east Africa, the majority of funding (33%) was allocated to Ethiopia. This implies that over the last ten years of 2002-2011, Ethiopia received over US$ 3.8 billion (more than $380m per year) from the USA. Since this funding was used mainly for drought related emergencies, when summed up to that of OCHA, it increases Ethiopiaȇs average annual emergency cost to more than US$ 732 million (USAID, 2011).

5) Drought Impact on Livestock Number

Following table summarizes the impact of drought on livestock in predominantly pastoral areas of Oromia, Afar and Somali regions. For example the 1983/84 drought that affected the entire pastoral areas created a tragedy that extremely hampered livestock growth in Borena by devastating calves with outsized mortality rate of 90% (Helland, 2000). Due to mortality, slaughter and sales associated with the 1983/84drought, a 60 percent decrease in cattle population was reported from the worst affected parts of Borena. During the same drought, Afar region had experienced 72% decrease in cattle, 45% decrease in sheep, 35% decrease in goats and 37% decrease even in camels.

Table 2.3.6 Impacts of Droughts on Livestock Lives in Pastoral Areas of Ethiopia (1980s to 2010s)

Drought Years	Location	Livestock Loss	Source
1983-1984	Borena and Guji Plateau	90 % of calves, 45 % of cows, 22 % of mature males (60% decrease in cattle numbers in worst areas)	Helland, 2000
	Afar Region	72% decrease in cattle herds; 45% decrease in sheep; 35% decrease in goats; and 37% decreases in camels.	Sandford and Habtu, 2000
1991-1993	Borena and Guji	42 percent of cattle	Desta and Coppock, 2002
1995-1997	Southern Ethiopia	46 percent of cattle; 41 percent of sheep and goats	FAO, 2000
	Somali region	78% decrease in cattle herd size; 45% decrease in camel herd size.	Sanford and Habtu, 2000
1998-2000	Ethiopia Borena/Oromia	62 percent of cattle	FAO, 2001
	Oromia (Borena)	30-80% decrease in cattle herd size 20-50% decrease in sheep flock size 20-30% decrease in goat herd size 10-20% decrease in camel herd size 10-20% decrease in equine numbers	FAO, 2000
	Somali	40-80% decrease in cattle herd size 40-60% decrease in sheep flock size 40% decrease in goat herd size 15-35% decrease in camel herd size	Sandford and Habtu, 2000
	Afar	15-45% decrease in cattle herd size 5-15% decrease in sheep/goat flocks 0-25% decrease in camel herd size.	FAO, 2000
1999-2000	Borena	About 42 % of its cattle populations	Desta and Coppock, 2002
2003/04	Somali	219,141 cattle (30%), 1,295,910 shoats (25%) and 115,824 camels (14%)	FAO, 2003
	Afar	10 - 90% of livestock loss depending on the areas	FAO, 2003; Oxfam, 2004
2011	Borena	60%, 40%, and 25-30% (an average of 27%) for cattle, sheep and goats respectively (729,685 cattle, 85,920 sheep and 162,592 goats losses)	FAO, 2012

Source: refer to the column of "Source"

The report by Desta and Coppock also stated that the Borena pastoral areas lost about 42 % of its cattle population due to the drought of 1991 to 1993 (Desta and Coppock, 2002). Following this tragedy, in the years from 1995-97, 46% of cattle and 41% of sheep and goats had been lost in the southern Ethiopia. The drought caused a drop of 78% in cattle population and 45% in camel herd size among sampled households in the Somali region (Sandford and Habtu, 2000).

The drought which occurred during the onset of the new millennium led to an acute scarcity of livestock feed in most parts of the pastoral areas and it was reported to have induced cattle herd-size decrease of 30-80% in Oromia region (42% in Borena zone), 40-80% in Somali region, and 15-45% in Afar in better and worse scenarios (Sandford and Habtu, 2000; FAO, 2000). This report wraps up its findings stating that there was a 37% drop from an average of 92 heads/ households in 1980/81 to 58 heads/ household of 2000 in the worst affected parts of Somali and Oromia, Borena zone.

For the drought of 2003/04, a total number of 219,141 cattle (30%), 1,295,910 shoats (25%) and 115,824 camels (14%) were lost in three worst affected zones of Korahe, Warder and Dagehabur of Somali region (FAO, 2004). In Afar region, figures for mortality rates for livestock populations in the 2003/04 drought vary from 10% to 90% for cattle and shoats depending on the specific areas affected and sources of the estimates. For example, in May 2003, a survey conducted in the Afar region (Zones 3 and 5) by Oxfam GB estimated a mortality rate of 50% for cattle and 25% for shoats (Oxfam 2003).

Borena was one of the most affected areas in Ethiopia by the 2011 drought. According to FAO, the total death rate could reach 60%, 40%, and 25-30% (an average of 27%) for cattle, sheep and goats respectively. The FAO estimate did not include the mortality or morbidity rate of other animals such as camels and equines. FAO estimated a total of 978,197 head of animals (729,685 cattle, 85,920 sheep and 162,592 goats) to have died as a result of 2011 drought in Borena zone (FAO, 2012).

2.4 Policies and Measures Tackling National Disasters

The frequency of nation-wide droughts that cause severe food shortage has increased from once in about 10 years in 1970-80s to once in about three years in 2000s. In fact, the droughts and the resultant food shortages have affected millions number of people in Ethiopia. As a result, the then RRC (now DPPC) was established in 1973 to manage the effects of drought in the country. Since then, the primary focus of disaster management has been to avert drought-induced famine and the main theme of the National Policy on Disaster Prevention and Management that was ratified in 1993 has been around drought and food insecurity.

The Government of Ethiopia revised its disaster management strategy and adopted the National Policy on Disaster Prevention and Management (NPDPM) in 1993. The accompanying policy directive was issued in 1993 and the policy implementation guidelines were developed in 1995. The major objective of the NPDPM is to save lives, integrate relief assistance with development efforts in order to mitigate the impacts of disasters, and enhance the coping capacities of the affected population through the creation of assets in the affected areas. The NPDPM has guided relief management policies, institutions, and processes whereby drought disasters are detected and resources, e.g. food aid, are mobilized and prioritized for affected areas.

2.4.1 Relevant Programs and Projects

To cope with droughts, the government of Ethiopia has been implementing a comprehensive food security program (FSP) to date. The food security program has four major components; namely, 1) Productive Safety Net Program (PSNP), 2) Household Asset Building Program (HABP), 3) Complementary Community Investment (CCI) component, and 4) Resettlement component. The food security program has its own program document, within which each component is regulated and implemented:

1) Productive Safety Net Program (PSNP)

The Productive Safety Net Program is the major component in the Food Security Program. The program focuses on the chronically food insecure households with a food gap of three months or more even during a normal year within defined food insecure woredas (the “program woredas”). The program was launched in 2005 in order to move millions of chronically food-insecure rural people from recurrent emergency food aid to a more secure and largely cash-based form of social protection. The program creates assets, i.e. public infrastructure, at the community level and also stimulates markets.

Their eligibility for the PSNP was defined by the frequency with which they required food assistance in the ten years preceding the design of the PSNP (ten years up to 2004). The PSNP beneficiaries are the food insecure populations living in these chronically food insecure woredas. The vast majority of PSNP beneficiaries are resource poor households who fail to produce enough food even in times of normal rains. Households with these characteristics are considered chronically food insecure. Around 8.3 million people were considered to be chronically food insecure at the program designing stage.

In addition to the specific households supported by the program, other members of the communities will also be beneficiaries for the community assets constructed through public works. All the communities can benefit from roads, environment protection, irrigation services, school buildings, etc. constructed under PSNP. Therefore program stakeholders include beneficiaries and non-beneficiaries, woreda institutions engaged in PSNP implementation and their zonal, regional and federal counterparts and those whose service delivery will be enhanced by the community assets constructed.

2) Household Asset Building Program (HABP)

The Household Asset Building Program (HABP) aims at: ñincome sources diversified and productive assets increased for food insecure households in chronically food insecure woredasò. The HABP is implemented through two primary means: technical assistance (through the extension service but in coordination with a variety of actors, including the small and medium enterprise development agency, programs for women and youth, off-farm technical officers, and others) and financial services (credit provided by the program through MFIs).

The program targets both chronically food insecure and transitorily food insecure households within defined food insecure woredas; that are the households who have food gap of three months or more in either a normal or moderately bad year. The HAB program provides the above services to households in the PSNP program and those having graduated from the PSNP though not yet food secured. However, in case of capacity and/or resource constraints, the first priority of the HABP will be given to those within the PSNP and those who have recently graduated from the PSNP.

3) Resettlement Program

The Resettlement Program targets chronically food insecure households with adequate adult able bodied labor who voluntarily put themselves forward for resettlement. The main objective of this program is to enable up to 440,000 chronically food insecure households attain food security within three years, through improved access to productive land. The resettlement program is planned for four regions: Tigray, Oromia, Amhara, and Southern Nations, Nationalities, and Peoples Region (SNNPR). Program implementation is proposed in three phases of approximately 100,000, 150,000 and 190,000 households each, although these figures are dependent on the voluntary choices of the households.

Participation in the program is voluntary; potential resettlers are identified during awareness creation campaigns at both the woreda and kebele levels. Host woredas are identified based on an availability of arable land. Steps are taken to mitigate negative social and environmental impacts that could result around resettlement sites. Besides providing resettlers with land, the program will establish basic infrastructure such as health posts, water supply, primary schools, roads, etc. in and around the resettlement sites. A food ration will be delivered to resettled households for an eight-month period or until the first successful crop harvest.

4) Complementary Community Investment[2]

The Complementary Community Investment component is a program of capital intensive community infrastructure development aimed at benefiting groups of food insecure populations in selected chronically food insecure woredas. Investments focus on pastoral, semi-pastoral and moisture-stressed highland areas. Each region defines such woredas in need and best able to take advantage of such investments. The program is intended to provide large-scale investments such as irrigation and watershed management as a way of facilitating strengthened livelihoods at a community level.

2.4.2 Achievements to Date

A report of Ministry of Agriculture and Rural development (2009) shows that more than 7 million people have received PSNP transfers enabling them to meet consumption needs, reducing the risks they faced and providing them with alternative options to selling productive assets. In addition, around 1,679,278 households were also benefited from HABP at the end of 2009 (see Table 2.4.1). In addition to that, the report shows that till 2009 there have been 213,917 households resettled by their interest,

2 Transforming livelihood for resilient futures: How to facilitate graduation in social protection programs, Rachel Sabates-Wheeler and Stephen Devereux, for community only, March 2011, Future Agricultures Working Paper: Social Protection and Agricultural Growth

and among them 94% (192,555) were self reliant at the end of 2009.

Despite this, there has only been limited progress towards graduation. As of October 2008, 56,895 households had graduated from the PSNP in three regions. In 2009, 86,308 households had graduated from the PSNP. Graduation has been higher in the resettlement program with 145,529 households considered self-reliant. Unfortunately, no full impact evaluation has been undertaken of the resettlement program to date to assess incomes and assets of resettled households nor the extent to which re-settlers have succeeded in bringing their full families from food insecure woredas[3].

The government has a plan to continue the PSNP, HABP, resettlement and CCI as in Table 2.4.2. The plan is to cover till year 2014/15, and PSNP for example is to target approximately over 7 million populations in year 2010/11 and is to reduce the beneficiaries down to 1.4 million in 2014/15. Under HABP, the target is over 200,000 households and this target is to reduce to 50,000 households. Resettlement program targets approximately 50,000 to 60,000 households for the first 2 years.

Table 2.4.1 Summary of PSNP, HABP, Resettlement and CCI Implemented

Program	Year	Million Birr Budget spent by year	No. of beneficiaries covered in million	No. of HH beneficiaries covered	No. of graduates	No of HH graduates	No. of HH graduates
PSNP	2004/05	674	4.830	NA	NA	NA	104,846 1.3% of total Beneficiaries
	2005/06	1,002	7.192	NA	NA	NA	
	2006/07	1,133	7.192	NA	NA	NA	
	2007/08	1,615	7.355	NA	69,006	18,538	
	2008/09	1,956	7.574	NA	362,374	86,308	
	2009/10	2,393	7.535	NA	NA	NA	NA
	2010/11	2,709	7.642	NA	NA	NA	NA
	2011/12	4,963	6.889	NA	NA	NA	NA
HABP	2004/05	NA	NA	284,518	NA	NA	NA
	2005/06	NA	NA	366,521	NA	NA	NA
	2006/07	NA	NA	377,713	NA	NA	NA
	2007/08	NA	NA	378,209	NA	NA	NA
	2008/09	NA	NA	272,317	NA	NA	NA
Resettlement Program	2002/03	NA	NA	32,759	NA	NA	NA
	2003/04	NA	NA	63,274	NA	NA	NA
	2004/05	NA	NA	53,601	NA	NA	NA
	2005/06	NA	NA	15,107	NA	NA	NA
	2006/07	NA	NA	28,786	NA	NA	NA
	2007/08	NA	NA	11,603	NA	NA	NA
	2008/09	NA	NA	8,787	NA	NA	NA
Compl. C. Investment (CCI)		NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	NA

Source: MOA (PSP)

Table 2.4.2 Summary of PSNP, HABP, and Resettlement Planned

Programme	Year	Target Beneficiaries	Target Beneficiaries (HH)	Budget to be spent (birr)	Expected HH number of graduates	Expected number of graduates
PSNP (HH)	2010/11	7,458,629		5,586,920,000	368,120	1,840,630
	2011/12	5,618,029		4,275,492,170	370,980	1,854,873
	2012/13	3,763,129		3,013,647,902	320,940	1,604,713
	2013/14	2,158,429		1,936,994,652	1610,20	805,077
	2014/15	1,353,329		1,341,902,743	85,680	428,405
HABP	2010-2014			US $83.3 M		
	2010/11	NA	233,400	NA	NA	NA
	2011/12	NA	233,700	NA	NA	NA
	2012/13	NA	202,200	NA	NA	NA
	2013/14	NA	101,400	NA	NA	NA
	2014/15	NA	54,000	NA	NA	NA

[3] Food Security Programme 2010-2014, Household Asset Building, Ministry of Agriculture and Rural Development, August 2009.

Programme	Year	Target	Target	Budget to be	Expected HH	Expected
Resettlement Program	2010/11	NA	52,042	NA	NA	NA
	2011/12	NA	69,959	NA	NA	NA
	2012/13	NA	0	NA	NA	NA
	2013/14	NA	0	NA	NA	NA
	2014/15	NA	0	NA	NA	NA

Source: MOA (PSP)

2.5 Future Climate Change Scenario and its Implication

In sub-chapter 2.2 Weather Trend in Ethiopia and Eastern ï Southeastern Parts of Ethiopia, past climate data of temperature and rainfall have been examined. Major findings are; 1) strong inter-annual variability in Ethiopiaøs rainfall makes it difficult to detect long-term trends providing no clear trend decreasing or increasing in the patterns of rainfall, and 2) there is a clear and sharp increase trend in temperature. Mean annual temperatures showed an increase from 0.5 to as high as 0.8 Celsius degree per decade. In this sub-chapter, future climate change is presented based on available research results, from which implication on the peopleøs future livelihood is withdrawn:

2.5.1 Climate Change Analysis in Ethiopia by McSweeney, M. New and G. Lizcano

C. McSweeney, M. New and G. Lizcano[4] had examined past climate trend in terms of temperature and precipitation in Ethiopia, and then run the simulation of Global Circulation Model to project future climate till 2100. Findings from the examination are summarized as blow:

1) Mean annual temperature over Ethiopia has increased by 1.3 Celsius degree between 1960 and 2006, equivalent to an average rate of 0.28 Celsius degree per decade. The increase in temperature in Ethiopia has been most rapid in JAS (July, August and September) at a rate of 0.32 Celsius degree per decade. Daily temperature observations showed significantly increasing trends in the frequency of hot days[5], and much large increasing trends in the frequency of hot nights.
2) The average number of óhotô days per year in Ethiopia has increased by 73 (an additional 20% of days) between 1960 and 2003. The rate of increase is seen most strongly in JJA (June, July, August) when the average number of hot JJA days has increased by 9.9 days per month (an additional 32% of JJA days) over this period.
3) The average number of óhotô nights per year increased by 137 (an additional 38% of nights) between 1960 and 2003. The rate of increase is seen most strongly in JJA (June, July, August) when the average number of hot JJA nights has increased by 18 days per month (an additional 59% of JJA nights) over this period.
4) The frequency of cold[6] days has decreased significantly in all seasons except DJF (December, January, February). The frequency of cold nights has decreased rapidly and significantly in all seasons. The average number of ócoldô days per year has decreased by 21 (5.8% of days) between 1960 and 2003. This rate of decrease is the most rapid in SON (September, October, November) when the average number of cold SON days has decreased by 2.3 days per month (7.4% of SON days) over this period.
5) The average number of ócoldô nights per year has decreased by 41 (11% of days). This rate of decrease is the most rapid in JJA (June, July, August) when the average number of cold JJA nights has decreased by 3.7 nights per month (12% of JJA nights) over this period.
6) On the precipitation, the strong inter-annual and inter-decadal variability prevails, so that one cannot observe clear trend of increasing or decreasing in rainfall in the long run. There is not a

[4] Scholl of Geography and Environment, University of Oxford, Tyndall Centre for Climate Change Research.
[5] óHotô day or óhotô night is defined by the temperature exceeded on 10% of days or nights in current climate.
[6] óColdô days or ócoldô nights are defined as the temperature below which 10% of days or nights are recorded in current climate of that region and season.

statistically significant trend in observed mean rainfall in any season in Ethiopia between 1960 and 2006. Decreases in JAS (July, August, September) rainfall observed in the 1980s have shown recovery in the 1990s and 2000s.

Above findings by C. McSweeney, M. New and G. Lizcano are very much corresponding to the examination results on the seven meteorological stations located at central ï eastern parts of Ethiopia under ñ2.2 Weather Trend in Ethiopia and Eastern ï Southeastern Parts of Ethiopiaò. However, the ratios of temperature increase computed for the seven stations were much higher than those findings by C. McSweeney, M. New and G. Lizcano. Former examination indicated 0.5 to as much as 0.8 Celsius degree hike per decade while the latter did 0.28 Celsius degree only. This higher increase may be attributed to the period covered and the location.

Seven stations data covered from early 1980s to date while the other covered since 1960 to 2006. It means that the seven stations data represent only the recent trend while the other dose longer period of time. It is reported, for example in IPCC report, that the rate of temperature increase in recent years is higher than the past whereby the seven stations data may have shown the higher ratio of increase. The seven stations are located in central-eastern part of Ethiopia where higher temperature prevails than the most highland areas of Ethiopia. Under this environment, temperature rise may have been amplified than those areas of highland.

C. McSweeney, M. New and G. Lizcano had further run computer simulations of general circulation model (GCM). GCM is a mathematical model of the general circulation of a planetary atmosphere or ocean and based on the Navierï Stokes equations on a rotating sphere with thermodynamic terms for various energy sources (radiation, latent heat). These equations are the basis for complex computer programs commonly used for simulating the atmosphere or ocean of the Earth. The GCM projections indicated the following results in temperature change and precipitation change in future over Ethiopia, and detail descriptions are made below:

Table 2.5.1 Temperature and Precipitation Projection by GCM (UNDP Climate Change County Profiles)

Season	Observed Mean 1970 - 99	Observed Trend 1960-2006	C.C. Scenario	Projected changes by the 2030s			Projected changes by the 2060s			Projected changed by the 2090s		
				Min	Median	Max	Min	Median	Max	Min	Median	Max
Temperature												
	C. degree	change in C/10-yr		Change in °C			Change in °C			Change in °C		
Annual	22.7	0.28*	A2	0.9	1.3	1.6	2.0	2.7	3.1	3.1	4.2	5.1
			A1B	0.9	1.4	1.6	1.7	2.6	2.9	2.5	3.5	4.6
			B1	0.5	1.1	1.4	1.1	1.8	2.2	1.5	2.3	3.0
JFM	23	0.27*	A2	0.8	1.3	1.8	1.8	2.6	3.1	2.9	4.4	5.4
			A1B	0.6	1.3	1.7	1.7	2.6	3.1	2.3	3.4	4.3
			B1	0.3	1.1	1.4	1.0	1.8	2.3	1.5	2.2	2.9
AMJ	23.8	0.31*	A2	**0.9**	**1.4**	1.8	**2.1**	**2.6**	3.3	**3.0**	**4.5**	5.3
			A1B	0.9	1.5	1.9	1.8	2.6	3.0	2.6	3.5	4.9
			B1	0.6	1.0	1.6	1.2	1.8	2.5	1.5	2.3	3.2
JAS	22.4	0.32*	A2	0.8	1.3	1.6	1.8	2.6	3.5	3.3	4.1	5.2
			A1B	0.8	1.3	1.9	1.8	2.6	2.9	2.5	3.4	4.8
			B1	0.6	1.0	1.5	1.1	1.8	2.3	1.6	2.2	2.9
OND	21.7	0.22*	A2	0.6	1.2	1.6	1.9	2.6	3.1	3.0	4.0	5.0
			A1B	0.9	1.4	1.7	1.6	2.5	2.9	2.3	3.4	4.5
			B1	0.3	1.0	1.4	1.0	1.7	2.2	1.4	2.1	3.0
Precipitation, mm												
	mm per month	**change in mm/10-yr**		**Change in mm**			**Change in mm**			**Change in mm**		
Annual	65.6	-1.2	A2	-2	3	9	-4	2	14	-2	6	25
			A1B	-2	1	7	-2	2	14	-4	4	13
			B1	-3	1	6	-3	3	9	-4	2	10
JFM	24.7	-0.2	A2	-2	0	4	-3	2	15	-1	3	13
			A1B	-3	2	14	-1	1	10	-6	0	14
			B1	-3	1	8	-3	1	6	-3	0	8
AMJ	84.0	-2.1	A2	-13	**0**	17	-13	-4	13	**-10**	**2**	24
			A1B	-12	0	9	-7	-1	12	-19	-2	11
			B1	-12	0	9	-15	0	12	-9	2	5
JAS	115.9	-1.9	A2	-20	2	15	-20	2	16	-17	1	30
			A1B	-13	0	11	-11	2	15	-12	0	14
			B1	-8	0	10	-8	0	15	-18	2	14
OND	37.7	-0.4	A2	-1	10	22	-4	7	39	2	22	58
			A1B	0	5	32	-2	10	38	3	14	47
			B1	-4	6	26	-3	11	20	-7	8	29

Note: * indicates trend is statistically significance at 95% confidence.

Note: CC means climate change scenario.

1) The mean annual temperature in Ethiopia is projected to increase by 1.1 to 3.1 Celsius degree by the 2060s, and 1.5 to 5.1 Celsius degree by the 2090s according to the climate change scenario A2, A1B, and B1. Under a single emission scenario (B1), the projected changes from different models span a range of up to 2.1 Celsius degree while highest emission scenario shows as high as 5.1 Celsius degree (see Figure 2.5.1).

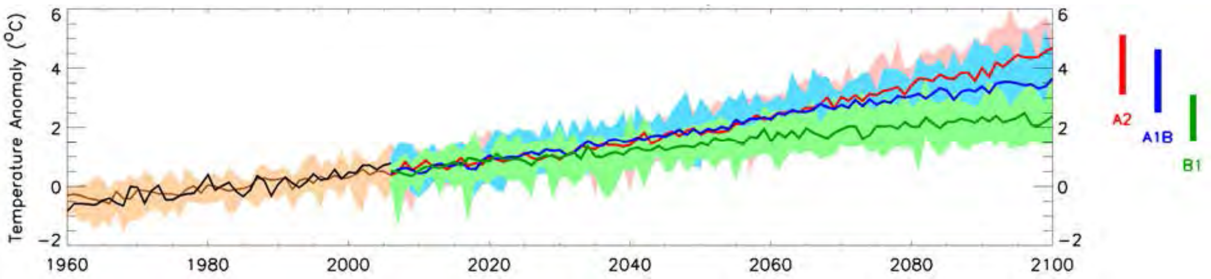


Figure 2.5.1 Mean Temperature Anomaly Annual relative to 1970-1999 Mean Temperature
Source: UNDP Climate Change Country Profiles, Ethiopia

2) By region, northern part of Ethiopia will have higher temperature increase than south and south-eastern parts. Looking into the Borena, south-eastern part of Oromia region, the annual temperature rises simulated under A2 scenario are 1.2, 2.4-2.6, and 3.9-4.0 Celsius degree respectively in 2030s, 2060s, and 2090s (see upper panels of Figure 2.5.2). In Gode area, the rises are 1.2, 2.5, and 3.9 Celsius degree respectively (see upper panels of Figure 2.5.2).

3) The hottest season in Borena and Somali area usually shows up in January ï March, just before the onset of Berg rainy season. Figure 2.5.2 shows in the lower panel of figures the temperature change during the period of January ï March. The temperature hikes are 1.3, 2.5-2.8, 4.2-4.5 Celsius degree for Borena area and 1.3, 2.7, and 4.6 Celsius degree respectively to the years, which were also computed under climate change scenario A2 (highest emission scenario).

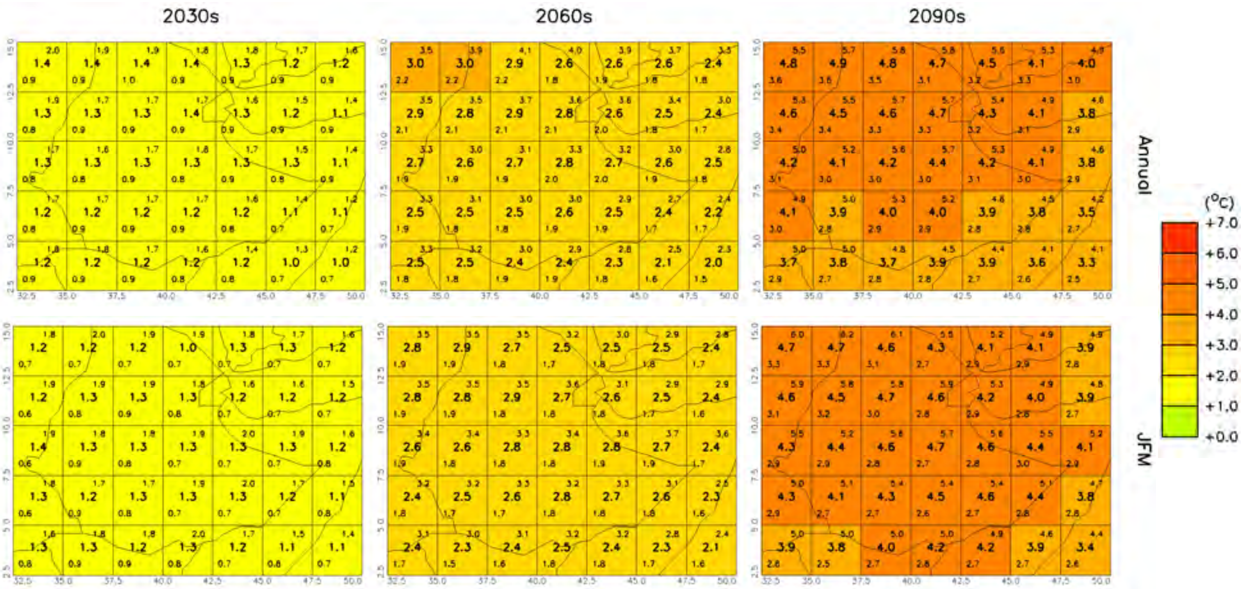


Figure 2.5.2 Special Patterns of Projected Temperature in Annul and JFM Season
Source: UNDP Climate Change Country Profiles, Ethiopia

4) All projections indicate substantial increases in the frequency of days and nights that are considered ðhotô in current climate. Annually, projections indicate that ðhotô days will occur on 19 - 40% of days by the 2060s, and 26 - 69% of days by the 2090s. Days that are considered ðhotô for their season are projected to increase the most rapidly in JAS (July, August, September), occurring on 38 - 93% of days in JAS by the 2090s.

5) Nights that are considered ðhotô for the annual climate of 1970 - 99 are projected to increase more

quickly that hot days, occurring on 29 - 66% of nights by the 2060s and 34 - 87% of nights by the 2090s. Nights that are considered ôhotô for their season are projected to increase the most rapidly in JAS, occurring on 53 - 99% of nights in JAS by the 2090s.

6) On the precipitation, the projection from GCM indicates slight increases in annual rainfall in Ethiopia (see Figure 2.5.3 shown in percentage change relative to 1970 ï 1999 mean climate). These increases are largely a result of increasing rainfall in the óshortô rainfall season of OND (October, November, December) in southern and south-eastern Ethiopia.

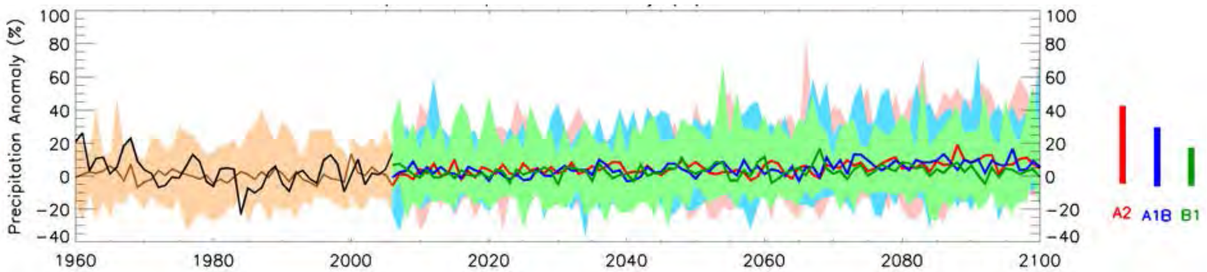


Figure 2.5.3 Monthly Rainfall Anomaly (%) Annual relative to 1970 – 1999 Mean Climate

Source: UNDP Climate Change Country Profiles, Ethiopia

7) On the precipitation distribution change, as is shown in the top panels of Figure 2.5.4 annual rainfall is to increase in eastern part of Ethiopia in 2030s, and eastern and southern parts of Ethiopia in 2060s, and certain range of increase in south-eastern parts of Ethiopia in 2090s. Looking into Belg (Gana) rainy season from April to June shown in the mid panels of Figure 2.5.4, southern part of Ethiopia including Borena zone is projected to have more rainfall except for the 2060s while in the northern part of Ethiopia the rainfall is to decrease. For the Mehr (Hagaya) season, ratio of increase is more than those of Belg season and almost all the area of Ethiopia is projected to have more rainfall especially in north-eastern part of the country.

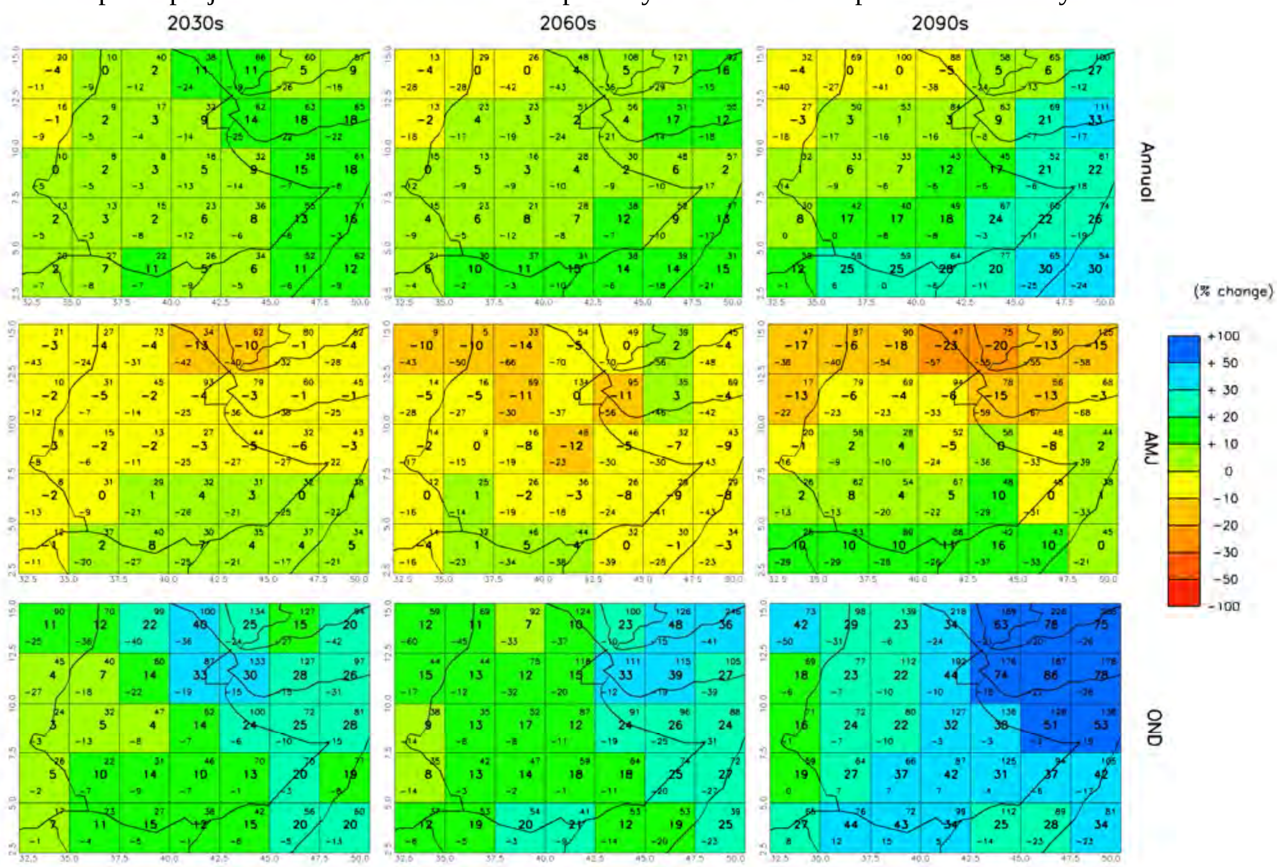


Figure 2.5.4 Spatial Patterns of Projected Rainfall Change in % to 1970 – 1999 Mean Climate

Source: UNDP Climate Change Country Profiles, Ethiopia

8) Simulation results indicate increases in the proportion of total rainfall that falls in ðheavy eventsñ. This is represented by the increase in the magnitude of 1-day (see the top panels of Figure 2.5.5) and 5-day rainfall maxima (see the bottom panels of Figure 2.5.5). The annual increases arise largely due to the increase in OND (October, November, December) rainfall as shown in Figure 2.5.4. Figure 2.5.5 further indicates that the changes in maxima in 1-day events in a year range from 1 ï 5 mm in 2060s and 0 ï 11 mm in 2090s while 5-day events per year range from 3 ï 10 mm in 2060s and 1 ï 22 mm in 2090s. Especially, southern, eastern and south-eastern parts including Borena zone and Gode area will receive more frequent maxima event.

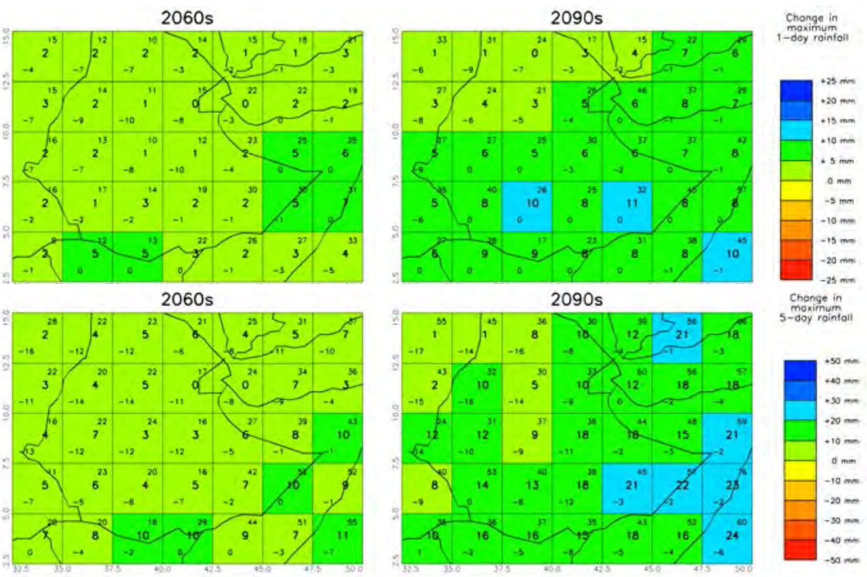


Figure 2.5.5 Spatial Patterns of Max 1-day and 5-day Rainfall (Annual)
Source: UNDP Climate Change Country Profiles, Ethiopia

2.5.2 Climate Trend Analysis by USAID

USAID Famine Early Warning System Network (FEWS, NET) examined recent trend in rainfall based on the last 110 years (1900 ï 2009) climate data where available recorded at 215 rainfall gauges and 9 air temperature stations. The data were calculated for mean values for the periods of 1960 ï 1989 and 1990 ï 2009. The difference between these means was converted into 1960 ï 2009 trend observations, and interoperated using a geo-statistical technique to project the trend in future from 2010 ï 2039.

Figure 2.5.6 shows climate change in rainfall as; A shows the average location of March ï June 500 mm rainfall counter lines for 1960 ï 1989 (light brown), 1990 ï 2009 (dark brown), and projected 2010 ï 2039 (orange); B shows the average location of the Juneï September 500 mm rainfall counter liens; C shows the average location of the Marchï September 900 mm rainfall isohyets; and D shows the average location of the Marchï June 250 mm rainfall isohyets. The semi-transparent purple overlay shows the areas with 2007 population densities of greater than 100 people per sq.km, and the yellow shading in the background delineates agricultural areas; the gray background delineates agro-pastoral and pastoral livelihood areas.

A conclusion from the figure is that between mid-1970s and late 2000s, Belg (March ï June rains) and Kiremt (June ï September) rainfalls decreased by 15 ï 20 % across parts of southern, south-western, and south-eastern Ethiopia. This is described as a contraction of the areas receiving adequate rainfall for viable agriculture livelihoods, which was assumed to be greater than 500 mm of rainfall per rainy season.

Between 1960 and 1989, the area receiving (on average) this 500 mm rain or more during the Belg season was large, more than 215,000 sq.km. For the Belg season this area is shown in light brown in the upper left panel of Figure 2.5.6 (A) and should be understood to lie beneath the dark brown and orange areas. During the past 20 years, the areas receiving sufficient Belg rains have contracted by 16 % (dark brown polygon), exposing densely populated areas in the Rift Valley insecurity. A continued decline in rainfall could result in a contraction of the area receiving more than 500 mm during the Belg season (orange polygon) by another 16 % in 2010 - 2029.

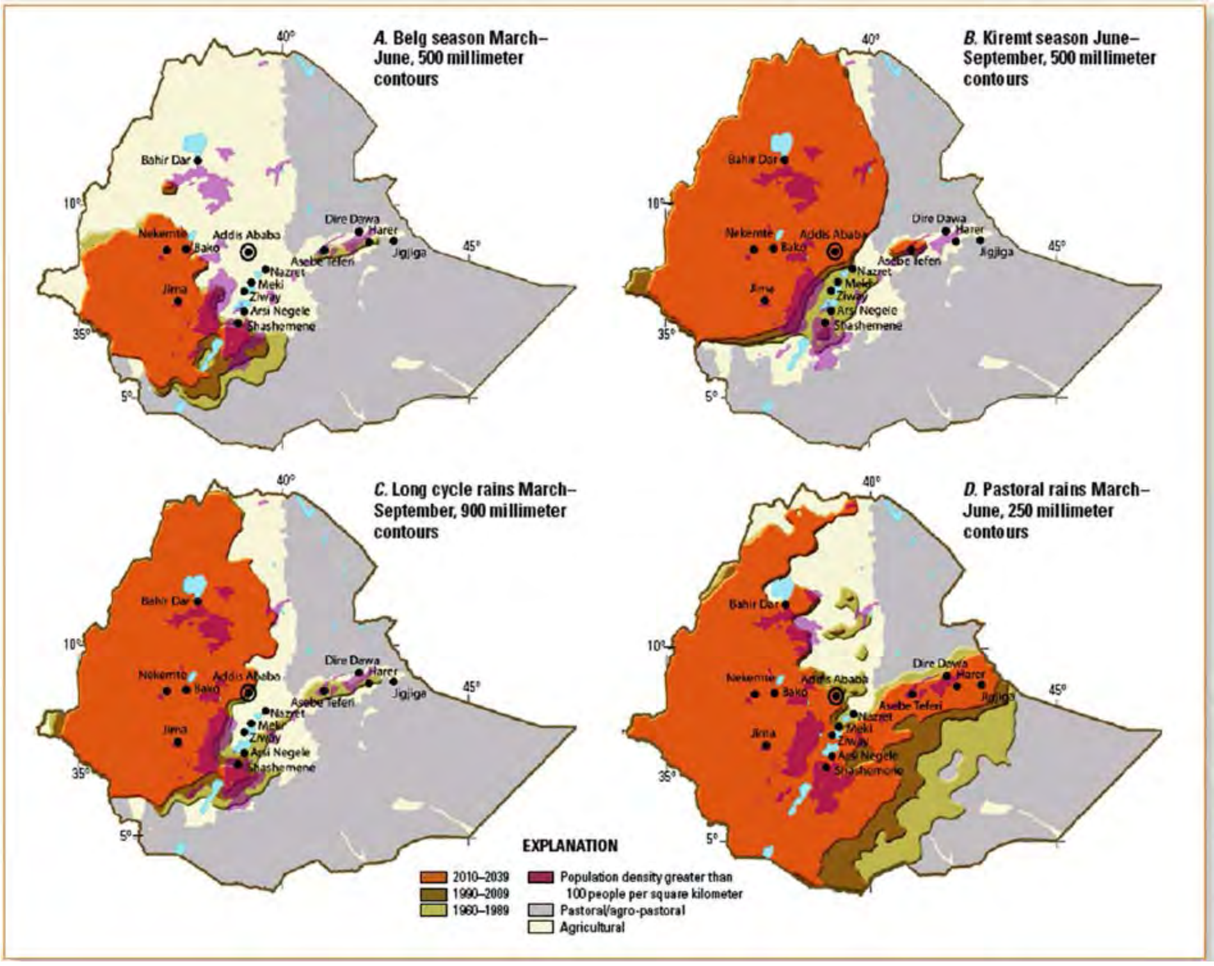


Figure 2.5.6 Climate change (A. Belg, B. Kiremt, C. Long Cycle Rains, D. Pastoral Rains of March-June)

Source: A Climate Trend Analysis of Ethiopia, USAID

During the Kiremt season between 1960 and 1989 the area receiving (on average) more than 500 mm is shown in light brown in the upper right of Figure 2.5.6 (B). During the past 20 years, the areas receiving sufficient Kiremt rains has also contracted (dark brown polygon), giving insecurity on many of the same Rift Valley populations in SNNPR and southern and eastern parts of Oromia region. These affected areas have approximately 12.6 million inhabitants (based on 2008 Land scan data; ORNL, 2011).

March to September, 900 mm rainfall accumulations, which relate directly to the performance of slow maturing ðlong cycleô crops, exhibit some areas of reductions in rainfall, running in a band that stretches from the eastern highlands to south-central Ethiopia as shown in the lower left panel of Figure 2.5.6 (C). Approximately 20.7 million people live in these affected zones. Poor long cycle crop performance in the south-central and eastern midlands and highlands could directly affect the livelihoods of many of these people, while adding pressure to national cereal prices.

Climate changes observed in pastoral zones are shown in lower right panel of Figure 2.5.6 (D), which shows the northwestward retreat of the 250 mm Belg season Marchï June isohyets between 1960ï 1989, 1990ï 2009 and as projected forward for 2010ï 2039. Such rainfall declines during the Belg season are reducing the quantity and quality of viable pasturelands including Borena zone. More frequent droughts in these areas are making it difficult for livestock to recover from poor rainy seasons. The area of contraction affects a total population of approximately 7 million.

On the temperature, Figure 2.5.7 shows spatial patterns and quantities of projected temperature increases by extending the rate of observed 1960 ï 2009 changes for each season, through 2010 ï 2039, based on an assumed persistence of the observed trends withdrawn from the examination by óA Climate Trend Analysis of Ethiopia, USAIDô. Given this estimation, the temperature from March ï June will increase the most in central to south-eastern part of the country by more than 1.2 Celsius degree during the period from 2010 ï 2039 (more than 0.4 Celsius degree increase per decade).

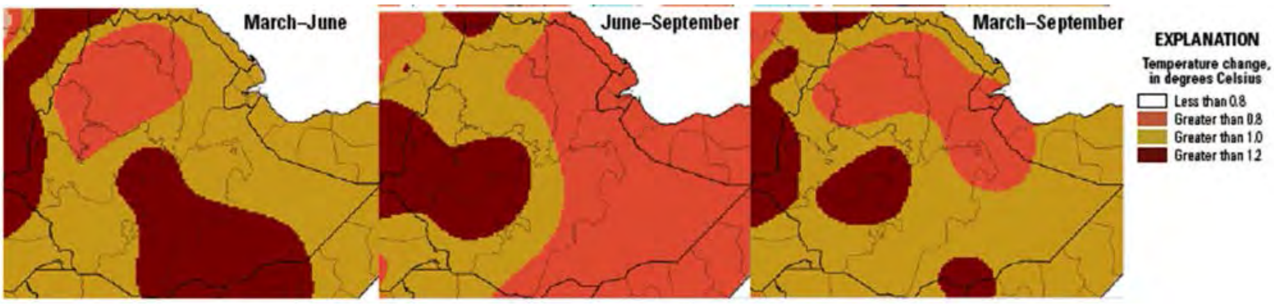


Figure 2.5.7 Projected Changes in March-June, June-September, and March-September Temperature

Source: A Climate Trend Analysis of Ethiopia, USAID

From June ï September, highest temperature rise will appear in central western part of the country while much of the eastern part will receive 0.8 ï 1.0 Celsius degree increase (approximately 0.3 Celsius degree increase per decade). From March ï September, northern part of the country receives between 0.8 and 1.0 Celsius degree increase while most of the other parts will receive 1.0 to 1.2 Celsius degree increase (0.3 ï 0.4 Celsius degree increase per decade) with high spot areas in western part and in south-eastern part bordering with Kenya.

2.5.3 Implications under Future Climate Change

On the temperature, the clear trend is that the temperature has been increasing and will increase in future as well. Based on the seven meteorological stations examined under this Project, the ratio of the increase is higher than the other research results, ranging from 0.5 to as high as 0.8 Celsius degrees while the others show a range of 0.28 Celsius degree average increase in annual temperature (or 0.22 ï 0.32 Celsius degree increase by season) by C. McSweeney, M. New and G. Lizcano and a range of 0.3 ï 0.4 Celsius degree increase by USAID óA Climate Trend Analysis of Ethiopiaô. Seven stations cited under this Project referred only to the recent trend after 1980s except for Jijiga station, and therefore recent temperature increase may be more than before.

In the future temperature, C. McSweeney, M. New and G. Lizcano had projected 1.4 ï 1.8 Celsius degree increase by 2030s, 2.2 ï 3.1 Celsius degree increase by 2060s and 3.0 ï 5.4 Celsius degree increase by 2090s in the annual temperature over Ethiopia according to climate change scenarios such as A1B, B1, and A2 depending upon the projection of green house gas emission. The increases are relative to the mean value of 1970 ï 1999 temperature, so that 0.3 to as much as 0.5 Celsius degree increase per decade is projected. USAID óA Climate Trend Analysis of Ethiopiaô had just assumed the past trend will persist in future too whereby same increase ratio of 0.3 ï 0.4 Celsius degree per decade was cited.

It is generally recognized that in future the temperature increase would accelerate due to irreversible melting effect on the huge sum of ices in the Poles and Greenland, etc. It is therefore rational to assume the people would face higher temperature, hot days and hot nights than ever before with a rate of 0.3 ï 0.5 Celsius degree increase per decade or even more. This temperature increase would affect the peopleõs livelihood to a greater extent.

On the precipitation, there may be a discrepancy between the existing research results aforementioned. C. McSweeney, M. New and G. Lizcano had identified no clear trend in the rainfall pattern in the past which is the same finding that this Project examined. On the other hand, USAID óA Climate Trend Analysis of Ethiopiaô indicated contraction of the areas which receive a threshold rainfall for farming.

The USAID research indicated 15 ï 20 % annual rainfall decline since the mid-1970s to date. Especially, average location of the March-June 250 mm rainfall contour lines, which is applicable for pastoral areas, was indicated to have retreated north-westwards as shown in the aforementioned Figure 2.5.6 (D). This phenomenon must have been affecting the quantity and quality of viable pasturelands in those pastoral areas including Borena zone.

Though it may be difficult to project the future rainfall pattern whether it is to increase or decrease, one thing clear is that even under the situation there would be more rainfall in the amount, the pattern would fall under heavy events to a large extent as aforementioned in the Figure 2.5.5. Therefore, future rainfall pattern would be more fluctuated than the past trend, which in turn would result in degrading pastureland due to frequent torrential rainfalls.

Summing up the above discussions, it may be concluded that peopleøs livelihood would be greatly affected due to the temperature increase, increased number of hot-day and hot-night, heavy events in the rainfall pattern, and probable retreat of threshold rainfall counter line enough for keeping good pastureland in the pastoral areas, etc. Since the people in the pastoral areas are already facing harsh environmental conditions, their vulnerability would be worsened losing quantity and quality of viable pasturelands should any measures not be undertaken.

PART II

COMPONENT I

(BORENA ZONE, OROMIA)

CHAPTER 1 PROJECT TARGET AREA

This chapter discusses the present situation of Borena zone, Oromia region from different angles such as spatial settings, demography, administration, and natural environment; major development sectors elaborating economy, development indexes, livestock, agriculture, infrastructure, as well as major development actors operating in the zone.

1.1 Spatial Settings, Administration, Natural Condition and Demography

The Borena Zone is located at 3 degree 26 minutes ï 6 degree 32 minutes N latitude and 36 degree 43 minutes- 40 degree 46 minutes E longitudes and its capital is Yabelo Town. It is located in the southern part of Oromia region. The Borena zone is divided into 13 woredas (districts) as shown in Figure 1.1.1, bordered in the south by Kenya, in northwest by the Southern Nations, Nationalities, and Peoples Regional State (SNNPRS), in northeast by Guji Zone, and in southeast by the Somali region.

As a zonal administrative entity it encompasses the total area of about 45,435 sq.km (CSA, 2011), equivalent to approximately 200 km square area. Most areas of Borena zone lies below 1,500m above mean sea level, especially in the eastern area bordering Somali region and southern part bordering Kenya. It is an arid and semi arid area with pockets of sub-humid zones. Of the area, grazing/browsing land covers about 18,712 sq.km (41%), bush and woodland about 15,510 sq.km (34%), and cultivated land about 3,421 sq.km (8%, 342,040 ha)[1].

1.1.1 Natural Conditions

As is shown in Figure 1.1.1, Borena zone does not show great physiographic diversity. Vast area of the zone is warm semi-arid lowland (known as Gamoji in Afan Oromo). These wide areas are found in the southwest and eastern parts of the zone including Moyale, Dire, Arero, and Yabelo. Some cool-humid highlands (over 1500 m above sea level) are found only in north central and southern parts of the zone including some areas in Abaya, Bule Hora, Yabelo and Dire districts. Yabelo-Mega plateau rising to 2000m and some of the highlands of Bule-Hora with altitude over 2500m are the most notable highland sections of the Borena.

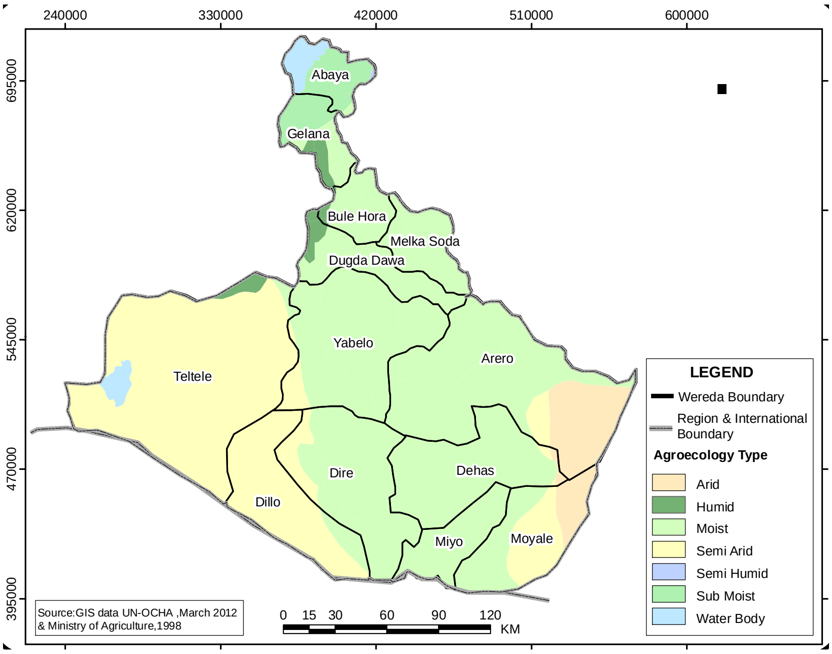


Figure 1.1.1 Administration and Agro-ecological Map of Borena Zone

Grassing/browsing land shares the most of the Borena zone, reaching as much as 18,712 sq.km, equivalent to 41% of the total Borena zone. The rangelands are dominated by tropical savannah vegetation with varying proportions of open grasslands and perennial woody vegetation. Because of the recurrent drought prevalence and rapid population increase in the area, rangeland recourses have depleted and are hardly able to carry livestock resources. It is therefore common to observe the pastoralists conflicting over pasture and water resources while they seasonally wander in search of

[1] Oromia Land and Environmental Protection Bureau, (2010)

pasture and water for their livestock.

1.1.2 Rainfall Trends, Variability, Irregularity and Scarcity

Borenaôs climate is basically divided into 2; namely the one for the mid-highland and highland areas, and the other for the lowland areas. The former is represented by Abaya, Galena and Bule Hora woredas while the latter by the rest 10 woredas falling in the lowland. The former shows quite similar climate to that of highland areas of Ethiopia while the latter is rather different. As is well known, there are bimodal rainy seasons in Ethiopia; and early rainy season in a year provides less rainfall than that of late rainy season for the highland areas while the reverse takes place for the lowland areas of Borena (refer to Table 1.1.1).

The lowland areas are severely affected by recurrent droughts. Looking at the rainfall pattern in the lowland area, about 50% of annual rainfall occurs in the long rainy season (*Ganna*), which covers from March to May (Table 1.1.1 below), while about 30% falls in the short rainy season (*Hagaya*) from September to November. The long dry season (*Bona*) occurs from December to February, and the short dry season (*Adolessa*) occurs from June to August. Variable rainfall results in great variability of forage and range production. To cope with variable range production, communities in Borena often combine mobility and sedentary livestock management.

Table 1.1.1 Seasons and Respective Proportion of Rainfall in Borena Zone

(1) Mid-highland and Highland

<table>
<tr><td>Months</td><td>D</td><td>J</td><td>F</td><td>M</td><td>A</td><td colspan="2">M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td></tr>
<tr><td>Seasons</td><td colspan="3">Bona
(Long dry season)</td><td colspan="3">Arfasa
(Short rainy season)</td><td>Dry season</td><td colspan="4">Ganna
(Long season)</td><td colspan="2">Birra
(Short dry season)</td></tr>
</table>

(2) Lowland

<table>
<tr><td>Months</td><td>D</td><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td></tr>
<tr><td>Seasons</td><td colspan="3">Bona
(Long dry season)
/≅11% rainfall/</td><td colspan="3">Ganna
(Long rainy season)
/≅53% rainfall/</td><td colspan="3">Adolessa
(Short dry season)
/≅6% rainfall/</td><td colspan="3">Hagaya
(Short rainy season)
/≅30% annual rainfall/</td></tr>
</table>

Source: JICA Project Team, Note: the percentages are estimated based on the rainfall data for the stations referred to in this section.

Average monthly rainfall and temperature data in the area are indicated in Figure 1.1.2. The data are taken from the NMA for stations found in different representative areas within Borena zone; i.e. Yabelo, Teltele, Moyale and Hagara Marian. Only Hagara Marian can be classified into highland area. The average annual rainfall ranges between 592 and 984 mm by station with considerable spatial and temporal variability in quantities and distribution. As Figure 1.1.2 shows, *Ganna* is more important rainy season than *Hagaya* in the area. On average, 51% of the annual precipitation concentrates in 3 months, March to May.

The climate of Borena zone varies from hot arid to warm semi-arid, and further to cool sub-humid. About 56% of the total area of the zone is characterized by hot arid (locally known as *gamojji-ho'a*), while about 31% and 13% of the total area is characterized by warm semi-arid (known as *gamojji*) and cool sub-humid (*badda-dare*) climate[2]. The warmest period in the year is from January to March, while the lowest annual temperatures occur between the months of June and August. However, fluctuation of temperature is relatively moderate throughout of the year in Borena.

[2] Oromia Land and Environmental Protection Bureau, (2010)

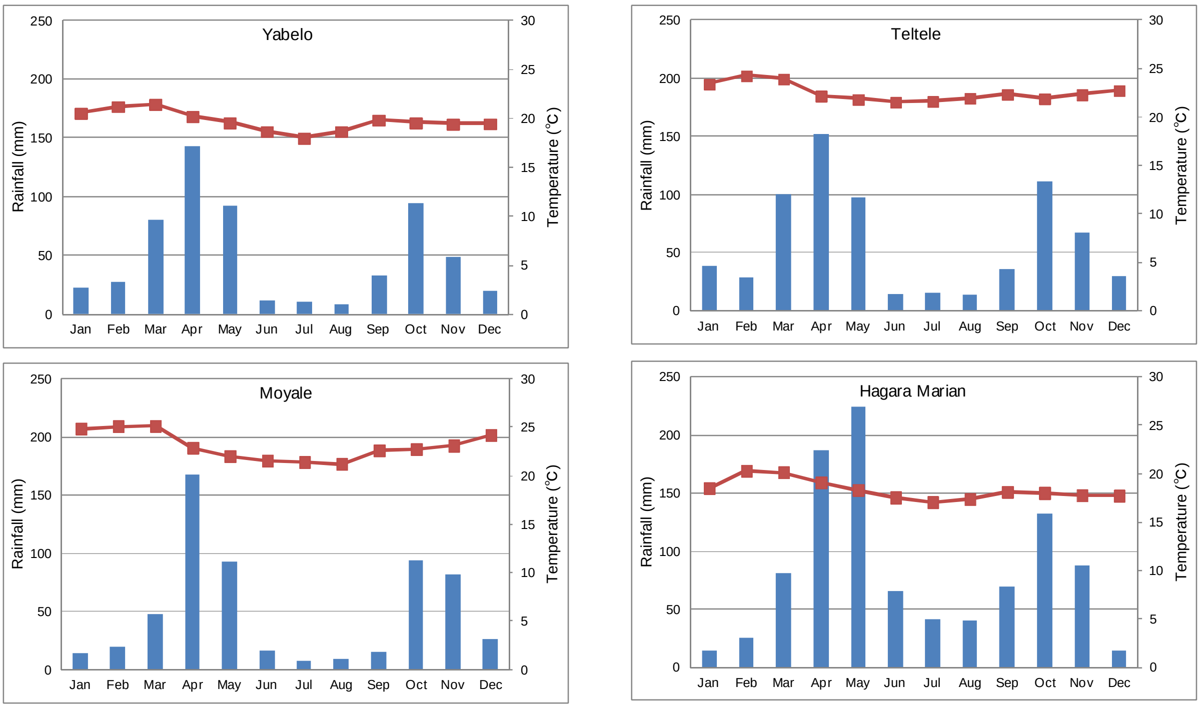


Figure 1.1.2 Monthly Rainfall and Temperature in 4 areas in Borena Zone
Source: National Meteorological Agency

Figure 1.1.3 shows averaged annual rainfall for the 4 stations described above. As indicated in the figure, the average annual temperature in Borena has been rising since late 1970s. The figure indicates that the mean annual temperature has risen from 19.4^{0}C in late 1970s to about 21.0^{0}C in 2010, presenting an increase of 0.52^{0}C per decade. Figure 1.1.4 shows long-term annual precipitation in Borena zone for the 2 stations of Yabelo and Moyale. As indicated, the annual rainfall fluctuates very much; however, there is not clear trend in the rainfall increasing or decreasing over the period of last 30 years.

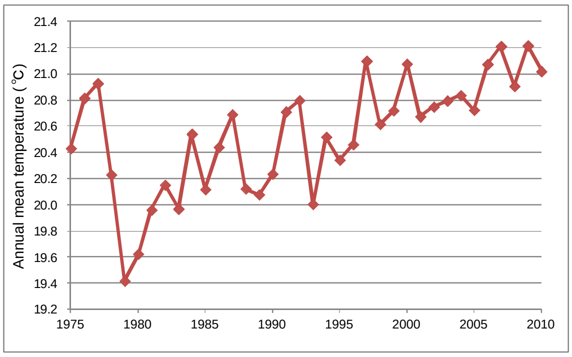


Figure 1.1.3 Long-term Annual Temperature in the Borena Zone
Source: National Meteorological Agency

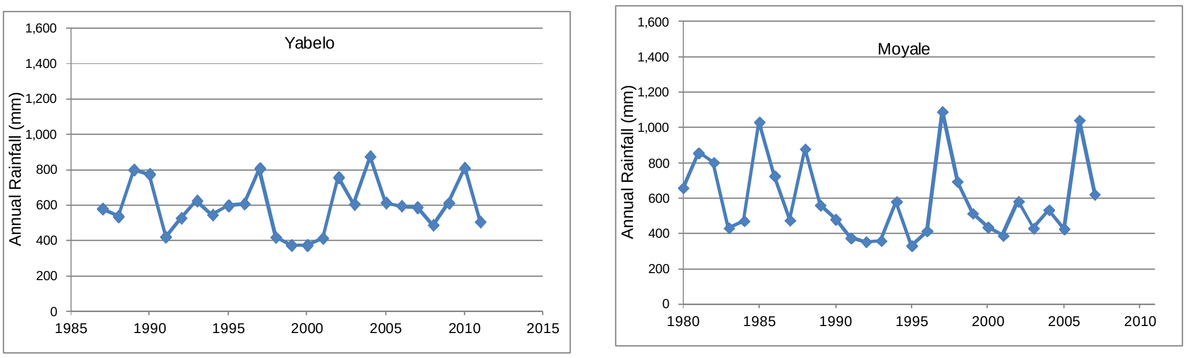


Figure 1.1.4 Long-term Annual Rainfall in the Borena Zone
Source: National Meteorological Agency

1.1.3 Demography

In Ethiopia, last national census was carried out in 2007. According to the census as shown in Table 1.1.2, the population of Borena zone was 962,489 as at year 2007, which shared 3.6% of the whole Oromia regionôs population of 26,993,933. Given the total land area of 45,435 sq.km of Borena zone, the population density at year 2007 arrived at 21 persons only per sq.km, which is relatively low as compared with the averages of Oromia region and whole country, 76[3] persons per sq.km and 65[4] persons per sq.km, respectively.

In addition to the Census 2007, Finance and Economic Development Bureau of Borena zone has been updating the population basically by every year though there is always difficulty in keeping accuracy of counting the people. Table 1.1.2 summarizes the population as at 2012 given by the Bureau. The table shows there were 1,113,538 people as at year 2012, which was increased by 116 % as compared with that population of last census year 2007. The inter-annual population growth over the 5 years thus arrives at as high as 3%. The 3% growth ratio means the population will double over the period of 24 years. By woreda, all the woredas except for Arero (-4.6%) show an increasing trend ranging from 0.5 (Teltele) to as high as 9 % (Dire).

Table 1.1.2 Population of Borena Zone by Woreda, Urban and Rural

Census 2007		Current	Urban + Rural			Urban			Rural			Increase	Ratio
Woreda	Population	2012	Both	Male	Female	Both	Male	Female	Both	Male	Female	%	%
Abaya	103,348	Abaya	119,747	60,286	59,461	5,717	2,874	2,844	114,030	57,412	56,617	116	3.0
Gelana	71,369	Gelana	80,577	40,709	39,868	3,084	1,620	1,464	77,493	39,089	38,404	113	2.5
Bule Hora	264,489	Bule Hora	308,139	155,885	152,254	46,425	24,009	22,416	261,715	131,876	129,838	117	3.1
Dugda Dawa	147,327	Malka Soda	68,651	34,946	33,705	0	0	0	68,651	34,946	33,705	114	2.7
		Dugda Dawa	99,678	50,867	48,811	6,946	3,567	3,378	92,734	47,300	45,433		
Yabelo	102,165	Yabelo	118,921	59,928	58,993	22,223	11,951	10,273	96,697	47,977	48,720	116	3.1
Arero	48,126	Arero	38,121	20,020	18,101	3,760	1,933	1,827	34,360	18,087	16,274	79	-4.6
Teltele	70,501	Teltele	72,345	36,540	35,805	6,098	3,164	2,934	66,246	33,376	32,871	103	0.5
Dire	73,401	Dillo	26,379	14,054	12,325	0	0	0	26,379	14,054	12,325	154	9.0
		Dire	58,330	29,376	28,954	7,681	3,976	3,705	50,649	25,400	25,249		
		Dhas	28,372	13,713	14,659	0	0	0	28,373	13,713	14,659		
Miyo	50,601	Miyo	58,680	28,790	29,890	4,932	2,409	2,523	53,748	26,381	27,367	116	3.0
Moyale	31,162	Moyale	35,598	18,425	17,173	0	0	0	35,598	18,425	17,173	114	2.7
Borena Zone	962,489	Borena Zone	1,113,538	563,539	549,999	106,866	55,503	51,364	1,006,673	508,036	498,635	116	3.0
			Ratio	51	49	10	52	48	90	50	50		

Source: Census 2007 (CSA) for population 2007, and population data in 2007 was given by Finance and Economic Development Bureau of Borena Zone.

According to the above table and Figure 1.1.5, Bule Hora[5] woreda shows quite large population amongst the 13 woredas. The population arrives at 308,139, sharing as much as 28% of the zonal population. The other woredas carries approximately 30,000 to just over 100,000 population. Note that area by woreda is not available, whereby population density at woreda level can not be estimated.

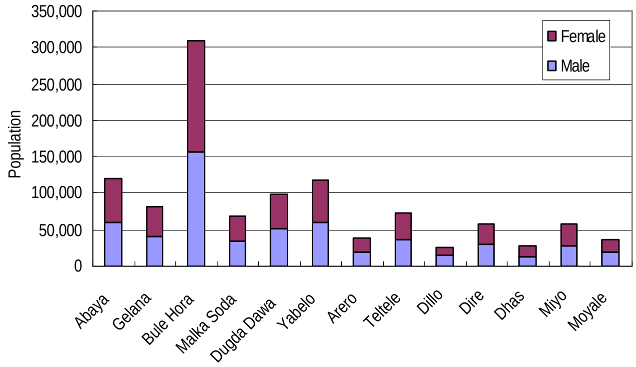


Figure 1.1.5 Population by Sex and By Woreda as at 2012
Source: Finance and Economic Development Bureau of Borena Zone

By sex, as in the bottom row of Table 1.1.2, male population shares 51% while female population occupies the rest, which is 49%. In fact, there is a general tendency that female population tends to surpass a bit that of male since biologically female is stronger keeping high survival ratio than the counterparts. However, here in Borena zone, though the difference is small, the male population shows a bit of larger portion than female. By area where the population resides, as much as 90% of the population live in rural area while the rest, only 10% live in urban towns.

Figure 1.1.6 summarizes the population cohort by sex by a range of each 5-year age. As is well

[3] Oromia region's population and area as of 2007 are 26,993,933 person and 353,632 sq.km (CSA, Census 2007).
[4] Ethiopia's population and area as of 2007 are 73,750,932 persons and 1,127,127 sq.km (CSA, Census 2007).
[5] Bule Hora is located along the main road and there is a town called Hagere-Mariam where lots number of people reside and come for business.

illustrated, the cohort shows very pyramidal appearance, the younger they are the more population presents. This kind of very pyramidal appearance usually shows up in such areas where high population growth ratio is accompanied. The population growth ratio in Borena zone is 3.0 % as aforementioned and also total fertility ratio as of Census 2007 was 5.95, which must have contributed to making such pyramidal cohort.

Table 1.1.3 shows the population as of Census 2007 together with the numbers of households by urban and rural. Dividing the population by number of households leads to the members per household. As in the table, in urban area of Borena zone the average member of the household ranges 3.9 in Dire to 5.1 in Dugda Dawa with an average of 4.3 members while in rural area the member ranges from 4.5 in Dire to 6.3 in Dugda Dawa. As per average member of the whole zone, it comes to 5.3 while that of Oromia region is 4.8. It can be said that the Borena zone presents a bigger household as compared to that of Oromia region and also its rural households carry bigger family members than the counterpart urban household.

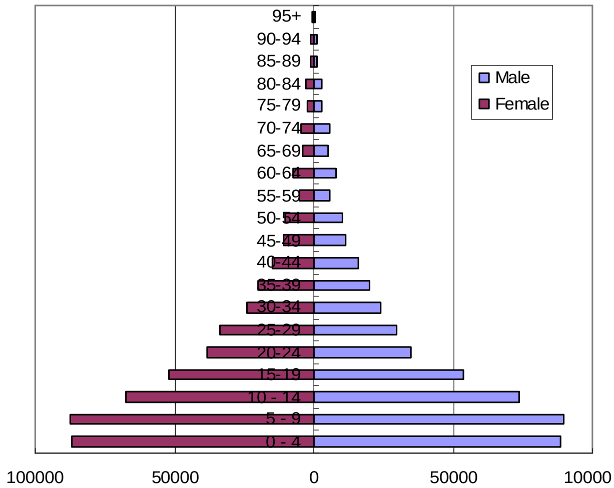


Figure 1.1.6 Population Cohort in Borena Zone
Source: Census 2007 (CSA)

Table 1.1.3 Population, No. of Household and Members per Household

Woreda	Population			No. of Households			Members per HH		
	U+R	Urban	Rural	U+R	Urban	Rural	U+R	Urban	Rural
Abaya	103,348	4,570	98,778	20,169	979	19,190	5.1	4.7	5.1
Gelana	71,369	3,502	67,867	12,851	795	12,056	5.6	4.4	5.6
Bule Hora	264,489	35,245	229,244	46,488	7,872	38,616	5.7	4.5	5.9
Dugda Dawa	147,327	5,560	141,767	23,570	1,081	22,489	6.3	5.1	6.3
Yabelo	102,165	17,497	84,668	21,408	4,426	16,982	4.8	4.0	5.0
Arero	48,126	3,004	45,122	9,932	734	9,198	4.8	4.1	4.9
Teltele	70,501	4,874	65,627	14,674	1,159	13,515	4.8	4.2	4.9
Dire	73,401	6,135	67,266	16,349	1,564	14,785	4.5	3.9	4.5
Miyo	50,601	3,941	46,660	11,031	902	10,129	4.6	4.4	4.6
Moyale	31,162	-	31,162	5,786	-	5,786	5.4	-	5.4
Borena Zone	962,489	84,328	878,161	182,258	19,512	162,746	5.3	4.3	5.4
Oromia Region	26,993,933	3,317,460	23,676,473	5,638,746	886,677	4,752,069	4.8	3.7	5.0

Source: Census 2007 (CSA)

1.2 Rural Community

1.2.1 Olla (natural settlement) and Rera (communal rangeland)

Borena ethnic group forms the distinct majority in the lowland of Borena zone where an *olla*, the natural settlement, is the core of their community. An *olla* is usually surrounded by a fence and has 10 to as many as 70 households, or about 100 to 500 inhabitants. Figure 1.2.1 and the phot show an example of *olla* called Jatani Molu located in Hallona PA (kebele) of Arero woreda. There are 38 households and eight *mona*, where they keep their cattle, in the *olla* so that about 5 households share each *mona*. An *olla* is named after the first settler and he becomes the head of the *olla* that is called *Abba Olla*.

Someone who wants to settle in the *olla* needs permission from the *Abba Olla*. The approval also means he can use the *rera*, communal rangeland where the *olla* belongs, as the mother camp for his cattle. He can graze his cattle in the rainy season. *Olla* moves within the *rera* every decade or so. Since cattle stay in the *mona* at night, they find it dirty with droppings after say 10 years, and then they move to a new place within the *rera* and build a new *olla* every 10 years or more. They also move when an elderly person dies. They build a tomb in the *mona* and leave the *olla* and again settle by putting up a new *olla* within the *rera*.

Figure 1.2.1 Sketch of an *olla*

Photo: A typical olla surrounded by a fence

Whereas Borenaôs traditional communities are made of household ï *mona* (a unit for cattle) ï *olla* (natural settlement) as afore-mentioned, the current administrative units are *gare* ï PA zone ï Peasant Association (PA=kebele), and then woreda. There are basically 30 households per *gare* and 10 *gare* per PA zone, and an *olla* and a *gare* are not always identically same. For example, as for the 4 PAs where the JICA team had an in-depth interviews (see Table 1.2.1), there are 39 *gare* from 26 *olla* at Areri PA of Yabelo woreda; 23 *gore* from 31 *olla* for Fuldowa PA; and 24 *gare* from 44 *olla* for Hallorana PA. Note that Galbokala PA in Malka Soda woreda where Guji ethnic group resides does not have *olla*, different from Borena communities.

Table 1.2,1 Village Strucutre in 4 PAs of Borena Zone

PA	Areri PA (Yabelo Woreda)	Fuldowa PA (Arero Woreda)	Hallona PA (Arero Woreda)	Galbokala PA (Malka Soda Woreda)
Population	6,673	4,209	3,152	7,205
Number of households	1,128	660	685	880
Number of *rera*	5	8	3 (= PA Zone)	No *rera* in *Guji* community
Number of *olla*	26	31	44	No *olla* in *Guji* community
Number of *gare*	39	23	24	30
Households / *gare*	20 - 30	20 - 30	17 - 49	28 - 35

Source: JICA Project Team

The Government decided to establish *gare* several years ago, and the delivery of efficient and effective administrative services is the main objectives to have introduced the *gare* system. The cost for constructing health posts and schools can be minimized if people settled permanently and in a large group. *Gare* is meant to promote integration of *ollas* and permanent settlements though they have moved within the *rera* every ten or more years. As for the relation between a *rera* and a PA zone, several *rera* usually form a PA zone and in some case just one *rera* may be identical to a PA zone for example in Hallona PA, Arero woreda.

For the *Guji* communities found in Malka Soda woreda, the community structure is quite different from the woredas where Borena ethnic group occupies an absolute majority. There are no natural settlements in Malka Soda woreda surrounded by fences like *olla*, but there are elders called *jarsa Biya* and each *jarsa Biya* represents several dozens of households under him. It seems that they are in groups but have no clear geographical boundaries between the groups. Several groups under different *jarsa Biya* may co-exist each other. Neighbors can belong to different *jarsa Biya*.

1.2.2 Resource Management by Community

From the interviews with the community elders, it was made clear that the units of resource management are different by the extent of resource such as water (e.g. *ella)*, rangeland (*rera*), and farming. For example, movement to the satellite camps, which are the rangelands for dry season, is done by the unit of *mona* in the center areas of Borena zone; by the unit of *olla* in the eastern side and the western side of Borena where the environment is harsher. Villagers also seem to start farming. In this case, the decision/ approval is principally made by *Abba olla* together with several *Jarsa olla*, who are in charge of issues in the *olla* and also representing *olla* at *rera*-level.

The decisions on the management of *rera*, which is the communal rangeland in Borena, are made at a meeting called *Kora Dheda*, where *Jarsa Gosa* who represents *gosa* (primary sub-clan) at olla-level gather. They decide where to pasture during the rainy season and when to open/ close *Kalo* (fenced pasture land) used for dry season feeding, and also how to divide outsiders in the *rera* to different *gare* or among several *rera* in order to avoid overgrazing when many cattle come to a water source located in the *rera*.

For the management of *ella* which is a permanent well, *Abba Ell* owns *ella at* a primary sub-clan level called *gosa*. *Jarsa Qa'e* designates three *Aba Herega*, the managers of *ella*, and he initiates the *gosa* people to come together and discuss *gosa* issues e.g. *ella* repair. For example, when they need to mobilize people for repairing an *ella*, *Jarsa Qa'e* uses the *gosa* level elders called *Jalaba* to let the same *gosa* people come, and when they need to collect money to repair *ella*, *Jarsa Qa'e* asks *Jarsa Dhuga*, honest elders at *olla* level, to collect necessary money from the level of *olla*.

In summary, the decisions on movement of cattle and farming are made at *olla*-level or smaller by the leaders at *olla*-level such as *Abba Olla* and *Jarsa Olla*; the decisions on management of *rera* are made at *rera*-level meetings attended by the *Jarsa Olla* of several *olla* in a rera; the decisions on management of *ella* are made at *gosa*-level meetings initiated by *Jarsa Qa'e* with the assistance of several *Jalaba* and *Jarsa Dhuga* (See Figure 1.2.2)

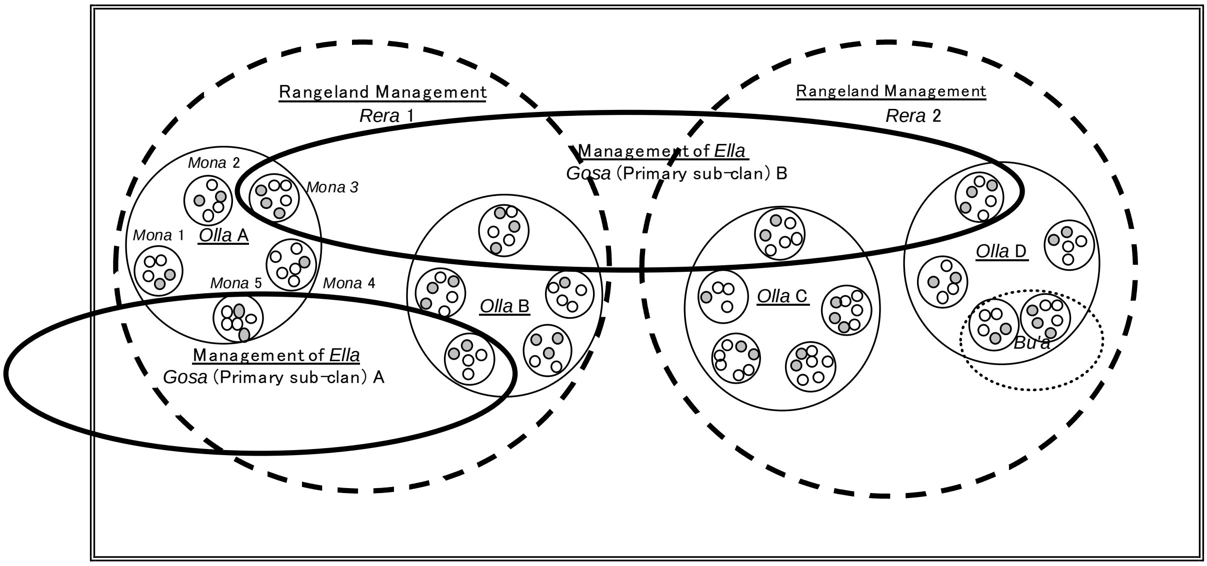


Figure 1.2.2 Levels of Community for Various Resource Management
Source: JICA Project Team based on Field Interviews

1.3 Livestock in Borena

Borena zone is composed mainly of highland 3 woredas and lowland 10 woredas. In the lowland woredas of Borena, the major livelihood is, no doubt, rearing of the livestock. Major livestock species are; cattle, goat, sheep, and camel, and to lesser extent house, donkey and chicken. This section discusses the Borena zoneȇs major livelihood, which is the livestock, and also examines the value chain of the livestock market.

1.3.1 Livestock Population by Species

Figure 1.3.1 shows the livestock number by species for the lowland 10 woredas after the drought of 2010/2011, and Table 1.3.1 details the numbers of livestock by woreda. From the figure and table, it is clearly understood that the number of cattle is far greater than the others, followed by goat and sheep, and then camel except for poultry. Number of cattle arrives at over 1.34 million heads for the 10 lowland woredas. Numbers of goat and sheep are about 707,000 and 414,000 respectively. Table 1.3.1 shows the average number of livestock per household[6] at the bottom row. With the table, it is found that the average number of cattle per household is about 13 heads, and those of goat and sheep are 7 and 4 respectively[7].

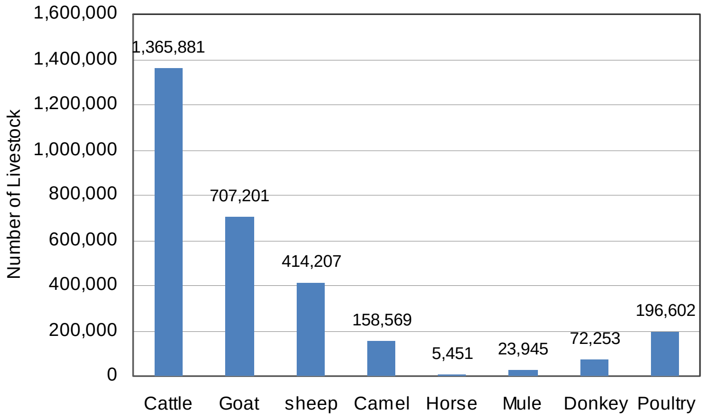


Figure 1.3.1 Number of Livestock in Lowland 10 Woredas
Source: Borena PDO Office

Table 1.3.1 Livestock Number by Species and by Woreda after the Death of 2010/11 Drought

Woreda	Cattle	Goat	sheep	Camel	Horse	Mule	Donkey	Poultry
Malka Soda	181,976	119,062	23,542	47,208	-	1,490	9,057	43,100
Dugda Dawa	286,913	20,945	16,580	9758	11	7,027	11,620	28,729
Yabelo	216,378	95,408	36,827	22,567	500	200	2,000	39,078
Arero	82,980	33,176	27,932	24,392	15	975	4,085	11,980
Teltele	168,064	149,053	57,669	1642	-	148	7,492	37,541
Dillo	141,502	97,698	192,218	10,684	-	1,467	12,168	76
Dire	87,774	56,351	18,404	4505	1,092	808	4,312	8,875
Dhas	122,859	72,722	23,981	21,827	3,500	7,000	7,369	100
Miyo	43,216	38,089	11,779	10,231	321	4,712	11,545	15,310
Moyale	34,219	24,697	5275	5755	12	118	2,605	11,813
Total	**1,365,881**	**707,201**	**414,207**	**158,569**	**5,451**	**23,945**	**72,253**	**196,602**
Av. No./ HH	**13.3**	**6.9**	**4.0**	**1.5**	**0.1**	**0.2**	**0.7**	**1.9**

Source: Borena PDO Office

1.3.2 Major Livestock Loss in Borena Zone

Borena zone socio-economic survey[8] and the Zonal diagnostic veterinary laboratory indicated that major animal diseases in Borena zone are: Anthrax, Contagious Bovine Pleuro-Pneumonia (CBPP), Contagious Caprine Pleuro-Pneumonia (CCPP), Trypanosomes, Pest Petitis Ruminant (PPR), Foot and Mouth Disease (FMD), Black leg, Bovine and Ovine Pastereolosis, Lumpy Skin Disease (LSD), internal parasite (including Cysticircus Ovis) and external parasite. Table 1.3.2 shows major livestock diseases and their severity for each species:

[6] Number of household referred to the Census 2007.

[7] In fact, Borena people are very well known for hiding their total livestock number, and therefore there is always possibility of underestimation evident on many occasions.

[8] Physical and socio-economic profile of Borena zone: data and information incorporated in the document are from zonal atlas of former Borena zone (Borena zone planning and economic development office July 1998), Oromia education statistics annual abstract 1996 (2003/04), Ethiopian agricultural sample enumeration of Borena zone 2004, and data of CSA 2003.

Table 1.3.2 Major Livestock Disease in Borena Zone by Order

Order	Severity List of Cattle Diseases in Borena Zone		
	Cattle	Shoat	Camel
1.	FMD	Coenorosis	Camel Trypanosomosis
2.	Bovine Pasteurellosis	CCPP	Respiratory disease complex
3.	Blackleg	PPR	Camel pox
4.	CBPP	Ovine Pasteurellosis	Septicemic disease
5.	Anthrax	Septicemic Disease	Plant poison
6.	Trypanosomiasis	Orf	Neck paralysis
7.	Babesiosis	Fasciolosis	Mange mites
8.	Malignant Catarrhal Fever	Sheep and Goat pox	Abscess
9.	Tick Infestation	Ectoparasites	Abortion
10.	Plant poison	Endoparasites	
11.	LSD	Babesiosis	

Source: Yabelo Regional Veterinary Laboratory Centre (YRVLC)

Table 1.3.3 below shows the number of livestock perished due to drought in 2010/11 and due to various diseases indicated above. During the 2010/11 drought, many cattle had died presenting as many as about 131,000 losses, equivalent to about 13 % of the whole cattle before the drought. On the other hand, camel is very tolerant to drought for which only less than 1% perished due to the drought. Losses caused by disease are not many, ranging from 1 to 2 % only.

Table 1.3.3 Livestock Death due to Disease in Borena Zone, 2011

Woreda	Due to Drought				Due to Diseases				Total
	Cows	Calves	Camels	Shoat	Cows	Calves	Camels	Shoat	
M/Soda	1,182	2,022	0	0	1,393	938	2	312	5,849
D/Dawa	6,636	608	50	393	0	0	5	1,064	8,756
Yabelo	7,164	2,222	201	1,811	1,877	628	178	3,178	17,259
Arero	7,817	6,432	306	4,569	2,752	1,513	802	12,323	36,514
Teltele	7,864	5,266	0	5,635	1,049	878	0	1,099	21,791
Dilo	1,522	1,508	39	3,715	441	299	79	2,654	10,257
Dire	6,169	2,795	1	4,023	0	0	0	0	12,988
Dhas	11,681	9,320	4	239	1,473	871	155	1,854	25,597
Miyo	70,394	14,324	11	470	5,171	1,545	501	6,056	98,472
Moyale	10,384	36,633	3	90	7	8	110	1,907	49,142
Total Loss	130,813	81,130	615	20,945	14,163	6,680	1,832	30,447	286,625
Total Livestock	1,578,297		155,096	1,476,543	1,578,297		155,096	1,476,543	3,209,936
Loss (%)	13.4		0.4	1.4	1.3		1.2	2.1	8.9

Source: Borena Zone Pastoral Development Office

1.3.3 Carrying Capacity of Borena Rangeland

Carrying capacity means maximum stocking rate within a limited area. The stocking rate is estimated based on types and the number of livestock, and land use in the area. It could be expressed as TLU (Tropical Livestock Unit) per day, month or year. The JICA team uses TLU defined by FAO[9] and regards 250kg of livestock as 1 TLU. Therefore, a camel is calculated as 1 TLU and cattle are converted to 0.7 TLU. Then, shoat (goat and sheep) are defined as 0.1 TLU. Since camels, cattle and shoat are major animals in Borena zone, the JICA team estimates the carrying capacity by accounting these animals.

Carrying capacity is synonymous with grazing capacity, which is the number of animals people are able to keep by availing of locally available resources such as grass and crop residues. In fact, estimation of carrying capacity is calculated in consideration of balance between the productivity of pasture and amount of pasture consumed by animals. It is assumed that 1 TLU consumes dry matters corresponding to 2.5 to 3% of body weight, and accordingly 1 TLU requires 2.28 to 2.74 tons of dry

[9] Source: http://www.fao.org/ag/againfo/programmes/en/lead/toolbox/Mixed1/TLU.htm

matters per year. Note that this requirement is only used for maintaining the body, and the animals require additional dry matters in case of fattening, producing milk and/or breeding.

1) Livestock Unit and Dry Matter Requirement in Borena

Table 1.3.4 summarizes the total number of livestock in 2012 (after the 2010/11 drought), in which goat and sheep are grouped in shoat. These numbers are converted into TLU by using the conversion factors of 0.7, 0.1, and 1.0 for cattle, shoat and camel respectively. The converted TLU is summarized in Table 1.3.5, showing a total of 1.227 million TLU. Assuming that 1 TLU requires 2.3 ton/year of dry matters[10], theoretical figure of total dry matter requirement arrives at 2,453,654 tons/year.

Table 1.3.4 Livestock Number by Species and by Woreda in 2012

Woreda	Cattle	Shoat	Camel	Total No. of Livestock
M/Soda	181,976	142,604	47,208	371,788
D/Dawa	286,913	37,525	9,758	334,196
Yabelo	216,378	132,235	22,567	371,180
Arero	82,980	61,108	24,392	168,480
Teltele	168,064	206,722	1,642	376,428
Dillo	141,502	289,916	10,684	442,102
Dire	87,774	74,755	4,505	167,034
Dhas	122,859	96,703	21,827	241,389
Miyo	43,216	49,868	10,231	103,315
Moyale	34,219	29,972	5,755	69,946
Total	1,365,881	1,121,408	158,569	**2,645,858**

Source: PDO Office, Borena Zone (2012)

Table 1.3.5 TLU Number and Dry Matter Requirement in 2012

Woreda	Cattle	Shoat	Camel	Total TLU	Total DM requirement (ton/year)
M/Soda	127,383	14,260	47208	188,852	434,360
D/Dawa	200,839	3,753	9758	214,350	493,005
Yabelo	151,465	13,224	22567	187,255	430,687
Arero	58,086	6,111	24392	88,589	203,755
Teltele	117,645	20,672	1642	139,959	321,906
Dillo	99,051	28,992	10684	138,727	319,072
Dire	61,442	7,476	4505	73,422	168,871
Dhas	86,001	9,670	21827	117,499	270,248
Miyo	30,251	4,987	10231	45,469	104,579
Moyale	23,953	2,997	5755	32,706	75,224
Total	956,117	112,141	158,569	**1,226,827**	**2,821,702**

Source: PDO Office, Borena Zone (2012), Note: DM means dry matters.

2) Production and Carrying Capacity in Borena Lowland

A field survey conducted by the JICA team evaluated that the rangeland in lowland of Borena can produce 3.1 ton/ha of native grass (dry matter based) at one time. The yield survey was conducted at Dhadim PA, Yabelo woreda in July 2014[11]. Though it could be assumed that livestock can graze on the pasture land more than one time thanks to 2-time rainy seasons, the Team simply adopts 3.1 ton/ha dry matter production per year in order not to overvalue the capacity of rangeland.

Table 1.3.6 shows major sub-basin areas and those rangeland ratios provided by Borena PDO office (2012). The overall average rangeland ratio is estimated at 18% by considering area weight. By applying this 18% of the rangeland ratio over the 10 lowland Borena woredas, the available grass in dry matter weight is estimated at 2,274,411 ton. Since 1 TLU is supposed to consume 2.3 ton/per of

---

10 1 TLU takes dry matters corresponding to 2.5 to 3% of body weight so that 1 TLU requires 2.28 to 2.74 ton of dry matters per year. Here, lowest figure of 2.3 ton is applied for the estimation.

11 4 plots (m^2 x m^2) were sampled and showed the results of sample 1 ($0g/m^2$), sample 2 ($80g/m^2$), sample 3 ($140g/m^2$) and sample 4 ($1,020g/m^2$).

dry matter, carrying capacity is now calculated as indicated in the most right column of the following table.

Table 1.3.6 Productivity and Carrying Capacity of Rangeland in Borena Lowland

Area	Area (km^2)	Area (ha)	% of Rangeland per Total Area	Available Grass to Livestock (DM,ton)	Carrying Capacity (TLU/ year)
Dawa sub-basin	17,407	1,740,700	13%	701,502	305,001
Lega wata/ Lega sure	22,363	2,236,300	24%	1,663,807	723,394
Rift valley sub-basin	9,767	976,700	11%	333,055	144,806
Sub-basin total	49,537	4,953,700	18%	2,698,364	1,173,202
10 lowland woredas	**41,754**	**4,175,400**	**18%**	**2,274,411**	**988,874**

Source: PDO Office, Borena Zone (2012), Note: 3.1 ton/ha of productivity (dry matter base) of grass is adopted.

As afore-mentioned, there are 1,226,827 TLU which requires total 2,821,702 tons of dry matter per year (refer to Table 1.3.5). On the other hand, the carrying capacity is estimated at 988,874 TLU (81%) based on the available dry matter grass of 2,274,411 tons per year (see Table 1.3.6). This indicates that the current carrying capacity is lower than what the livestock need, or the current number of livestock may already exceed, by about 20%, the carrying capacity based on the grass that the Borena lowland area can produce once a year.

The grass production was assumed only once a year in the above estimation, and therefore if the area is blessed with good rains, the carrying capacity may be balanced to or even more than what the livestock needs in a normal year. In Borena, however, when they are hit by a drought, they take their cattle far into Konso highland. This migration implies the carrying capacity during drought year definitely can not support all the livestock in the Borena lowland area. Thus, it may be concluded that the carrying capacity of Borena zone is just balanced in a normal year while during drought season it can easily become lower than what the livestock needs.

3) Rainfall Deficit and Cattle Crash

A note is that the above calculated carrying capacity was estimated from the average productivity of rangeland in lowland areas of Ethiopia. However, carrying capacity in Borena zone significantly fluctuates by year according to the rainfall. For example, the annual rainfall in Yabelo ranges from 400mm to over 800mm, and therefore the productivity of rangeland also greatly differs by year. Then, livestock crash often happens in response to reduction of the rainfall and thus reduction of natural resources in Borena zone where the carrying capacity may be just balanced or often beyond the carrying capacity.

Figure 1.3.2 shows the relationship between a 27-year annual rainfall pattern[12] and livestock crash happened (shown as black bar chart) in Borena zone[13]. For example, it was reported that the livestock crash took place in 2005 and it was reported by Zonal PDO office that 40 to 60% of animals in the low land died. During the 20 years when livestock crash did not happen, average annual rainfall was 704mm. On the other hand, during the 7 years when livestock crash occurred, average annual rainfall was only 516 mm. Since the average annual rainfall throughout the 27 years was 699mm, the latter case had 26 % lower amount of rainfall than that of the average.

It is also known from the Figure 1.3.2 that though livestock crash tends to happen in the year when annual rainfall is below the average, the crash does not necessary take place in all the small rainfall year. It means that small amount of annual rainfall is not always proportional to the death of livestock.

[12] Four representative sites on the central plateau (Yabelo, Arero, Negele and Mega) for 27 years (1980 to 2007) were surveyed by Global Livestock Collaborative Research Support Program

[13] Source: Global Livestock Collaborative Research Support Program, http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1211&context=envs_facpub

The balance between annual rainfall and the livestock population (density) is more important to determine the occurrence of livestock crash. Figure 1.3.2 indicates that livestock crash has happened in case that the previous years had much rainfall and rapid rainfall reduction was there in the following year.

Thus, livestock crash tends to happen under small amount of rainfall and also at the times when livestock has increased in the population and then exceeds the carrying capacity of areas. Therefore, difference between precipitation in previous years and this year should carefully be observed rather than precipitation just by single year. It is generally reported that it takes about 6 years to recover the number of livestock after a livestock crash[14]. Figure 1.3.2 clearly indicates such tendency; namely, livestock crash has occurred once in every 6 ï 7 years during the last almost 30 years.

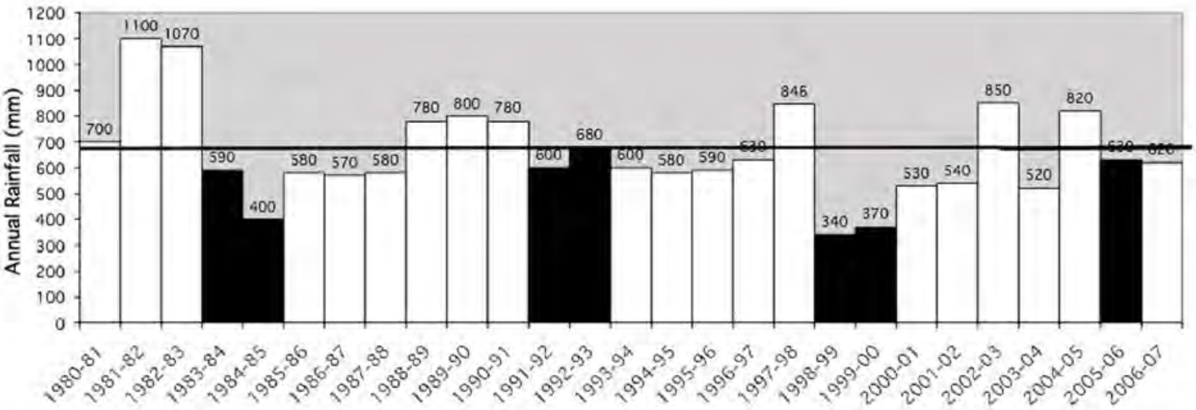


Figure 1.3.2 Relationship between Rainfall and Livestock Crash in Borena Zone

Source: Global Livestock Collaborative Research Support Program

1.3.4 Livestock Movement

Figure 1.3.3 shows the movement of pastoralist and there are mainly three occasions depending on the situation, namely rainy season, dry season and severe drought time. In wet seasons, herds barely move. In every corner of Borena land, local grazing areas are divided into *rera*. Borena herds usually graze on grasses in their own *rera* during rainy season. During dry season, the main driving force is water. Migration occurs away from residents to remote grazing areas (satellite camp). This means that a large proportion of Borena herders move to the areas where water sources are existent during dry season.

Ellas are permanent water sources, which are abundantly found in the *Tulla* grazing zone. As Figure 1.3.3 shows, majority of pastoral movements during dry season can be found in this zone. Of course, there are still the other pockets of permanent water sources spread in other grazing zones in Borena land, to which lots number of livestock come during the dry season. Areas located around permanent wells are often overstocked in this season, and in this case further movement starts toward Konso highland and also towards northern parts of Borena where high elevation prevails.

Further, in case of severe drought, routes toward the highland areas of Konso Zone of SNNPR through Dikale PA of Yabelo from Dhas and Dire Woreda would become the main corridor for pastoralists as shown in Figure 1.3.4. On the way, they pass water sources such as *Haro Bake* and *Ella Areri*. They move to the Konso Zone of SNNPR looking for pasture and water, and sometime after the severe drought has passed, they start moving back to their homestead since those areas belong to different ethnic group, mostly Konso, and it is said there are more livestock diseases there than their lowland areas. There are also groups who move to highland areas of Guji zone for the sake of resources during severe drought.

[14] Source: Global Livestock Collaborative Research Support Program

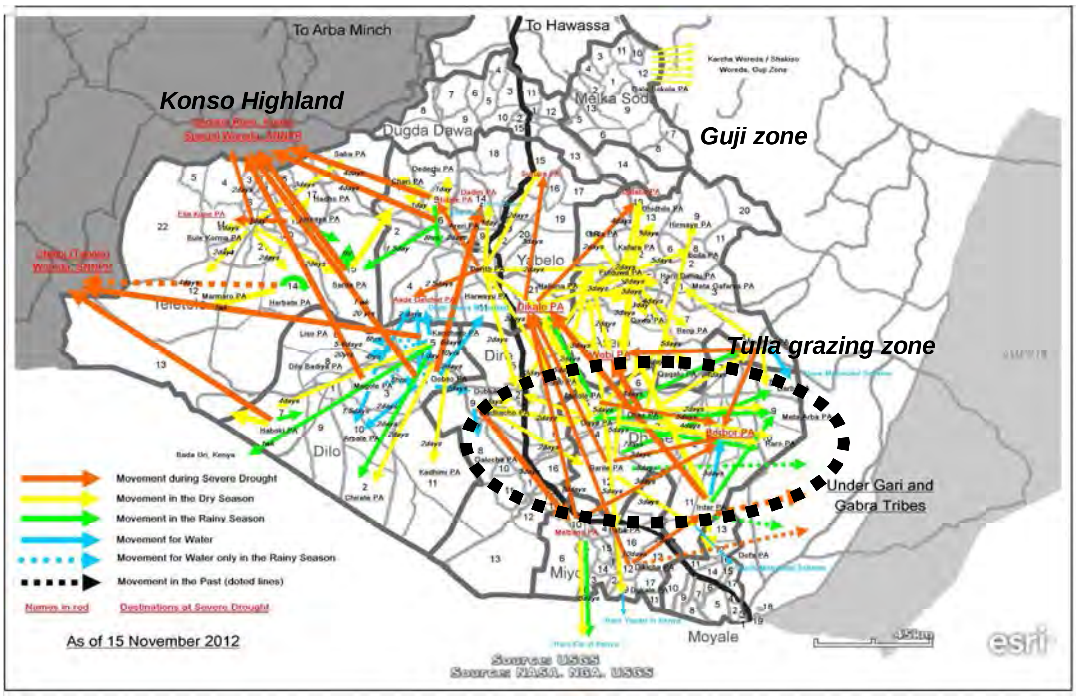


Figure 1.3.3 Movement of Pastoralist in Borena Zone by season

Source: JICA Project Team based on Field Interviews

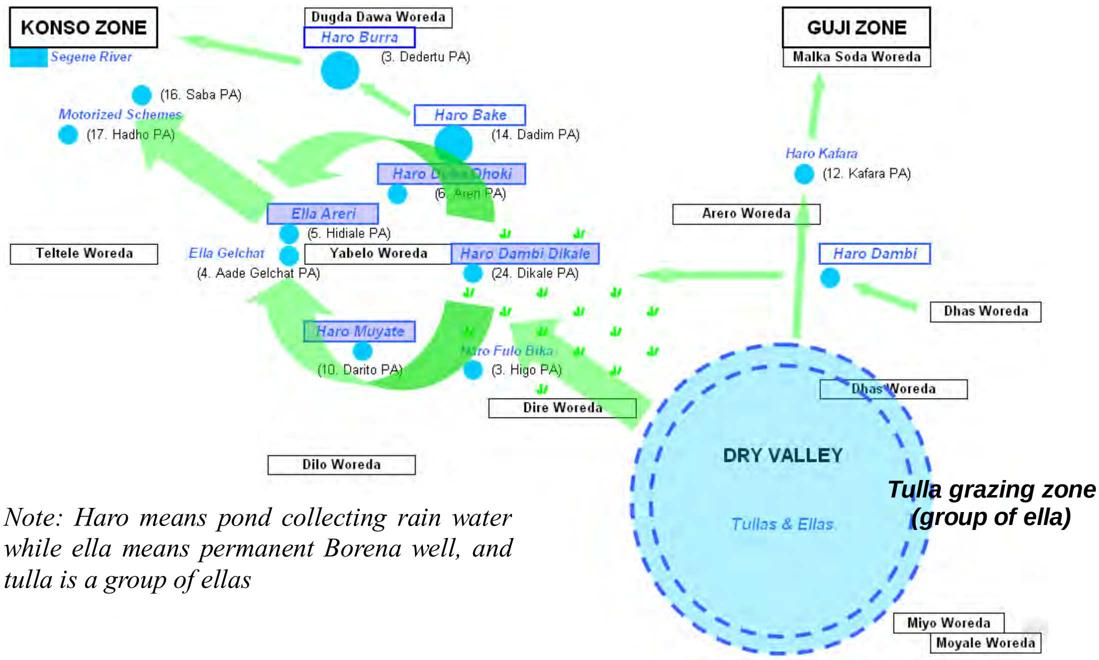


Figure 1.3.4 Cattle Movement during Severe Droughts in Borena Zone

Source: JICA Project Team based on Field Interviews

1.4 Livestock Value Chain in Borena

1.4.1 Livestock Market

Livestock markets are places where buyers and sellers (pastoralists) gather to transact through purchasing and selling of animals and exchange cash and animals or others. There are 5 types of markets in Ethiopia based upon the handling numbers and tax levied. These are bush market, primary market, secondary market, and terminal market as shown in Table 1.4.1.

Table 1.4.1 Type of Livestock Market

Market Type	Livestock No.	Tax
Bush Market	5 - 10	No
Primary Market	11 - 500	pay
Secondary Market	501 - 1000	pay
Terminal Market	> 1000	pay

Source: Borena Zonal Market and Trade Office

1) Bush markets are places where animals are exchanged with numbers ranging from only 5 to 10 weekly between the pastoralists and small scale traders or collectors for breeding purpose or sale in the primary markets. This type of market does not levy tax to the participants.

2) Primary markets are placed in rural towns where the sales volume does not exceed a basic number of 500 cattle per week. The major sellers are pastoralists and small scale traders, whereas the major buyers are so-called collectors/assemblers (middle men), agents employed by abattoirs, and medium scale traders.

3) Secondary markets are placed in major towns where the weekly supply volume is, as cattle basis, over 50 and less than 1,000. Here, the major market participants are medium scale traders acting as sellers and the big traders as buyers. The secondary market should accompany with one animal health post.

4) Terminal markets are located at the country's big cities where over 1,000 cattle basis are supplied weekly. Big traders are the major sellers whereas large scale abattoirs and exporters are the major buyers.

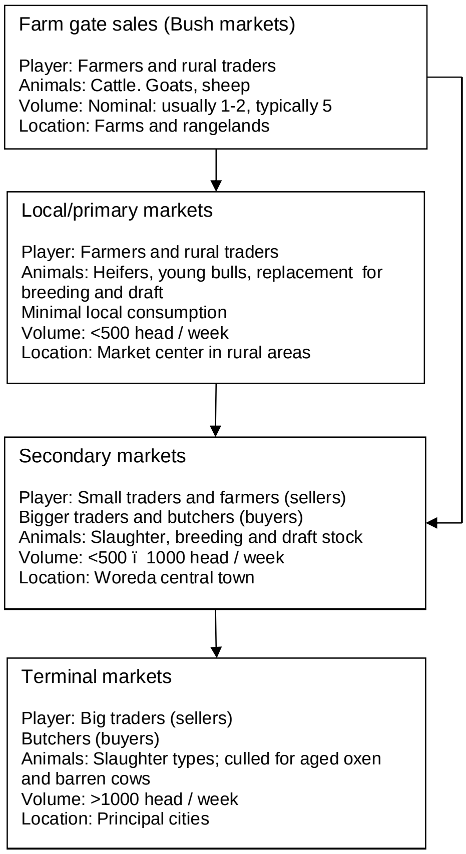


Figure 1.4.1 Livestock Market Structure
Source: Beyene and Lambourme (1985), Zewdu et al. (1988)

Livestock markets within the 10 lowland woredas of Borena zone are summarized in Table 1.4.2. There are 18 primary livestock markets and 7 secondary markets. Figure 1.4.2 shows spatial distribution of livestock markets and routes of livestock for marketing in Borena zone. As the figure shows, Haro Bake in Yabelo Woreda is regarded as the most central and biggest livestock market in Borena zone followed by Dubluk in terms of the volume of animals. In general, animals from Teltele, Dugda Dawa, Bule Hora, Malka Soda, Yabelo and Arero direct to the Haro Bake secondary livestock market.

Table 1.4.2 Livestock Markets in Borena Zone

Woreda	Market Type		Total No.
	Primary Location	Secondary Location	
Malka Soda	Malkasoda, Bayagundi, Dawa, Halo	0	4 (4+0)
Dugda Dawa	0	Fincawa	1 (0+1)
Yabelo	Surupa, Dida Hara, Elwaye, Yabelo	Harobake	5 (4+1)
Arero	Matagafarsa, Mader, Hirmaye	0	3 (3+0)
Teltele	Bulekorma	Milami	2 (1+1)

Woreda	Market Type		Total No.
	Primary Location	Secondary Location	
Dilo	0	Dilo	1 (0+1)
Dire	Mega	Dubluk	2 (1+1)
Miyo	Hidi Lola	Bokulubamo	2 (1+1)
Moyale	Moyale, Tuka, Arbale	0	3 (3+0)
Dhas	Dhas	Borbor (Under Construction)	2 (1+1)
Total	18	7	25 (18+7)

Source: Zonal Market and Trade Development Office

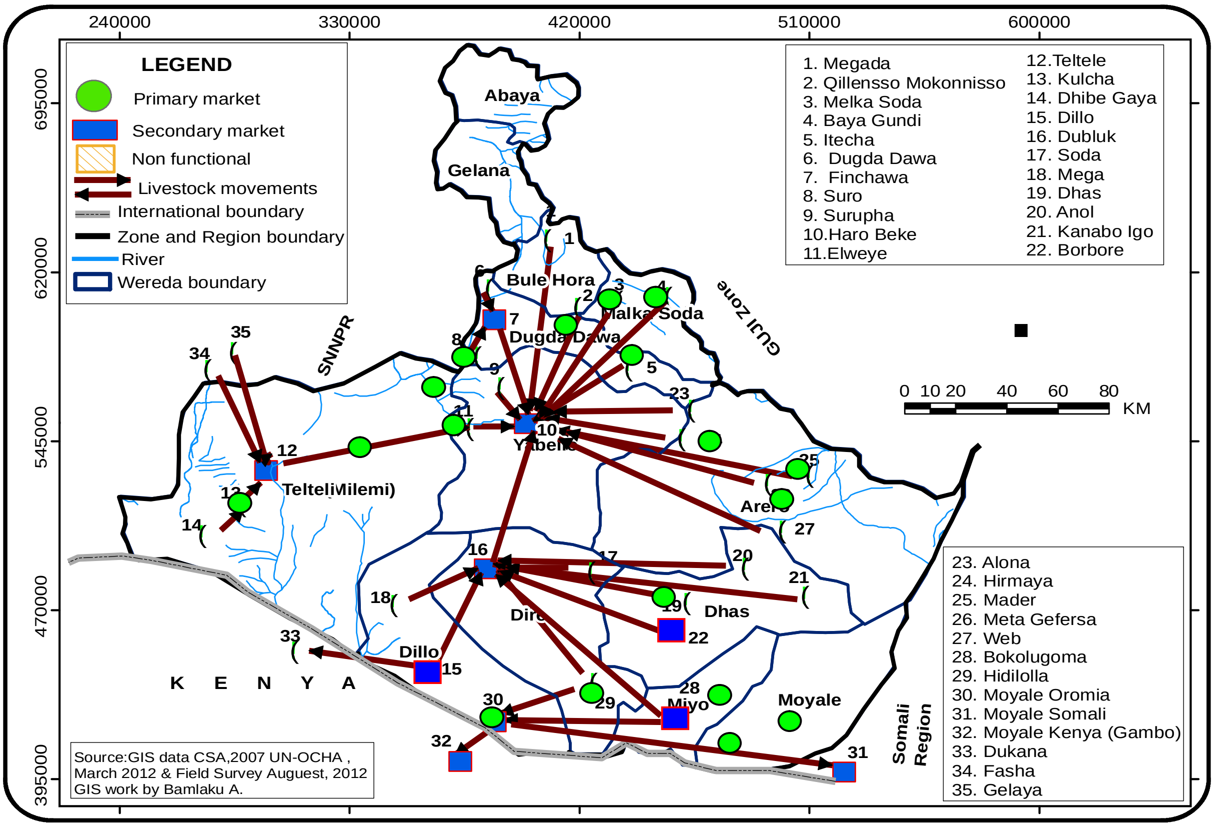


Figure 1.4.2 Spatial Distribution and Channels of Livestock Markets in Borena Zone

Source: CSA, UN-OCHA and Balaku A

Particularly, those from Teltele, Dire and Dugda Dawa woredas often reach the Haro Bake livestock market by passing the other secondary markets. Thus, the Haro Bake market appears to play a role of a superior livestock market like a market between terminal markets of big cities such as Addis Ababa and Nazareth (Adama) and other secondary markets in Borena zone. In addition, Haro Bake livestock market receives animals from the other 10 primary markets[15]. Eight primary and bush markets, including some smaller secondary markets, feed to the Dubluk[16] secondary market, which is the second largest livestock market in Borena Zone.

In fact, access to the secondary market by the producers has been limited due to physical distance to the market. Long distance to the livestock market causes livestock to lose a lot of weight while they travel. In general, it is recommended that livestock should travel on average a distance of 25km per day to reach a market place. Therefore, the producers often sell animals to brokers (local traders) at the bush market or primary market. Then, the brokers will sell such collected animals at the secondary markets having large transaction.

15 Elwaye and Surupha in Yabelo Woreda, Dhibe Gaya, Kulcha, Bulekorma in Teltele Woreda, Alona, Hirmaya, Mader, Meta Gefersa and Webi in Arero Woreda

16 Mega and Dilo in Dilo Woreda, Soda and Hidilola in Dire Woreda, Dhas and Borbore in Dhas Woreda, and Bokulugoma in Miyo Woreda

Then, animals collected in Borena zone move to outside of Borena aside from local consumption. There mainly seems to be two routes for cross-border trade of livestock dispatched from the Zone. One is that collected animals in Borena Zone are taken to the highland areas near Addis Ababa such as Nazareth (Adama), sold to the feedlot operators and fattened, and then shipped for domestic consumption or legitimate export to Arab countries such as Djibouti, Yemen, Saudi Arabia and UAE.

The other route is unofficial channels of export through Moyale to Kenyan side and characterized by absent of fattening systems. Moyale is known as a vibrant livestock trading hub straddling the border between Kenya and Ethiopia and a rapid increase in trade volumes has seen in this area. There are three livestock markets in Moyale Somalia, Moyale Oromia and Moyale Kenya. A Moyale office of Ethiopian Customs and Revenue Authority reported as of 2012 that around 300 to 600 castrated bulls were transiting from Moyale Oromia daily.

1.4.2 Stakeholders Involved in Livestock Marketing

As Figure 1.4.3 shows, there is a hierarchy of livestock value chain actors next to producers in Borena zone at several levels. Traders and brokers could be categorized into the following groups; primary traders, medium traders or secondary brokers, and big traders:

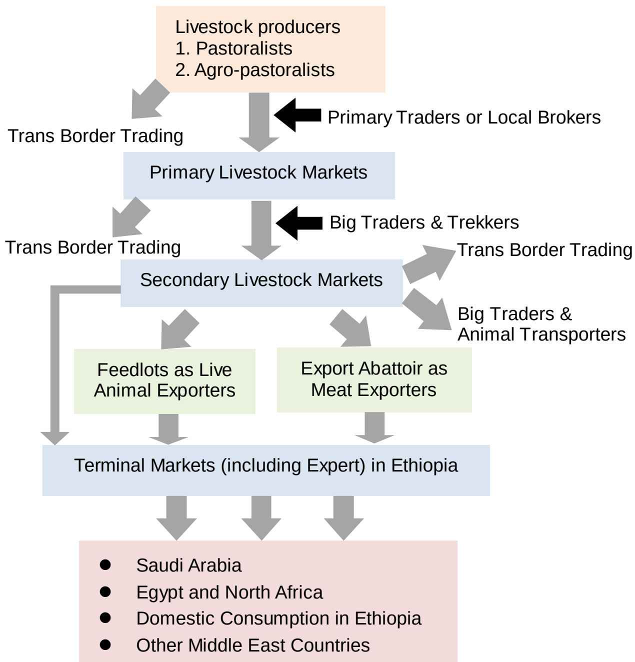


Figure 1.4.3 Stakeholders Involved in Livestock Market in Borena Zone

Source: Trade and Market Development Office, Borena

There are small village level traders purchasing animals on a cash base, who are called primary traders. They buy animals from their own neighborhood (producers) or at bush markets. Usually they are pastoralists or agro-pastoralists who are also the community members and operate in bushes with 5 to 10 cattle and trek the livestock to the primary markets. In addition, there are also people called trekkers to transport livestock from original places to primary and secondary markets by trekking.

Medium trader or secondary brokers (or secondary market level brokers) are usually residents of woreda level towns who buy animals from the primary brokers and sell them to big traders who are at the 3rd level traders or feedlot owners. Credit is common among the transactions occurring from the secondary markets onwards, even without any written agreement. The, big traders collect livestock from the medium traders and supply to the central terminal market either in Addis or Nazareth (Adama).

1.4.3 Amount of Transaction

As already mentioned, Table 1.4.3 clearly indicates that the Haro Bake secondary market has the largest amount of livestock transaction. It is also found that three livestock markets in Borena zone; namely, Haro Bake, Dubluk and Finchawa, are the major markets having more than 1,000 cattle per market day. Regarding the type of livestock, cattle are the most traded animals in Borena zone. Actually, so called Borena cattle produced in Borena zone are famous in European and Arab countries thanks to the good quality meat. The table also shows camels are featured livestock in the Haro Bake livestock market, because the market is located in Goomole grazing zone where the camels are dominant animals.

Table 1.4.3 Amount of Transaction per Market Day in Major Livestock Markets, Borena

Woreda	Livestock Market	Market Day	Volume of Livestock Supply per Market Day (Average 2010/11 to 2011/12)			
			Cattle	Camel	Shoat	Donkey
Yabelo	**Haro Bake**	**Sunday**	**1,250**	**250**	**600**	**50**
Dire	**Dubluk**	**Friday**	**1,250**	**30**	**200-250**	**20**
Dugda Dawa	**Finchawa**	**Tuesday**	**1,000**	**30**	**1,600**	**50**
Moyale	Moyale	-	-	-	-	-
Teltele	Milemi	Saturday	450	-	400	40
Miyo	Bokuluboma Hidilola	Thursday	200-300	0	400-600	-
Dhas	Dhas	-	50	0	50	5
Malka Soda	Malka Soda	-	550	60	250	30

Source: Result of Interview to Livestock Traders

Figure 1.4.4 shows livestock supply and demand by species at the Haro Bake secondary market in Borena in 2011/12. Generally, the supply corresponded with the demand and no large surplus was found throughout the year except some months on the marketing of cattle. In fact, a research done by USAID[17] showed that difference between the supply and sales of cattle in the Haro Bake secondary market is the smallest among other 8 markets existing in Ethiopia, meaning nearly 100% sold, although amount of the transaction is relatively small by comparison with such markets.

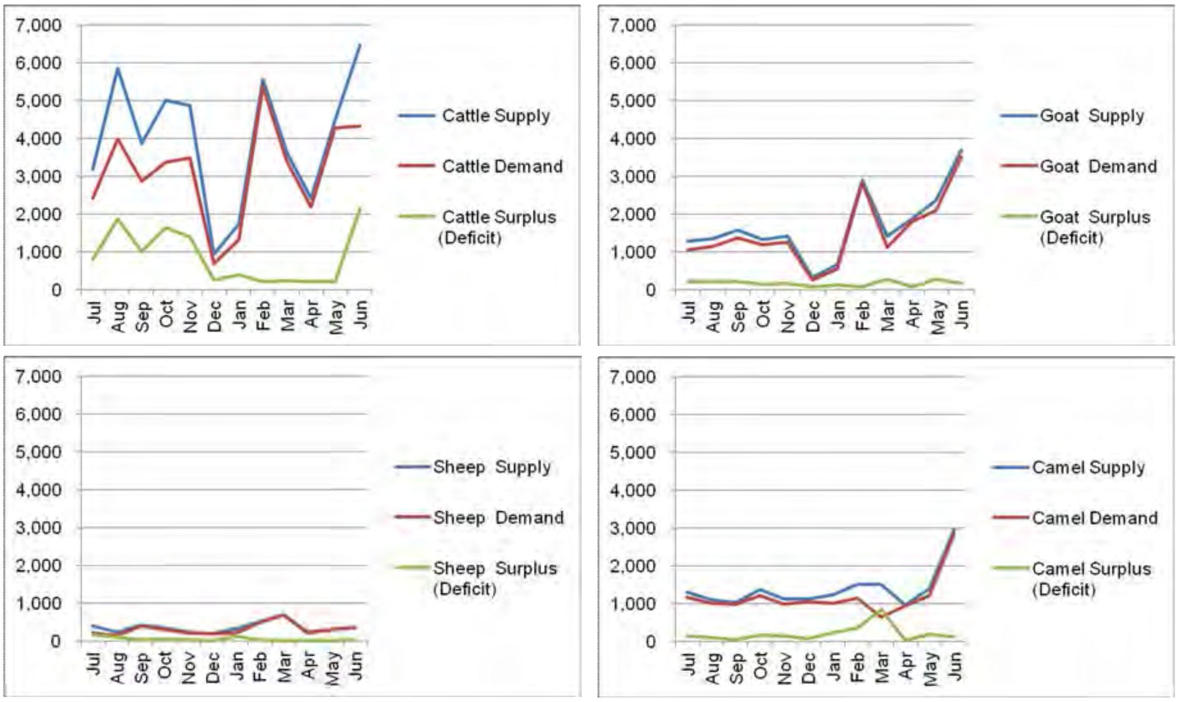


Figure 1.4.4 Livestock Supply and Demand by Animal, Haro Bake in Yabelo Woreda (2011/12)

Source: Trade and Market Development Office, Borena Zone

The figure also indicates that the supply of cattle and goat increased rapidly from January and this corresponds with the timing of the harshest dry season in Borena Zone. Many producers tend to sell their animals since there may be a possibility to lose them because of shortage of water and animal feed. However, rapid decrease of the price was not seen during the same period. This may be because the traders usually take animals to the highland areas near Addis Ababa and dry and rainy seasons are not overlapped with those in lowland areas of Borena zone.

Thus, it could be assumed that amount of transaction on the Haro Bake livestock market may depend on the supply rather than the demand. Then, just after *Gana* season (long rainy season in Borena zone) had started, rapid dropping and rising of the supply and demand were seen due to a period of fasting and Easter in Ethiopia. On the other hand, such rapid increase of supply during dry season was not

[17] Ethiopian Livestock Market Information

seen on camel. This may be attributed that camels have more resistance on drought.

1.4.4 Market Price

Figures 1.4.5 shows the prices of cattle and goat at Hara Bake secondary market from January 2013 to July 2014 (Oromia Trade and Market Development Office). The market price of cattle in the Haro Bake market was relatively stable throughout the year although the difference between highest price (11,000Birr) and lowest price (7,030Birr) was about 4,000 birr during the one and half years. The price of goat was more stable than that of cattle ranging only from 1,600 to 1,800 birr throughout the year.

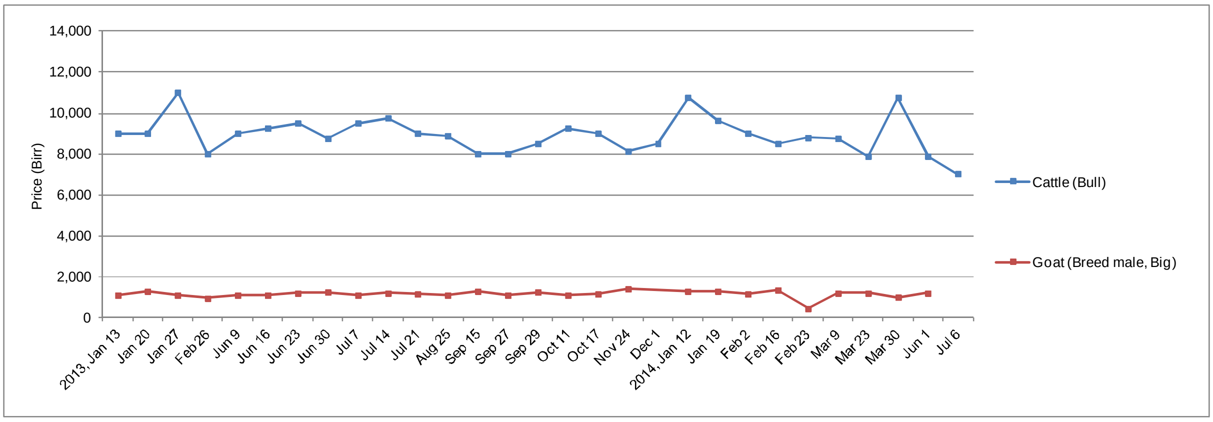


Figure 1.4.5 Trend of Market Price by Livestock (Top: Cattle, Bottom: Goat) in Haro Bake, Yabelo Woreda

Source: Oromia Trade and Market Development Office

1.4.5 Distribution of Added Value by Market Chain

As Table 1.4.4 shows, each of the livestock value chain actors adds value to the product as the product passes from one actor to another. In a way, the actors change the form of the product through transportation, feeding and time utility. The value addition is calculated for a bull purchased in the Haro Bake livestock secondary market and until it is finally sold in a Gulf country. Pastoralists after keeping a bull for 4 - 5 years get 42% of the final price without deducting the opportunity cost of labor of pastoralists in herding, watering and feeding whereas feedlots get 28 % of the final value after keeping the animals for 2 to 3 months.

Table 1.4.4 Distribution of Added Value among Major Livestock Chain Actors for Bull

Price categories	Major livestock value chain actors				Remarks
	Producers	Traders	Feedlots	Exporters	
Sales price (Birr/Head)	6,796	8,000	12,500	16,155	
Gross Value added (Birr)	6,796	1,204	4,500	3,655	
% value added	42	7	28	23	

Source: Interviews to key informants,

1.5 Water Resources in Borena

1.5.1 Type of Water Resources

Borena Zone is generally located within Genale river basin in its northern part and within Dawa river basin in the southern part. Groundwater tables are generally deep (deeper than -10m from the ground surface). The Borena pastoralists use traditional wells (known as *ella*) that have existed over 600 years in the area. Today, the *ellas* still serve as crucial resources of the pastoral livelihoods systems. Some of the wells reach to the depths of over 30m below the ground level[18]. In addition to the traditional wells, *ellas*, there are several types of water points such as spring, shallow well, deep well, hand pump

[18] Direct observation by JICA team confirmed very deep *ellas*, sometimes reaching about 30 m depth from the ground surface.

equipped well, ponds, etc. Among those, pond which collects rain water and the *ellas* are the major water points in Borena zone.

Table 1.5.1 summarizes the water points in Borena zone by its type reported by Borena Zone Emergency Coordination Taskforce. Note that the types are sometimes named differently by woreda even though it indicates same type of water facility. Table 1.5.1 shows that there are as many as 1,918 functional and 235 non-functional water points. Given the population by woreda, Table 1.5.1 also estimates average population served by one water point. In Bule Hora where largest share of the population resides, one water point serves an average of 2,656 population while in other woredas the average population served by one water-point ranges from around 100 to 1,000 in most cases. The overall average population per water point is 581 population.

Table 1.5.1 Summery of Water Points by Type in Borena Zone

Woreda	Type	Quantity/Condition				Remarks
		Functional	Total of w. points	Persons served/ point	Non-functional	
Abaya	Motorized	7	91	1,316	3	
	Shallow well	39			3	
	Spring on spot	42			3	
	Spring on gravity	3			0	
Galana	Motorized	3	110	733	1	
	Hand pump	9			5	
	Spring on spot	1			1	
	Spring with gravity	1			0	
	Hand dug well	0			3	
	Open hand dug well	96			0	
Bule Hora	Motorized	14	116	2,656	3	
	Hand Dug Well	28			3	
	Shallow well	48			3	
	Spring on spot	25			0	
	Pond	1				
Malka-Soda	Motorized	1	176	566	1	
	Hand pump	4			3	
	Ponds	16			0	
	Shallow wells	155			0	
Dugda Dawa	Hand Dug well	3	28	2,452	4	
	Hand pump	6			4	
	Ellas	4			0	well
	Ponds	15			0	
Yabelo	**Pond**	**66**	126	944	10	
	Motorized	12			2	
	Hand pump	24			4	
	Ellas	**24**			0	
Arero	**Pond**	**102**	263	145	3	
	Motorized	5			3	
	Hand pump	6			3	
	Ellas	**150**			0	
Teltele	**Pond**	**28**	45	1,608	0	
	Motorized	16			7	
	Hand pump	1			1	
Dillo	Motorized	7	62	425	0	
	Well	**38**			0	
	Pond	**15**			0	
	Spring	2			1	
Dire	Motorized	10	490	119	3	
	Hand pump	9			2	
	Solar	0			2	
	Spring	5			0	
	Pond	**354**			57	
	Ellas	**112**			0	
Dhas	Motorized	2	205	138	2	
	Hand pump	4			2	
	Pond	**80**			64	
	Ellas	**119**			13	

Miyo	Motorized	9	171	343	1	
	Well	**66**			3	
	Solar	1			0	
	Pond	**59**			0	
	Hand pump	36			3	
Moyale	Motorized	3	35	1,017	0	
	Hand pump	6			4	
	Pond	**25**			5	
	Solar	1			0	
			1,918	581	235	

Source: Computed based on data from Borena Zone Emergency Coordination Taskforce

As aforementioned, pond and *ellas* are the most important water source in lowlands of Borena zone. A great number of ponds, called *halo*, have been constructed, and according to the report by the Borena Zone Emergency Coordination Taskforce, 761 ponds are operational as of year 2011 as indicated in Table 1.5.1. Typical pond is shown in the photo right, and such type of ponds has been constructed by community members themselves or otherwise under different programs including PSNP. The ponds collect or literally saying they harvest rainwater. By nature, such ponds should be constructed in a depreciated area to which rainwater gathers; however due to its nature it would end up in drying-up during severe drought season.

A typical pond which collects rain water. This type of pond is called Halo.

1.5.2 Borena Traditional Water Resources; Ella

On the other hand, *ellas* are supported by permanent source; either spring water or stable groundwater. *Ellas* are established on shallow groundwater sources and managed by local communities, mainly by *Gosa*, sub-clan for Borena people. *Ellas* are mainly utilized for livestock water supply during dry periods mainly from November to March as well as June to August when natural and manmade ponds which collect rainfall dry up. As it contains salts it is used mainly for livestock but sometimes it is used for humans especially during severe drought season. The *ellas* typically serve communities from several adjacent PAs (kebeles), and during severe drought season there are many cattle coming from far places including Kenyan side.

A typical ella found in Dire woreda (right photo). Left photo shows the trench leading to the water point through which cattle are brought down for watering.

A typical feature of Borena *ellas* are the trenches which allow the livestock to move down to the water sources, rather than having water transported to the ground surface. *Ellas* are mainly located on flat areas of land, which collect and accumulate water in the ground. *Ellas* are owned by a sub-clan. There are two types of groups in *ella*: Addadis and Tulas (Ella/Borena Well, Mapping Report, Feb. 2012, FAO). Though there is no definitive consensus, on which is which, Addadis are generally known to be a group with low water source potential, while Tulas are known as high potential water sources. Each and every *ella* has a representative, locally known as *Abba Ella*, a person responsible for looking for the day-to-day activities at the site, and is also responsible for the management and maintenance of the *ella*.

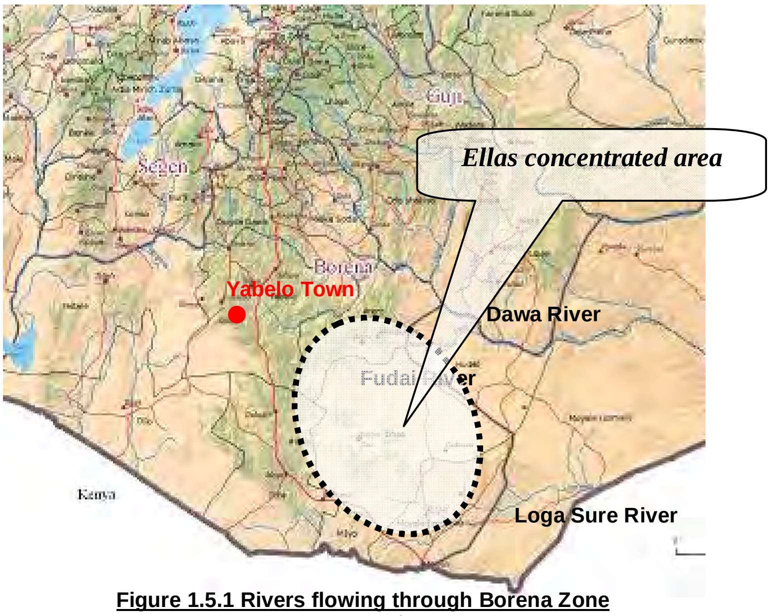


Figure 1.5.1 Rivers flowing through Borena Zone
Source: JICA Project Team

Ellas are by nature dependent on the availability of shallow groundwater table. In Borena, shallow groundwater table can be found in the lower catchment area of Dawa river basin. Dawa river originates in the highland woredas of Borena such as Abaya, Galana and Bula Hora, and flows south-eastern direction going out to Kenya. There is a tributary of Dawa river called Fudali, which collect rainwater from Dhas, Dire, Arero and Yabelo, and joins Dawa river in Somali region. The Fudali river flows during flooding season and dries up in dry season. This river replenishes the groundwater along those woredas located in the catchment, whereby a lot number of *ellas* can be found in those 4 woredas especially in Dire and Dhas woredas.

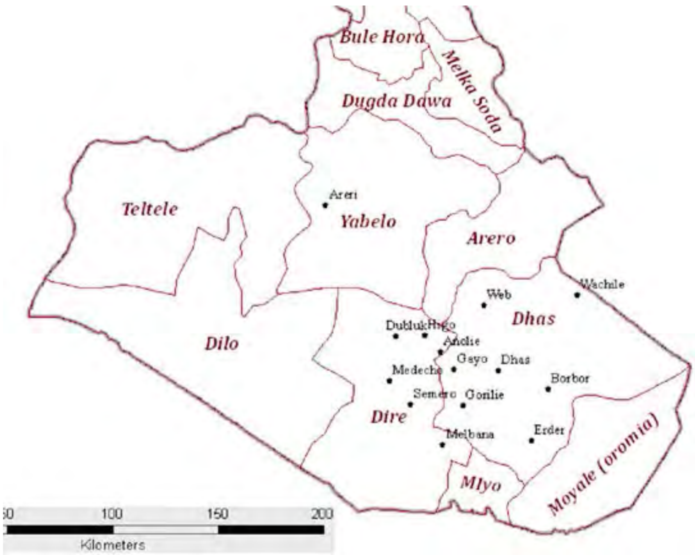


Figure 1.5.2 Areas (cluster of Ellas) surveyed by FAO
Source: Ell/Borena Well Mapping Report, Feb. 2012

In addition, flowing almost along the border with Kenya is Loga Sure river, staring from Dire woreda and flows through Miyo and Moyale woredas and goes out of the border with Kenya. In the upper reach of the catchment area, there are also a lot number of *ellas* especially in southern parts of Dire and Dhas woredas.

FAO carried out a survey on the *ellas* for the woredas of Arero, Dhas, Dire and Yabelo where there are relatively many number of *ellas*. The survey found out a total of 247 *ellas* from 14 sites (areas, or cluster of *ellas* shown in Figure 1.5.2). Most of them are located in Dhas and Dire woredas. Dubluk, Borbor and Gorilie sites have very high numbers of *ellas*.

Table 1.5.2 summarizes the survey result by FAO in terms of status; rehabilitated, under rehabilitation, un-rehabilitated, etc. as of year 2012. From the table, it is known that there are 247 *ellas* in the 4 woredas scattered in 14 clusters (group of *ellas*), of which 107 *ellas* have been rehabilitated, 17 under rehabilitation, and 123 *ellas* have not yet been rehabilitated. As an average approximately half of the *ellas* have been rehabilitated or just under rehabilitation.

Table 1.5.2 Summery of Rehabilitation and Un-rehabilitated Ellas

Particular	Cluster	Rehabilitated ellas	Under rehabilitation	Total Left	Un-rehabilitated ellas	Total	% of rehab. and under rehab.
Yabelo	Areri	7		7		7	100
Arero	Wachile	4	2	6	8	14	43
	Web	14		14	9	23	61
Dire	Higo	8	3	11	4	15	73
	Medecho	9		9	5	14	64
	Melbana	7		7		7	100
	Semero	1		1	2	3	33
	Dubluk	3	4	7	42	49	14
Dhas	Anolie		3	3	4	7	43
	Bobor	15		15	25	40	38
	Dhas	11	1	12	3	15	80
	Erder	10	1	11	4	15	73
	Gayo	10		10	1	11	91
	Gorilie	8	3	11	16	27	41
Total		107	17	124	123	247	50

Source: Ella/Borena Well, Mapping Report, FAO, February 2012
Note: Cluster names are shown in Figure 1.5.2.

The FAO survey further examined number of functional *ellas* as summarized in Table 1.5.3. From the 14 clusters visited in 2012, *ellas* were 100% functional in only 3 clusters, namely Areri, Melbana and Semenro. In the Wachile, Gorilie, Medecho and Borbor, 93%, 93%, 86% and 83% of the *ellas*, respectively, were functional. The maximum number of non-functional *ellas* was recorded in Dubluk and Web, as shown in the table, right. Overall functional ratio of *ellas* is 63%, just over half. The reasons which led the *ellas* to non-functional condition are flood as the primary reason, followed by landslide associated again with flood.

Table 1.5.3 Summery of Functional and Non-functional Ellas

Woreda	Cluster	Functional ellas	Non-functional ellas	Total	% of functional ellas
Yabelo	Areri	7		7	100
Arero	Wachile	13	1	14	93
	Web	5	18	23	22
Dire	Higo	7	8	15	47
	Medecho	12	2	14	86
	Melbana	7		7	100
	Semero	3		3	100
	Dubluk	6	43	49	12
Dhas	Anolie	5	2	7	71
	Bobor	33	7	40	83
	Dhas	12	3	15	80
	Erder	12	3	15	80
	Gayo	8	3	11	73
	Gorilie	25	2	27	93
Total		155	92	247	63

Source: Ella/Borena Well, Mapping Report, FAO, February 2012
Note: Cluster names are shown in Figure 1.5.2.

Table 1.5.4 shows number of PAs (kebeles) using the *ellas*, number of animals using *ellas*, number of households using *ellas*[19]. From the table, it is known that most of *ellas* are shared by several number of PAs (kebeles) ranging from 1 to 9 with the average 5 PAs. Number of animals using *ellas* are estimated at about 450,000 in total, and one *ella* serves a range of animals from approximately 1,000 to as many as over 13,000 heads. Number of households using *ellas* comes to about 24,000 as average, indicating one *ella* serves from 50 to over 500 households depending on the availability of other water sources.

[19] Note that generally pastoralist do not inform exact number of cattle they own, and also number of users very much differs from wet year to drought year, so that the table only indicates rough estimation and also under usual situation where no severe drought is not in place.

Table 1.5.4 Summery of Kebeles, Animals and Households using Ellas

Woreda	Cluster	No. of Kebeles using ellas	No. of animal using ellas	Animals per ella	No. of HHs using ellas	HHs per ella	No. of functional ellas
Yabelo	Areri	2	28,000	4,000	228	33	7
Arero	Wachile	3	18,870	1,452	1,553	119	13
	Web	11	52,900	10,580	1,845	369	5
Dire	Higo	5	22,050	3,150	795	114	7
	Medecho	6	40,300	3,358	3,400	283	12
	Melbana	6	22,580	3,226	1,790	256	7
	Semero	1	NA	-	NA	-	3
	Dubluk	9	79,500	13,250	3,170	528	6
Dhas	Anolie	5	7,800	1,560	375	75	5
	Bobor	4	73,900	2,239	5,812	176	33
	Dhas	5	40,600	3,383	2,220	185	12
	Erder	7	20,800	1,733	1,002	84	12
	Gayo	4	19,100	2,388	740	93	8
	Gorilie	7	22,650	906	1,254	50	25
Total/ average		5.3	449,050	2,897	24,184	156	155

Source: Ella/Borena Well, Mapping Report, FAO, February 2012

Note: Cluster names are shown in Figure 1.5.2.

1.6 Agriculture in Borena

Borena zone is largely demarcated into mid-highland area and lowland area by its elevation. A part of Abaya and most part of Gelana, and Bule Hora woredas are located in the highland and mid-highland areas falling in the most northern part of the Borena zone. Dugda Dawa and Malka Soda woredas are also located in mid elevation area in parts. In these mid-highland areas, farmers cultivate even coffee and *enset* (false banana) which should be placed in cool weather. They intercrop the coffee and *enset* with cereals and pulses in many places. In these areas, they can enjoy 2-time cultivation according to the relatively rich 2-time rainy season, or otherwise year-round perennial cultivation.

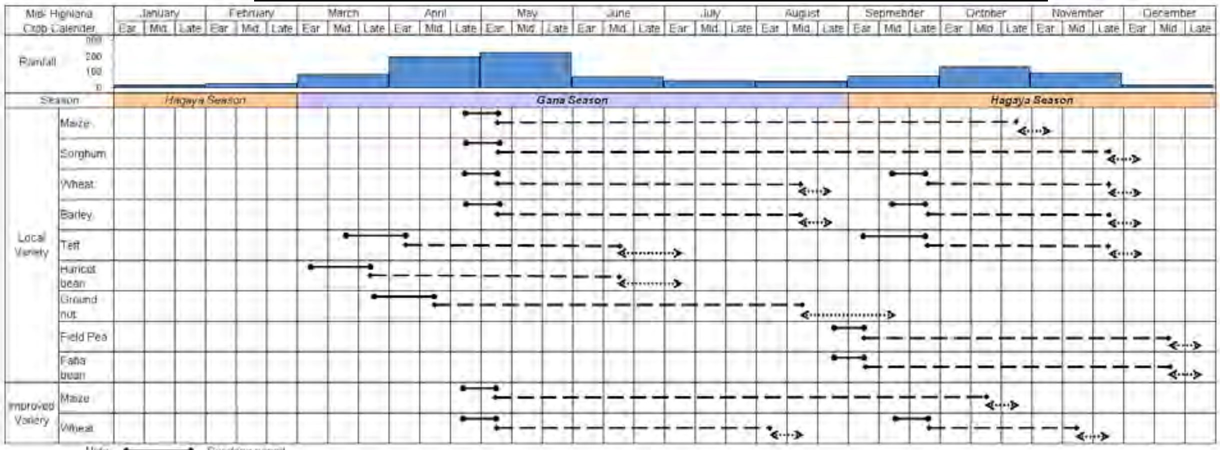
On the other hand, in lowland areas the people can hardly practice 2 times cropping. Especially in much lowland areas such as eastern and south-eastern parts of the zone, dry weather tends to prevail whereby *Hagaya* season cropping can not be practiced and even the cultivation during *Gana* season frequently fails. In this case, the meager amount of rainfall is the factor limiting agriculture production, worsened by its unstable rainfall pattern temporarily and spatially. Especially, before germination and during flowering time crops need due rainfall, and when hit by drought in these season crops start failing to grow even though there is enough rainfall as total in the season.

1.6.1 Farming Calendar

Table 1.6.1 shows cropping calendar in mid-highland area while Table 1.6.2 depicts that of lowland. Commonly grown crops in mid-highland area are; maize, wheat, barley, teff, haricot beans, and small quantity of field pea and faba bean (local varieties). Cropping season starts from March in case of teff, and haricot bean, followed by other crops in late April. Maize and sorghum stay through 2 rainy seasons from March to October since they are usually dried up in the field. Therefore they are cultivated only once in a year. Haricot bean is cultivated only during long rainy season while field pea and faba beans are cultivated only in short rainy season in most cases alternately or combined with other crops.

In lowland areas, cultivated crops are maize, sorghum, wheat, barley, teff, haricot bean, and chick pea by all local variety and to a little extent or trial basis maize, wheat and teff by improved variety, which are mostly short maturity and drought tolerant. The cropping season starts in mid March, upon the onset of long rainy season. In the lowland area, not losing the cropping season, most crops are planted almost simultaneously after the rain starts falling. Maize and sorghum need longer growing period, so that they are cultivated only one time while other crops are tried not only during long rainy season but also during short rainy season though they often fail to yield during the latter season.

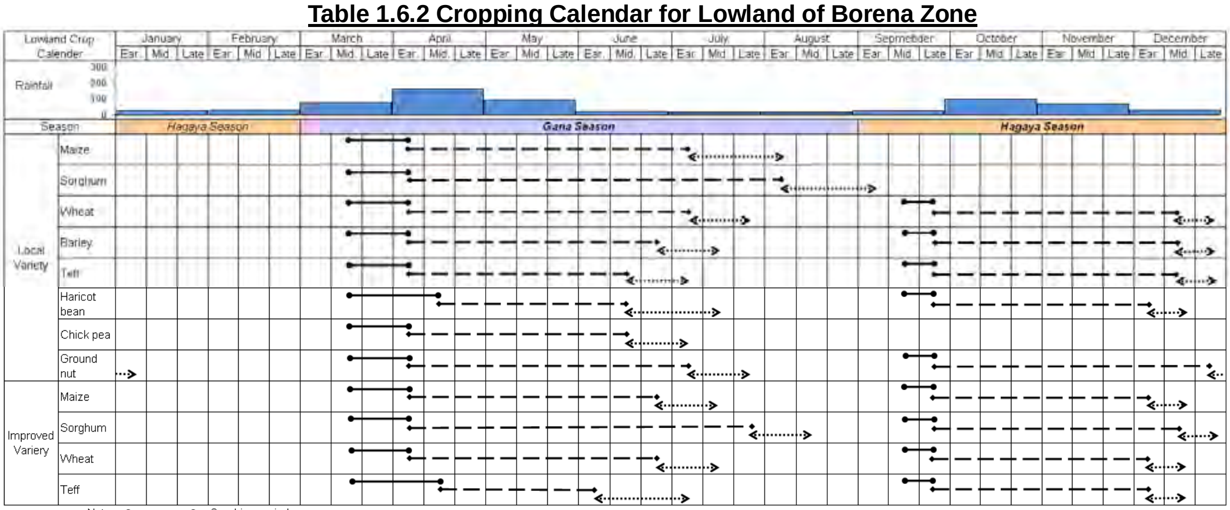
Table 1.6.1 Cropping Calendar for Mid-highland Areas of Borena Zone



Note: Seedring period; Growing period; Hervesting period

Source: established by JICA team based on interviews to Woreda Pastoralist/Agricultural Offices and own field surveys.
Note: rainfall is the date recorded at Hagare Marian, the center of Bule Hola, from 1975 to 2007.

Table 1.6.2 Cropping Calendar for Lowland of Borena Zone



Note: Seedring period; Growing period; Hervesting period

Source: established by JICA team based on interviews to Woreda Pastoralist/Agricultural Offices and own field surveys.
Note: rainfall is the average date recorded at Yabelo (1987-2006), Teltele (1070-2007), Mega (center of Dire, 1075-2007), Moyale (1980-2007).

1.6.2 Planted Area and Production

Agricultural data such as planted area and production have been collected from woredas for the years from 2005/06 to 2010/11 though there were a lot of data irregularities; some were missing, some were too high beyond reasonable range, etc. Those irregularities had been corrected as much as possible through discussions with woreda agricultural experts, yet there may be still some data inaccuracy. With this in mind, Figure 1.6.1 to Figure 1.6.6 summarize the planted area, production and yield by 2 major production areas; highland and lowland.

The former include Abaya, Gelana and Bule Hora woredas while the latter includes the rest 10 woredas. Planted areas for almost all the crops, especially maize and teff, in the highland area have been increasing except for sorghum. In the lowland, on the other hand, though there is a slightly increasing trend in the planted areas of maize and haricot beans, other crops have not shown increasing trend over years. Production shows more or less same tendency as the planted areas. With respect to yield, the highland area shows higher yield with most crops ranging from 0.5 to 1.0 ton/ha. In the lowland area, most of the yields stay only around 0.5 ton/ha.

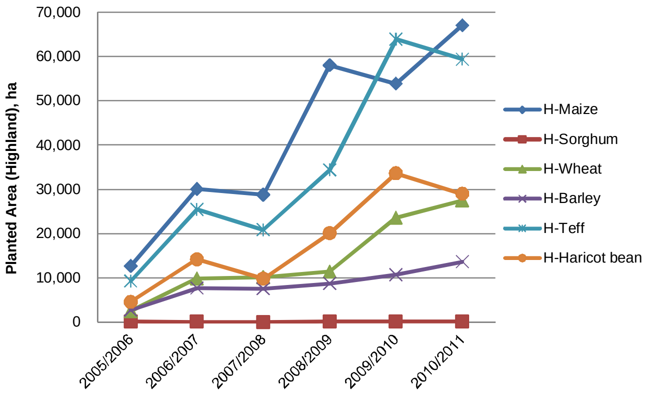


Figure 1.6.1 Planted Area (Highland Woredas)
Source: PDO Office, Borena Zone (2012)

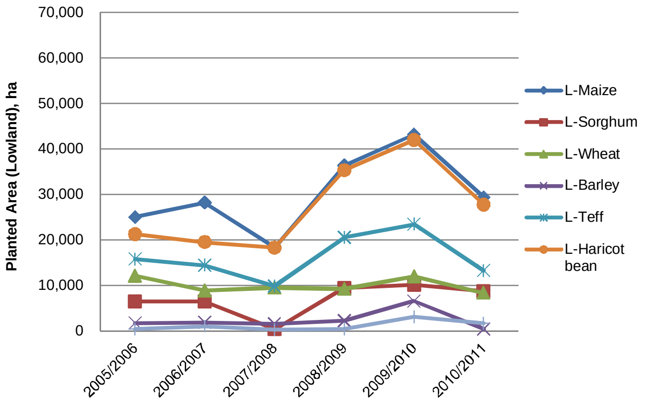


Figure 1.6.2 Planted Area (Lowland Woredas)
Source: PDO Office, Borena Zone (2012)

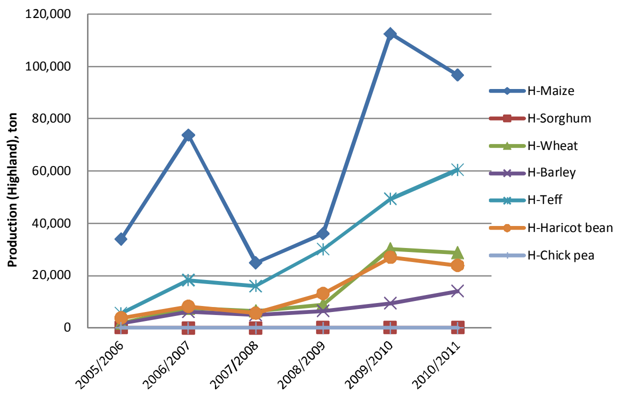


Figure 1.6.3 Production (Highland Woredas)
Source: PDO Office, Borena Zone (2012)

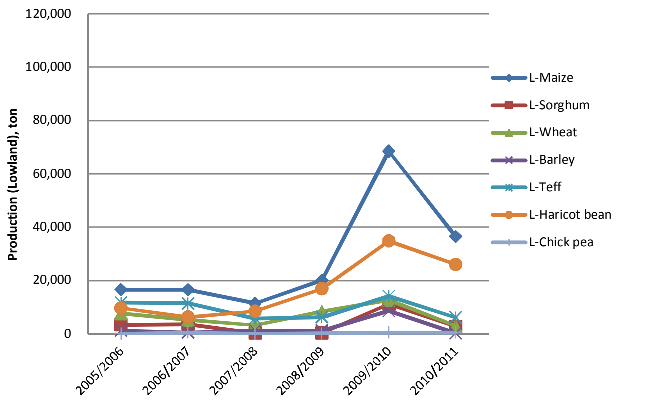


Figure 1.6.4 Production (Lowland Woredas)
Source: PDO Office, Borena Zone (2012)

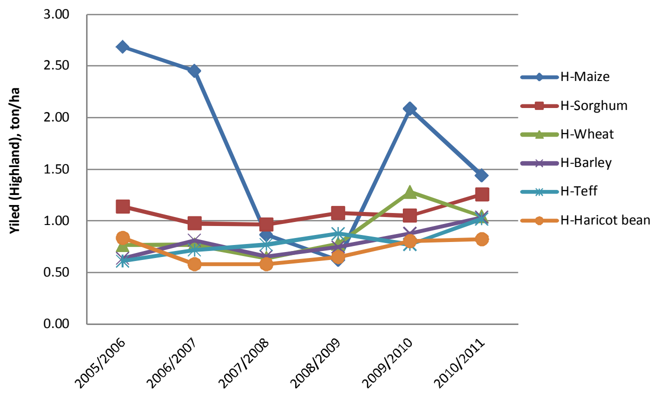


Figure 1.6.5 Yield (Highland Woredas)
Source: PDO Office, Borena Zone (2012)

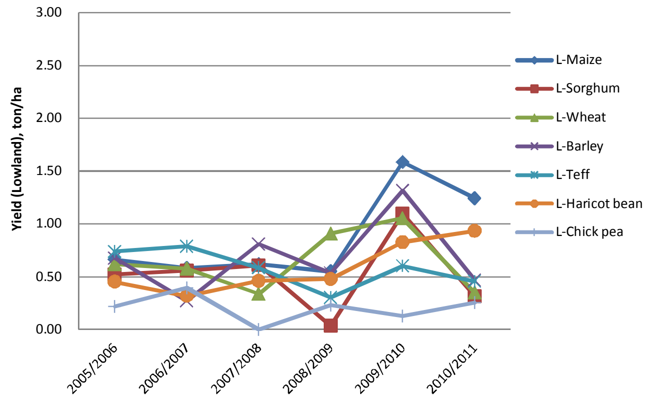


Figure 1.6.6 Yield (Lowland Woredas)
Source: PDO Office, Borena Zone (2012)

1.6.3 Agriculture Evolution in Borena

As Figure 1.6.7 shows, people from Guji ethnic group accounts for a large proportion of Malka Soda, Blue Hora and Dugda Dawa woredas. They initially migrated from Guji zone located on the north of Borena zone. In addition, there is SNNPR on the western part of Borena zone and then, Konso ethnic group moved from the region to almost 11 PAs[20] of northern part of Teltele woreda. In addition, Shewa and Burji ethnic groups live in the hilly areas of Yabelo, Dire and Miyo Woredas[21]. These ethnic people practice agriculture by their tradition.

---

[20] Ibsa PA, Fultole PA, Qalo PA, Kulcha PA, Darge Dhaba PA, Blue Danbi PA, Milami PA, Bila PA, Hadho PA, Hatuse PA and Makanisa PA, Teltele

[21] Elwaye PA, Obda PA, Yubdo PA and Gegna PA in Yabelo Woreda, Dida Mega PA in Dire Woreda, Hidi PA, Chari Turura PA, Dhokosu PA of Miyo Woreda

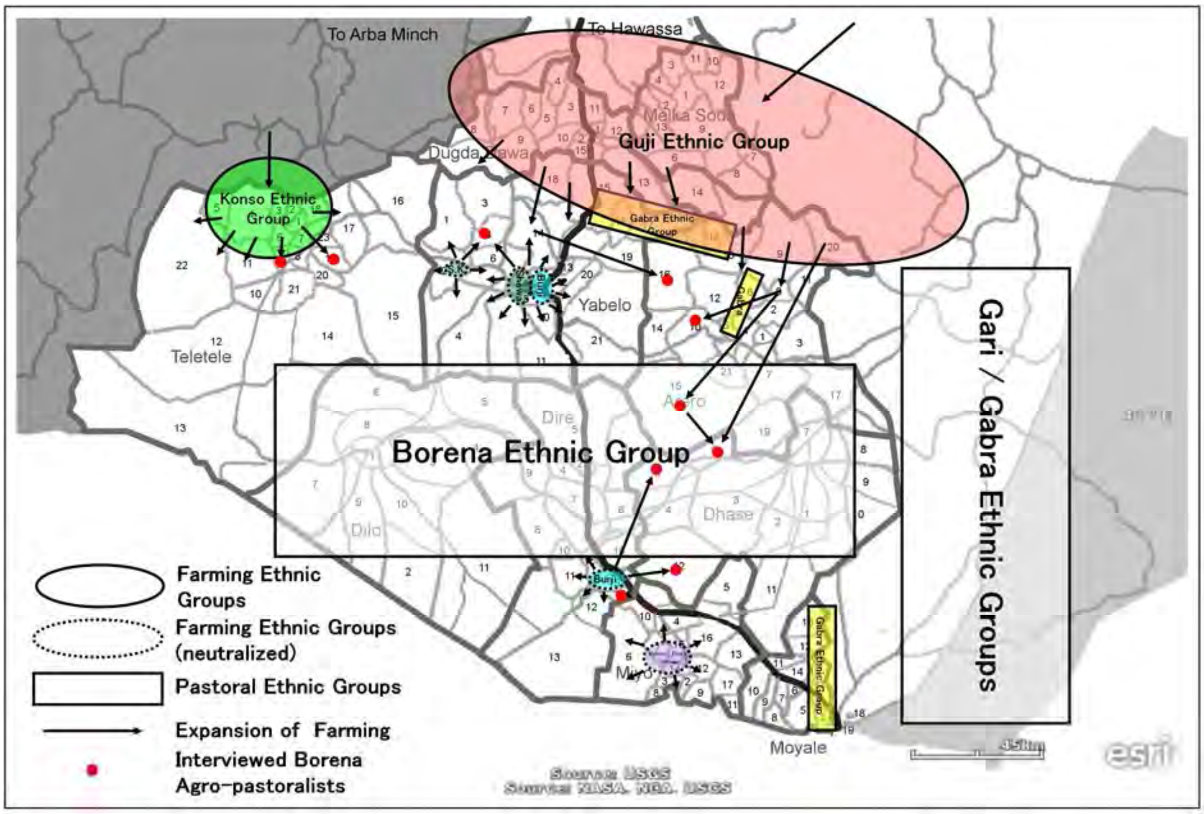


Figure 1.6.7 Distribution of Ethnic Group in Borena Zone and Expansion of Agriculture

Source: JICA Project Team based on Field Interviews

Agriculture in Borena zone has thus been introduced through those farming ethnic groups. The immigrants who came from highland areas in the 1970s initiated farming in Borena zone. Through field surveys, it was found that the agro-pastoralists interviewed in Teltele, Yabelo and Dire woredas are descendants of the immigrants and now approximately fourth-generation. On the other hand, there are also pastoralists originally from Borena ethnic group who began farming by following highland peopleõs practices. According to the field surveys, it could be estimated that Borena people may have began agriculture only 20 years or 2 generations ago.

To start up the agriculture, the Borena agro-pastoralist learnt the techniques from Konso and Burji ethnic groups by observing and applied the way to their farm land. In fact, these people were disinclined for accepting cultivation of crops at the beginning of the time they had started agriculture. However, now they regard benefits of farming as that 1) people do not need to buy crops from far areas, and 2) even households without livestock can survive owing to the harvest from farming. Agriculture is now deemed to be one of the opportunities of their livelihood. Thus, farming initiated by the people from the highlands has been widespread across Borena zone except for harsh dry areas e.g. Dillo woreda, Dhas woreda, especially the eastern part of Dhas.

CHAPTER 2 WORKSHOPS FOR PLANNING AND CAPACITY BUILDING

2.1 Summary of Major Workshops

Table 2.1.1 summarizes the series of workshops undertaken throughout the implementation of Component I in Borena zone. The Team has organized total 14 workshops/meetings/trainings, composed of 3 participatory situation analysis WSs, 2 study tours for community members and another 9 training WSs relating to the project implementation. In total, as many as over 3,000 in gross have participated. In most of the training WSs, DAs were the main target participants since they are the frontline extension officers in Borena zone playing important role in community development.

Table 2.1.1 Summary of Main Workshops Undertaken by RREP in Borena Zone

	Title	Date	Venue	Main Participants	F	M	Total
Phase I	Participatory Situation Analysis Workshop (Zonal Level)	May 1 to 2, 2012	Research Center, Yabelo Town	Zonal PDO & AD, Woreda PDO & AO, Zonal Relevant Government Offices, NGOs and MoA	5	54	59
	Participatory Situation Analysis Workshop (in 10 Woreda)	Jun 7 to Sep 1, 2012 (10 times)	Woreda Center in 10 Woredas	Woreda PDO, DA & DA supervisor and Relevant Woreda Government Offices	59	434	493
	Participatory Situation Analysis Workshop (in 4 Communities)	Jul 28 to Oct 10, 2012	Community in Malka Soda, Arero and Yabelo	Community Members	99	183	282
	Kickoff Workshop for CBPs	Dec 7 to 10, 2012	Research Center, Yabelo Town	DA & DA supervisor in Phase I target PAs and Zonal & 4 Woreda PDOs	9	48	57
	Monitoring WS for CBPs	Apr 21 to 22, 2013	Research Center, Yabelo Town	DA & DA supervisor in Phase I target PAs and Zonal & 4 Woreda PDOs	9	47	56
	Training Workshop for CBPs	Jun 17 to 21, 2013	Research Center, Yabelo Town	DA & DA supervisor in Phase I target PAs and Zonal & 4 Woreda PDOs	12	63	75
	Learning Study Tour for CBPs	Aug 2014	16 PAs in 4 woredas	Community Members	157	899	1,056
	Final Evaluation Workshop for CBPs	September 5 to 6, 2013	R Catholic Church Hall, Yabelo Town	DA & DA supervisor in Phase I target PAs and Zonal & 4 Woreda PDOs	66	7	73
Phase II	Introductory Meeting	Nov 21, 2014	Research Center, Yabelo Town	Zonal PDO & Representatives of 6 Woreda PDOs	1	8	9
	Kickoff Workshop for CBPs	Dec 2 to 7, 2013	R Catholic Church Hall, Yabelo Town	DA & DA supervisor in Phase II target PAs, DA facilitators, Zonal & 6 Woreda PDOs	13	57	70
	1st Monitoring Workshop for CBPs	May 20 to 24, 2014	R Catholic Church Hall, Yabelo Town	DA & DA supervisor in Phase II target PAs, DA facilitators, Zonal & 6 Woreda PDOs	11	83	94
	2nd Monitoring Workshop for CBPs	Aug 11 to 15, 2014	R Catholic Church Hall, Yabelo Town	DA & DA supervisor and PA manager in Phase II target PAs, DA facilitators, Zonal & 6 Woreda PDOs	13	97	110
	Learning Study Tour for CBPs	Jul 30 to Aug 7, 2014	16 PAs in 6 woredas	Community Members	34	542	576
	Final Evaluation Workshop for CBPs	Oct 27 to Oct 30, 2014	R Catholic Church Hall, Yabelo Town	DA & DA supervisor in Phase II target PAs, DA facilitators, Zonal & 6 Woreda PDOs	12	89	101
				Total	500	2,611	3,111

Source: JICA Project Team

2.2 Participatory Situation Analysis (Zonal, Woreda and Community Level)

The designing of the community based projects started with participatory situation analysis at zonal level, then woreda level and further went down to community level. A series of participatory situation analysis was initiated at zone level which was launched on May 2, 2012, and a set of woreda level workshops were organized from June 7 to September 1, 2012 in 10 lowland woredas separately. Mainly two subjects, problem analysis and situation analysis, were undertaken in the workshops.

2.2.1 Situation Analysis

The purpose of situation analysis is; 1) to get and share a bird's-eye view of the target area to enable all the participants to assess the situation objectively, and 2) to prioritize the issues and spatial areas for identifying potential project activities with sites. At the zonal workshop, agro-ecological zone was firstly examined by the participants. The zone was classified according to altitude; namely, high land, mid-highland and lowland. Through the plenary discussion, the participants grouped Abaya, Galena and Bule Hora in a mid-highland and highland area located in the northern parts of Borena zone. The other woredas are grouped in ñlowland areaò, which has more than 80 to 90% of lowland.

Following the area classification by woreda, a level of food security at each woreda was examined by all the participants. The level of food security in Abaya, Galena, Bule Hora and Dugda Dawa was better than that of the other woredas, though the participants from these woredas had also reported more than a half of kebeles fall in food insecurity from time to time. The other 9 woredas, located in the lowland of Borena zone, reported that all the PAs (kebeles) were facing food insecurity, sometimes acute food shortage or otherwise chronic food shortage.

After the participants discussed food security being the most important issue, total ten key issues were identified for the group discussion. The issues covered crop productivity, water infrastructure, water shortage for livestock and human, bush encroachment, livestock marketing, etc. Upon this identification made, the participants formed three groups and elaborated the conditions on each key issue together with strengths and opportunities. The end of this session was the ranking in a scale of 1 to 5 for all the key issues (1 being the worst while 5 being the best) by comparing with those of the other Woredas.

Table 2.2.1 Result of Situation Analysis (Scoring) at Borena Zone Level

Key Issues \ Woreda	1. Abaya	2. Galana	3. Bule Hora	4. Malka Soda	5. Dugda Dawa	6. Yabelo	7. Arero	8. Teltele	9. Dilo	10. Dire	11. Dhas	12. Miyo	13. Moyale
Agro-ecological zone (Highland, Mid-highland, Lowland)			H: 11%										
	M: 35%	M: 30%	M: 36%	M: 15%	M: 15%	M: 20%	M: 5%			M: 5%		M: 15%	M: 5%
	L: 65%	L: 70%	L: 53%	L: 85%	L: 85%	L: 80%	L: 95%	L: 100%	L: 100%	L: 95%	L: 100%	L: 85%	L: 95%
Food Security	3	3	3	1	2	1	1	1	1	1	1	1	1
Crop Productivity	3	4	1	1	2	2	1	2	1	1	1	1	2
Water Infrastructure	3	3	2	1	1	3	1	2	1	2	1	2	3
Water Shortage for Livestock	1	3	1	3	1	2	1	1	1	3	1	1	2
Water shortage for Human	1	2	1	1	1	1	1	1	1	1	1	1	1
Drought / Lack of Rainfall Climate Change	1	3	3	1	1	1	1	1	1	1	1	1	1
Bush Enclosure	5	3	4	2	1	1	1	1	1	1	1	2	2
Livestock Marketing	1	1	2	2	3	3	1	1	1	2	2	2	2
Animal Health	2	3	2	3	1	3	1	2	1	2	2	1	2
Erosion of Customary Institution	3	3	4	2	1	2	2	2	2	3	3	1	2
Technology Adoption of Pastoralists & Agro-pastoralists	3	3	2	1	2	2	2	2	1	1	3	2	2

Note that the results of Malka Soda woreda were added later since they did not send the participant to the kickoff workshop.
Source: JICA Team, Zone level kickoff workshop held on March 1 & 2, 2012.

The scoring for the situation analysis is summarized in Table 2.2.1 and the summary is; 1) it was identified that almost all the situation in the lowland woreda are very much severe, or harder, as indicated by many score-1 as compared to the counterpart woredas located in the mid-highland, 2) such woredas as Arero, Teltele, Dillo and Miyo do not have any more than score-2, indicating harder environmental situation in those woredas, and 3) particularly, the condition for the availability of water such as water shortage of livestock and human, drought and etc. are more significant.

The Team and a sub-contractor engaged in rural situation survey continued Situation Analysis at woreda level for the lowland Borena area[1] and the participants from each woreda prioritized 5 development issues as livestock, crop, health, income and population based on the situation of PAs they belong to. In addition, they also identified the most crucial three key issues under the top prioritized sectors (e.g. shortage of water for livestock, poor soil fertilities and etc.).

Figure 2.2.1 and Figure 2.2.2 summarizes the priority sectors identified at woreda level. As shown in the figures, livestock sector was given the first priority by as many as 86 PAs out of the total 151 PAs. Then, 47 PAs ranked the crop sector as the top priority. With respect to income sector, only 9 PAs gave

[1] The Survey targeted 10 lowland woredas excepting Abaya, Galana and Bule Hora, however due to security problem Moyale woreda could be covered by the survey.

the 1st priority, while 8 PAs gave the top priority to the health sector. From this counting, livestock sector was given a very high priority for the lowland woredas as expected, followed by crop sector. The woredas which gave higher priority to the crop sector than the livestock as whole PAs were Teltele, Dugda Dawa, Dire and Miyo.

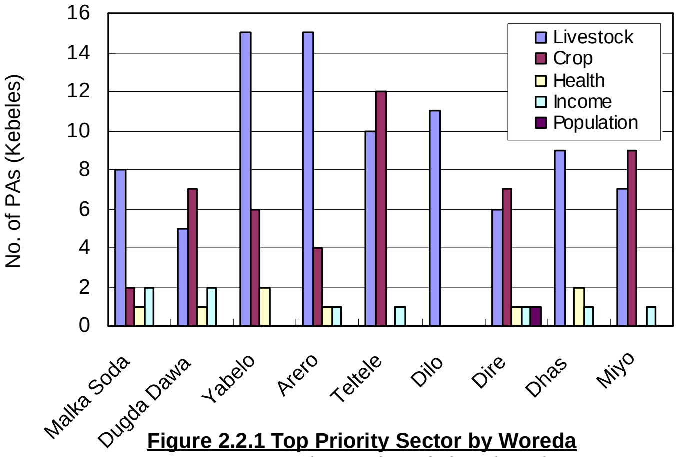


Figure 2.2.1 Top Priority Sector by Woreda
Source: Woreda Level Workshop (JICA)

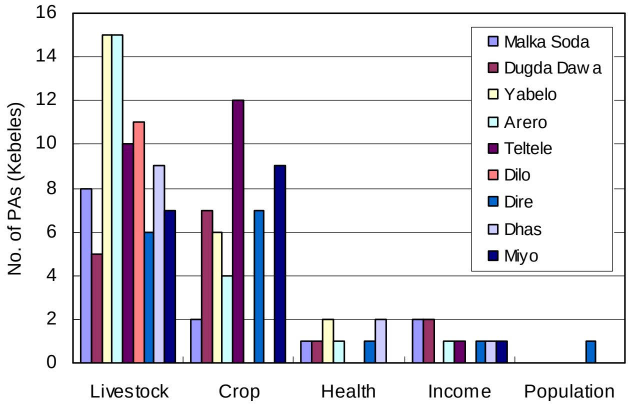


Figure 2.2.2 No. of Woredas by Top Sector Priority
Source: Woreda Level Workshop (JICA)

Top 3 priority project approaches identified by PAs are summarized in Figure 2.2.3. The figure first summarizes the priority by group of sector such as livestock, crop, income and health. The first bar (blue) shows the count number of 1st priority, the 2nd bar shows that of 2nd priority and the 3rd bar shows the number counted on 3rd priority project approaches. As is well shown in the figure, shortage of pasture was given the top priority by the highest number of PAs (51 PAs), followed by water shortage (24 PAs for top priority), both of which fall under the livestock sector. The 2 priority approaches were also given 2nd top priority by many PAs.

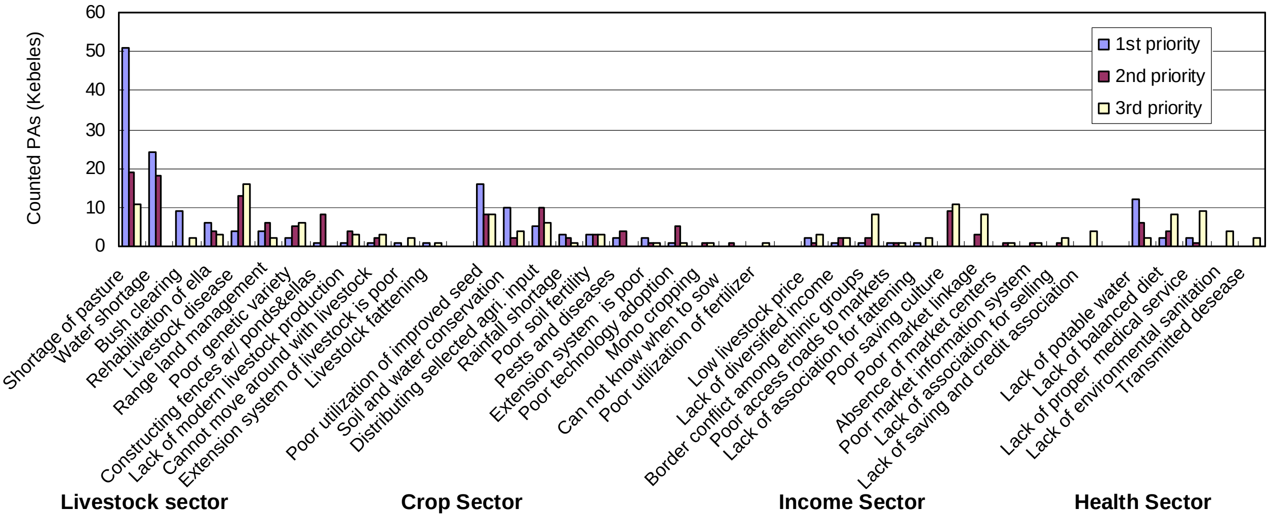


Figure 2.2.3 Priority Project Approaches identified by PA (Kebele) and by Sector
Source: Woreda Level Workshops (JICA Team)

With respect to crop sector, poor utilization of improved seeds was given higher priorities by many PAs (16 PAs of top priority), however the priority was much lower than those top 2 approaches raised under the livestock sector. When looking at the income sector, poor market linkage, poor saving culture and border related conflict were given some priorities. Under health sector, lack of potable water was given higher priority as 12 PAs gave the top priority to the issue.

2.2.2 Problem Analysis

The participants at all the situation analysis workshops analyzed the relationship amongst the problems into causes and effects. By structuring a problem tree, it can be clarified the relationship between the problems and their causes. This helps the participants to identify which areas (what problems) should be tackled with what priorities and how (with what measures) they should be intervened, leading people to design the components.

As direct causes of the core problem õñPeople of Borena Zone is not food securedò, A) Livestock productivity is low, B) Crop productivity is low, C) Food purchasing power is poor, D) Population is increasing rapidly, and E) Human health status is low were confirmed. Following these direct causes, secondary and tertiary causes were also pointed out by the participants. The problem tree framed by the participants is given in Figure 2.2.4.

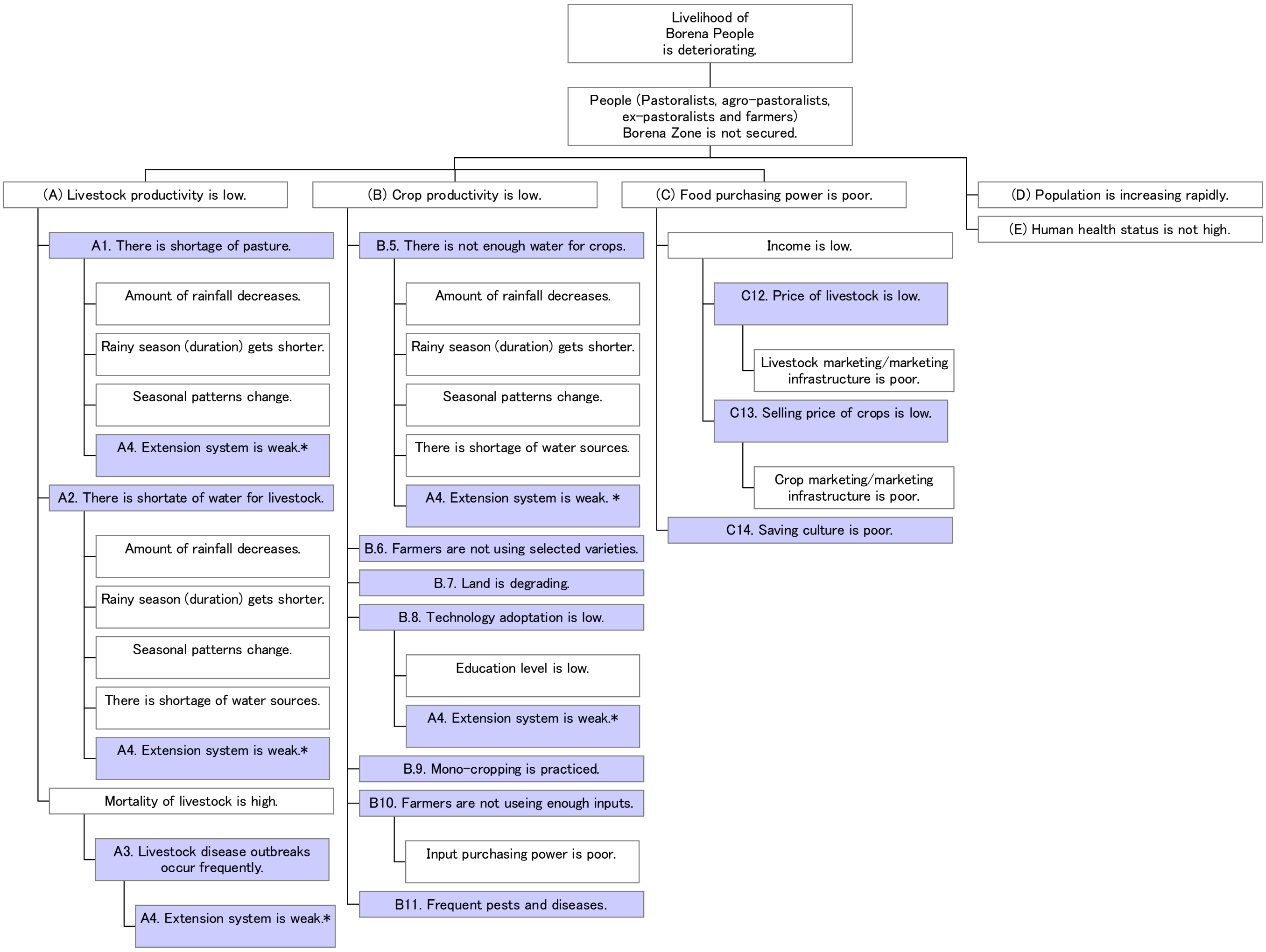


Figure 2.2.4 Summary of Problem Analysis undertaken in Borena Zone

Source: JICA Project Team

2.3 Workshops in Phase I

Zonal PDO and JICA team considered that DAs, the frontline extension officers, should play an important role in pastoral community development. Accordingly, at the commencement of the project, a kick-off training workshop was organized to technically train DAs, woreda experts and zonal experts in order to equip them with necessary skills, knowledge, hands on experiences and norm to pursue the development of communities in Borena zone. In addition, a refresher training workshop was carried to complement the kickoff workshop, followed by monitoring and evaluation workshops.

2.3.1 Kickoff Workshop in Phase I

Before the commencement of pilot activities of Phase I in Borena zone, the Team initiated a kick-off training workshop, during which the Team explained the project objectives and its components, mainly community based projects and livestock market construction, and presented implementation schedule and the findings so far made. There were discussions on the selection criteria for the two secondary livestock markets to be constructed under RREP, inclusion of *ella* rehabilitation, utilization of nursery sites established by woredas, etc.

After the explanation of the overall plans of Phase I, the JICA team started training sessions on; 1) participatory development, 2) water development, 3) rangeland management, 4) field visit to similar project sites, 5) dryland agriculture improvement, and 6) soil conservation. Regarding the session "1) participatory development", participants had conduct such practices as situation analysis and problem analysis. During the "2) water development", they shared the type of water sources in Borena zone, and discussed on how to rehabilitate *ellas* (Borena traditional well), and newly construct Horo (pond).

During the session of 3) rangeland management, the participants shared their experiences on the cause of rangeland deterioration. An expert on the rangeland management from Yabelo PDO explained that Borena people traditionally burn bush to manage their rangeland. However, during "Derg" regime burning of bushes was forbidden by a national proclamation. Thus, bush encroachment has been expanded to the current stage, which is beyond the capacity of community management.

After the class sessions, the participants visited some sites for soil and water conservation conducted in Harbor PA, Yabelo woreda, where bare land was converted to grassland naturally after one year. Rotational system was also explained to the participants as a good example of the rangeland management. In addition, the participants visited one farm land and observed high performing fruits, vegetables and other crops. Basic techniques on farming were introduced to the participants such as recommended varieties of crops and line planting. The participants also learnt water harvesting techniques.

Photo during a field trip on December 9, 2012 where total 57 officers (9 female and 48 male) attended.

At the last session of the kick-off training workshop, the Team presented project implementation modality, logistic support and basic operation principles as; 1) the project does not pay wage to the community participants for the engagement in works from the view point that the RREP is a development project, not emergency responsive project nor recovery responsive project; namely, no cash & food for works, and 2) instead the project provides necessary hand tools and materials to the communities to enhance and accelerate their development activities.

After the explanation by the Team, the participants raised their worry towards letting the community work without any wage. Payment for works is, in fact, very common and deep-rooted in Borena area. All NGOs working in this area pay wage for any type of activities regardless of it being emergent or development related activities. JICA team clarified that this is to develop the sense of self-help and ownership on the development activities. When the community works by themselves, they consider it as it is their own and vice versa. The participants finally supported the idea.

2.3.2 Monitoring Workshop in Phase I

After the above Kickoff workshop, the Team launched actual activities such as hand tools delivery and on-site trainings on agriculture and forage production, and the communities had started their activities by using input supplies delivered by the Team. Progress at each target community has been monitored weekly and on-site evaluation was also conducted by DAs and PDO officers to improve the activities hereafter.

In the course of the implementation, the Team conducted a monitoring workshop in June 2013. The workshop objectives were to; 1) acknowledge project progress for the first stage, 2) identify communitiesô major achievement and make a map of their target PAs with basic information, 3) understand *RREP Approach* and *Project Approach*, 4) understand how monitoring and evaluation on the *RREP approach* are taken by the communities, DAs and woredas, and 5) understand monitoring method on farming techniques for improved varieties.

There were two main group sessions and one was the mapping of the 16 PAs including the settlement of villagers, spatial distribution and type of CBPs depending on levels of the communities like *Olla* and *Rera*, and villages which received and non-received hand tools. Finally, 16 PA maps were constructed, from which it was learned that natural resources such as *ellas* (Borena traditional wells), *kalos* (rangeland) and *haros* (ponds) were often shared by the villages based on the coverage levels and size of them. Likewise, the participants learnt that the CBPs were often worked by several communities rather than only one *olla* (village).

The Team and the participants acknowledged that this kind of multi-layered projects would strengthen social ties on the different levels of the communities. Strengthening of social tie could result in enhancement of resilience for the communities and this should be monitored and evaluated throughout the project implementation. The maps prepared in this WS spatially indicated such linkages between the communities and encouraged concerned people to monitor and evaluate communitiesôactivities in easy and effective way.

Another group session was a participatory evaluation of the Community Based Projects (CBPs). Problems identified at this stage were mostly related to the supplies; namely, shortage of tools and late distribution of them. In addition, overlapping of the community projects with the other programs such as watershed program and personnel activities like farming was also raised. It was therefore agreed that the timing of the activities should be carefully determined with the concerned communities.

2.3.3 Training Workshop in Phase I

A local NGO sub-contracted by the JICA Team organized a training workshop consisting of 5 days for the purpose of building capacity of DAs and other relevant government officers such as woreda experts, zonal experts engaged in livestock, agriculture and soil conservation sectors. Especially, this training workshop complemented the kickoff workshop and was launched as a refresher course for the DAs by adding some new ideas. It also dealt with problems/issues they encountered at that early time during the implementation of Phase I.

Topics of the workshop included major subjects like water management, rangeland management and improved dryland farming practices and a strategy to be followed for the continuous implementation of the development activities. Under those subjects, such topics were tackled as; soil conservation coupled with rangeland management, bush clearing and fencing, forage production, silage making, pond construction and rehabilitation, the use of short-matured crop varieties, compost making, seed selection for crop production, pest and disease control for both livestock and crop production, etc.

2.3.4 Evaluation Workshop in Phase I

At the end of Phase I, the Team held a zonal workshop to evaluate the pilot activities of CBPs, dryland farming improvement and pasture production from September 5 to 6, 2013. The participants also examined the lessons learnt from the activities, the issues arisen and their solutions for the next phase which starts in November 2013. In order to share the progress and achievement of the overall project implementation with the participants, first of all, the Team explained difference between *RREP Approach* and *Project Approach* undertaken during the project implementation, work progress and achievement of the CBPs, pasture production and dryland farming improvement.

After that, the workshop participants formed groups and discussed the major activities of CBPs like water development, infrastructure and rangeland management undertaken during the Phase I. The participants selected one activity which had high performance and another activity which had poor performance in each PA and examined 5-aspect evaluation on them, strength, weakness, challenges and possible measurements to have been or be taken (See Table 2.3.1). DAs recognized the high achievements of solving water problems first and then rangeland and infrastructure. Also high motivation, strong ownership, sound competition among *gares* and good experience sharing were highlighted.

As challenges, overlapping of development activities especially cash-for-work, frequent change of schedules by communities and weak technical and M&E support were raised. DAs also recognized that high participation of the community is possible when the activity has high priority; the community can see the benefit; the community can get good technical support from Das; and when enough tools are delivered on time. On time planning, fixed schedule and a full appointment to the community, continuous training and technical support as well as M&E were mentioned to further improve the development activities.

Table 2.3.1 Mid-Term Evaluation at Borena Zone Evaluation Workshop (5 September 2013)

Major Outputs				*Major Issues*		*Bad Influence on the CBPs*	
Water	**Rangeland**	**Infrastructure**	**Capacity**	**Season / Drought**	**Overlapping**	**Participation**	**Tools**
A: Shortage of water problem decreased	A: Expansion of kalo	M: An alternative road	Y: High motivation on development activities	A: Low participation due to drought	A: Overlapping with cash-for-work	D: Low participation	A: All the gares did not get delivered the tools
A: Additional haro was constructed.	A: Thin cattle get enough grass	M: Services are facilitated at the zone center	M: Strong ownership	D: The activities stopped because of drought	M: Overlapping of works	Y: Low coordination of communities	D: All the gares did not get access to the tools
A: Water became available nearby	A: Women don't need to travel long distance	M: Road access for motorcycles	M: Competition among gares	M: Problem of the rainy season	Y: Overlapping of farming with development activities	M: Weak social ties	D: Shortage of tools (sledge-hummers, wheel barrows and water cans)
M: Water became available nearby	A: Keep grass together	M: Inter-PA road access	D: Finishing the activities in short time			M: Lack of uniform participation in all PAs	D: Late distribution of tools
M: Water became available nearby	M: Problem of pasture decreased	D: Availability of a road for transportation	Y: Good experience sharing	**Technical Support**	**Scheduling**	Y: Participation not balanced	Y: Late supply of tools
M: Duration of water became longer	M: 7-8,000 cattle benefited from rangeland	Y: Good road access		D: Weak technical support from DAs and RREP	M: Difficult to do M&E on all PAs at the same time		Y: Number of tools
M: Water is available at the nearest ella.	D: Problem of pasture decreased			Y: Weak monitoring and technical support from DAs	D: Change of schedules		
D: Duration of haro became longer	Y: Bush decreased		**Tools**				
M: No need to migrate for searching water			D: Availability of tools improved	**Seeds**	**Topography**		
M: More ella were constructed				M: Lack of vegetable & fruit seeds	M: Problem of topography for road		
D: Enough water for calves and cows nearby							
Y: Water became available nearby							
Y: Shortage of water problem decreased							
Y: Access to potable water							

Social Ties	*Farming etc.*	*Best Practices*		*Bad Practices*	*How to Improve*		*Impact of Cash-For-Work*
Haro	**Low participation**	**Good participation**	**High Priority**	**Tools**	**Tools**	**Participation**	**Low Participation**
A: Gare level	M: Low participation because of farming	D: (**Haro**) High participation of the community	A: (**Haro**) Water still is a problem with high priority	M: (**Irrigation**) Late distribution of tools	A: Need support of qualified tools	M: DAs to increase community participation	A: Low participation on development activities
Y: Gare level	Y: Low participation because of farming	Y: (**Haro**) High participation	D: (**Haro**) High priority	M: (**Health post**) Necessary tools were not distributed	A: Need maintenance for the delivered tools	Y: Improve cooperation	M: Low participation
D: Gare level	D: Less commitment to development activities	Y: (**Haro**) Good participation	Y: (**Haro**) Still priority	Y: (**Primary school**) Lack of necessary tools	M: On-time supply of tools	Y: Strengthen cooperation	D: Low participation
M: Gare level	M: Low participation because of mining	Y: (**Haro**) All gares participated		**Cash-For-Work**	D: On-time supply of tools	**Planning**	Y: Low participation of community
Ella	D: Increase of private work causes low participation	M: (**Road**) High participation	**Good Benefit**	A: (**Haro**) Activities stopped for cash-for-work	D: Need additional supply of sledgehammers	D: Fixed schedule / appointment to the community	
D: Gosa level	Y: Low participation because of private work		D: (**Haro**) Good benefit from the haro	**Low Awareness**	Y: Balanced number of tools for participants	Y: On-time planning	**Low Interest / Motivation**
Kalo		**Tools**		M: (**Guji ella**) Low awareness	**Continuous training, Monitoring & Tech Support**	Y: Balanced planning of tools and manpower	A: Less motivation on development activities
D: Rera level		A: (**Haro**) Tools were enough and managed effectively	**Technical Support**	**Not Started**	A: Continuous training for the community	**Awareness**	D: Low interest on development work
A: Rera / Zonii level		M: (**Bridge**) Enough tools	M: (**Haro**) Technical support from the DAs	D: (**Ella**) Not started yet	M: Technical support for the community	M: Experience sharing	Y: Less consideration on development act
Y: Zonii level				**Technical Support**	M: Continuous training for DAs and the community	Y: Awareness creation	
M: Gare level				Y: (**Ella**) Need technical support	D: Continuous monitoring & tech support by DAs & RREP	**Camera**	**Dependency**
Road					M: Continuous and strong monitoring	A: Need camera for monitoring the activities	A: Dependency on cash-for-work
M: Zonii level					**Bicycle**	D: Need camera for monitoring the activities	Y: Dependency
Y: PA level					M: Bicycle maintenance		M: Dependency

2.4 Workshops in Phase II

After having reviewed a series of the workshops undertaken during Phase I, the Team held an introductory meeting for Phase II activities on November 6, 2014 in Yabelo, inviting woreda and zonal heads. During this meeting, all the achievement made during Phase I and planned activities in Phase II were shared and agreed upon amongst the participants. Thereafter, the Team scheduled a 4-set of workshops under this Phase II consisting of kickoff workshop, 1st and 2nd monitoring workshops and final evaluation workshop at an interval of every 3 to 4 month.

2.4.1 Kick-off Workshop in Phase II

The kick-off workshop of Phase II was launched in December 2 to 7, 2013 at the commencement of the activities. First, the Team presented achievements and lessons learnt from the CBPs and the pilot activities of pasture production and dryland farming improvement in Phase I. Then, group discussion had started on the review of situation analysis results made during Phase I, and also the results were modified by the participants. Particularly, the Team realized that agriculture was also getting important position in the peopleȏs livelihood in agro-pastoralist areas. In fact, livestock sector was replaced by farming as a top priority sector in some PAs of such woredas as Malka Soda and Teltele.

The Team also presented what the *RREP Approach* is and the difference between *RREP Approach* and conventional approaches (*Project Approach*). Besides, a facilitator further explained procedure of monitoring and evaluation of community based projects under *RREP approach*. In addition to 5-aspect evaluation, the Team also emphasized that the participants should closely monitor multilayered social ties, and flexibility and diversity of communitiesȏ development activities. And then, the participants carried out the group works on the mapping of each PA. DAs and DA facilitators drew a base line map of their PAs.

DA facilitators shared their experiences accumulated during the Phase I of the project with the participants in charge of newly added target PAs. They explained that how community based projects were implemented in Phase I and also what steps were undertaken by the DAs described as; explanation of approach taken by RREP, facilitating communities to make their plans, appointing representatives for handover of hand tools and, follow-up and monitoring of activities. An expert from PDO asked that how the DAs selected *gare* leaders during tools distribution. The DA facilitators answered that the DAs did not select new *gare* leaders but they mobilized the ordinary *gare* leaders who were selected through the conventional structure.

Regarding the session of rangeland management, the participants moved to Dadim PA, Yabelo woreda, where the community had launched forage production since *Gana* season 2013. First of all, a trainer demonstrated practices such as land preparation and seed sowing for specific forage varieties. Then, the participants were grouped into 4 teams and practiced what they learnt there. Particularly, the Team observed that the DA facilitators became a trainer of each group and instructed the participants. The participants moved to bush encroachment areas and actually conducted bush thinning. Based on what the participants learnt during training sessions, they formulated an action plan of forage production for next *Gana* season in their target PAs.

Demonstration of bush thinning by a DA facilitator

With respect to dryland farming improvement, the Team presented the achievement made in Phase I such as a series of technical trainings, improved seed distribution, etc. After the presentation given, the

DAs discussed and recorded farming practices by the communities, cropping condition, problems encountered and the needs of communities in their target PAs. The DAs and experts also made action plan for the pilot activities of dryland farming improvement in Phase II. The action plan was formulated basically for focusing on seed procurement and distribution, agricultural trainings and monitoring works along with RREP supports.

At the end of the program, the Team presented project implementation modality to be followed in Phase II. Emphasis was placed on the modality of no-wage payment but tools provision together with technical assistance only in terms of support to the communities. Then, a presenter detailed the plan of the CBPs as; the responsible bodies in charge of accomplishment of the planned activities, types and quantities of the supports to be arranged by the JICA team, schedule and procedure of implementation of the activities in Phase II and logistics supports to be provided to both DAs and woreda experts.

2.4.2 First Monitoring Workshop in Phase II

First monitoring workshop of Phase II was held in May 2014. The Team at first presented the progress of overall pilot activities in the target 16 PAs of 6 woredas for Phase II. And then, the DAs and woreda experts exercised a role play and investigated the percentage of dependency on pastoralism and farming in their target PAs in order to enable the Team and the participants to understand possible resilience strategy based on the areas. The top of Figure 2.4.1 shows current situation of pastoralism in terms of percentage, while the bottom indicates the future image, say after 10 years, of pastoralism in 32 PAs covered by both Phase I and Phase II. Most of the participants viewed that people would advance agriculture and the number of pure pastoralist would decrease.

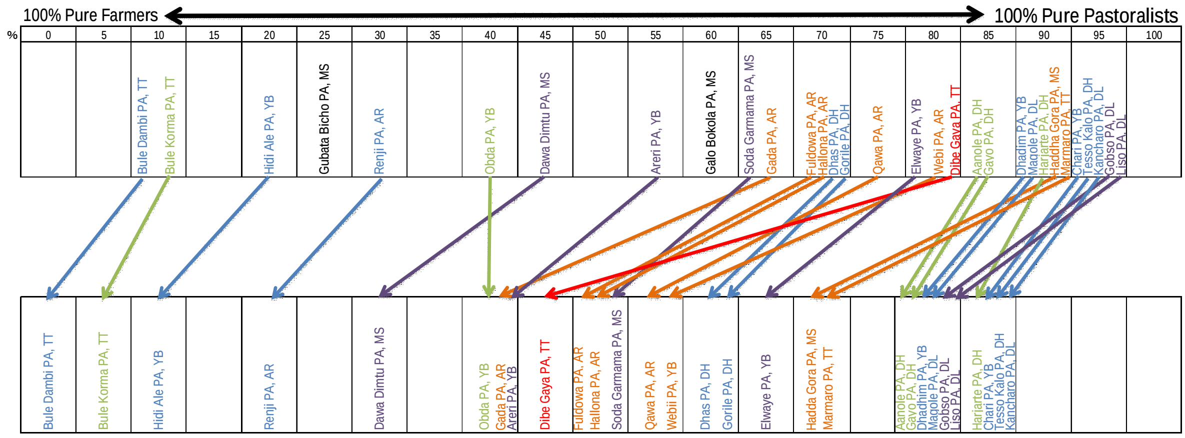


Figure 2.4.1 Percentage of Pastoralism and Future Image by PA

Source: JICA Project Team

Then, the Team shared the results of CBPs with the participants. The major problems regarding participation in CBPs during the monitoring period (December 2013 to February 2014) raised at the presentation were; 1) overlapping of the community activities with the government initiated watershed management program, 2) high mobility of communities due to shortage of pasture and water during dry season, 3) starting of the preparation of farming, 4) no good facilitation and monitoring by government officers due to such reasons as repeated transfer of DAs. Major expectations as DAs to achieve better achievement in CBPs in future were; to provide technical trainings to the community; stay at the site and work with the community; and conduct monitoring and facilitation.

For a 2-day session of pasture development, DAs and PDO officers confirmed the progress such as date of sowing, amount of forage seed sown, participation of communities, good points observed, challenges and their solutions taken, etc. Then, the participants moved to Dida Yabelo PA where the communities actually started pasture production in this Phase II. The participants there checked and discussed technical challenges on pasture production in the area as; seed density applied was too high and it suppressed the growth of pasture; a part of pasture land was grazed by animals due to poor fencing and weak management of the communities, etc. After that, they moved to Yabelo Research Center and conducted practical training of silage making.

A program for dryland farming improvement was started by a presentation of agricultural situations and farming types of Borena zone. Areas and types of farm land and the experiences people have are quite variable from woreda to woreda and further PA to PA. In many PAs, while farming is still primitive, for instance, in Dillo woreda, farming in some PAs such as in Yabelo woreda is at more advanced level. It is therefore advisable that intervention on farming activities should refer to the actual situation of each PA and the DAs should provide skills and trainings depending on the types of farming that the people practice.

Then, the facilitator reviewed the pilot activities of dryland farming improvement conducted during Phase II. The Team did not include woredas where farming is less prevalent in the pilot activities. Rather, the Team targeted PAs where people practice medium to advanced farming. After the presentation given, the participants in those PAs monitored the progress of the activities based on the action plan they formulated during the last kickoff workshop. The participants also joined the field visits to a PTC (Pastoral Training Center) at Dida Yabelo PA and the facilitator explained how to monitor the peopleÌs works on farming by using a monitoring sheet in their PA. In addition, DAs in charge of Dida Yabelo PA explained about improved farming techniques, e.g. intercropping, they had introduced.

An expert from Zonal PDO, explained the advantages of Intercropping during the field visit to Dida Yabelo PTC

At the end of the workshop, they examined current status of social ties within/among communities. Regarding the social ties people have, DAs pointed out weak social ties at PA, *zonii* and *rera* level. The participants said that people prefer and tend to work at their *gare* level because; there is long distance between *gares;* many people do not consider such works at *zonii* and PA levels as theirs; and weak monitoring and following-up at *zonii* and PA level from community representatives. In order to strengthen such social ties, the participants answered reserving some tools for public work at *rera*, *zonii* and PA level, involvement of a PA and *zonii* cabinet and *gare* leaders, using government structure in order to influence the communities to participate in public works at *zonii* and PA level, selecting a site close to all *gares*.

2.4.3 Second Monitoring Workshop in Phase II

Second monitoring workshop aimed at sharing the progress and lessons of the pilot activities of CBPs, pasture development and dryland farming improvement. In regard to CBPs, a facilitator presented results of tool usage survey with the CBPsô results of period IV (March to June, 2014). For instance, the facilitator presented that the wheelbarrow was used more extensively for communal works while a sickle was used more often for private purposes in all the target woredas except Malka Soda where the tools were mostly used for private purposes. This was because that there were relatively much agricultural practices and individually working manners of the communities.

On the session of dryland farming improvement, a training of water harvesting technique was given. It encompassed the water harvesting techniques such as micro-catchment, macro-catchment, run-off harvesting and flood water harvesting. The facilitator also introduced an experience of diverting flood water to a farmland observed in Arero woreda. The example showed that the structure made the flood to pass through grassland and then enter to the farm land. With this arrangement, power of the flood can be reduced when passing through grassland. Thus, the water can be disseminated through large areas of farmland rather than making gully over the farm.

Rainwater is firstly harvested over a catchment area, and then led to grassland where the flood power is reduced, and then finally brought about to the farmland without making gullies.

In regard to pasture development, the facilitator made a presentation on seed collection. First of all, he showed videos taken at Daya Dawa PA, Malka Soda woreda, where the community members had continuously been conducting seed collection of Rhodes grass. The PA chairman emphasized the importance of forage production and said that they can expand the pasture land by using harvested seed by themselves. Then, the facilitator theoretically showed how to harvest seeds such as timing of the collection, checking the maturity, how to harvest the seed, how to dry the seeds, how to thresh and storage the seeds.

In addition to the forage seed delivered by the JICA team, the facilitator also emphasized the importance of collecting native grasses which can be found in Borena zone. He introduced specific varieties of native grasses available in each PA and actually showed grasses collected in the field. After the presentation, the participants set goals to collect both newly introduced and native grasses. In the field, participants actually practiced seed collection of Rhodes grass, Pigeon pea and other natural grasses. Then, they moved to the Yabelo Research Center and opened the pits of silage which had been prepared by them during the 1st monitoring workshop.

At the end of the workshop program, a facilitator from the Team explained 5 types of typical livelihood models in Borena zone and made recommendations how people can enhance the resilience based on the models. Based on the presentation made, the participants discussed recommendations and modifications on the RREP resilience models presented, work roles to be taken by each stakeholder so as to pursue the strategy, measurements to be taken for each sector of livestock and agriculture, etc. Those results of the discussion were reflected to the RREP resilience model later on.

2.4.4 Final Evaluation Workshop in Phase II

A 4-day final evaluation workshop was held from October 27 to 30, 2014, covering topics of evaluation of Community Based Projects (CBPs) as conventional projects and as continuous development activities including resilience enhancement through strengthening of social ties. In addition, the participants also evaluated the pilot activities of improved dryland farming and pasture production.

First of all, a workshop facilitator reviewed summary of the indicators of community initiated activities from Period III to V (November 2013 to October 2014) in all the 32 target PAs. Following it, the facilitator explained the procedure of evaluating the CBPs and detailed the five aspects for project evaluation, defined by Development Assistance Committee[2] (DAC) of Organization for Economic

[2] http://www.oecd.org/development/evaluation/daccriteriaforevaluatingdevelopmentassistance.htm

Co-operation and Development (OECD).

Since the Team organized study tours for CBPs from July to August 2014, during which target communities evaluated their initiated activities, the facilitator shared with the participants the findings from the study tours and presented the results of 5-aspect evaluation undertaken by the community member themselves. After having finished the presentation by the facilitator, group discussions and presentation of conventional project evaluation were made by the participants (refer to Table 2.4.1).

On the second day of the workshop, a facilitator made a presentation about evaluation of *RREP approach* as continuous development activities. First, he explained the definition and difference of *RREP approach* and *Project approach*. While *Project approach* has a fixed target group, pre-set time framework and project activity plans mainly designed by the outsiders, *RREP approach* aims at supporting continuous communitiesô initiated activities and strengthen the resilience and social ties the communities have accumulated over long time.

Whereas *Project approach* focuses on how much people achieved fixed objectives, evaluation of *RREP approach* examines changes of continuous activities in terms of participation and also social ties; namely focusing on process evaluation. This is because that those communitiesô initiated activities do not always have entry and exit points as ñprojectsò but rather just continue as long as the people and communities need. Therefore, the facilitator emphasized that the Team has continuously observed the communitiesô/peopleõs participation in the activities, the number and indicators/size of the activities throughout the implementation of CBPs. The facilitator shared those results of CBPs from November 2013 to October 2014.

As the end of session of CBPs, the participants undertook evaluation of strengthening of the social ties as the outcome of development activities. The facilitator first reviewed mechanisms of enhancing resilience through the social ties which are multilayered, flexible and diversified at such levels as *olla*, *rera* and *gosa* (traditional structure) or *gare*, zone and PA (administrative structures). And then, he introduced several types of social ties functioning in Borena zone and features of the ties that the main five ethnic groups[3] particularly have. The communities, especially Borena community, conventionally have the culture of sharing properties and belongings with others and strong social ties. He also added that the communal activities are also multilayered depending upon the size or intensiveness of the activities.

Finally, the facilitator presented the changes of social ties after tools provision by RREP and mentioned that the support in fact brought qualitative positive changes to their social ties. After the presentation made, the participants evaluated CBPs in their target PAs by comparing *RREP approach* and Conventional Project approach mainly opting for the approach of Cash for Work, examining the change of tools usage and peopleõs participation in community and government initiated projects and identifying the level of community participation such as *olla* level and *gosa* level (for the evaluation results, refer to the CHAPTER 4).

Aside from CBPs, the participants also evaluated the pilot activities of pasture production and dryland farming improvement. After the Team has shared with the participants the monitoring results, issues arisen and lessons learnt from the both activities in Phase II, the participants evaluated them from the five aspects of view by mentioning reasons for the actual scores (from the evaluation results, see CHAPTER 5 and CHAPTER 6).

[3] Borena, Guji, Konso, Burji, and Shewa ethnic groups, of whom the Borena is the majority followed by Guji people.

Table 2.4.1 Evaluation Results of Community Based Projects (Phase II)

Source: JICA Project Team

Woreda	Type of Community Development Activities whit community Initiatives	Number of tools used on the community activities before and after the supply		Efficiency	Reasons	Effectiveness	Reasons	Impact	Reasons	Relevance	Reasons	Sustainability	Reasons
		Before	After										
Malka Soda	1. Haro for Human Being	42	175	5	High community participation and enough tools were provided	5	High community participation	5	Water accessibility increased & Water carrying capacity of the pond was increased	5	Still need more water	5	Communities livelihood depends on water and pasture
	2. Haro and Guji Ella for Livestock	123	873	4	Enough tools and good participation from the community	4	Strong follow up and management from the community at zonii level	5	People can access water nearby	5	Shortage of water for livestock is still priority problem	5	
	3. Borena Ella	N.A	N.A										
	4. Kalo	200	450	5	Enough tools and good participation from the community	5	Pasture availability increased by 1 month	5	Movement of livestock for pasture decreased & Livestock productivity also increased	5	The need of livestock has not been fulfilled yet	5	Tools are available now and community also get good working habit
	5. Farming (Irrigation)	40	145	3	Low community participation	3	Most of the important activities were not done properly (not using appropriate farming technologies)	2	Some important tools are missing, it also need skill and knowledge	4	Still people have food security problem	4	To insure food security
	6. Infrastructure	192	960	4	Good community participation and strong management at zonii	3	Need skill and knowledge	4	Improved road access	4		4	To solve transportation problem
	7. Construction	132	1078	3	Participation of the community is not as expected	4		4	Additional classes and resident for workers were built	5		5	
Yabello	1. Haro for Human Being	29	45	3	Low community participation	3	Low community participation	4	Water shortage problem is solved somewhat	5	Water shortage for human is still priority problem of the area	5	It is usual activity of the community
	2. Haro and Guji Ella for Livestock	77	135	4	Good participation from the community and existence of strong tradition of using haro by	4	Improved water shortage for livestock	4	Water carrying capacity of the ponds increased	5	Water for livestock is still priority problem of the area	5	Water for livestock is still priority problem that community are trying to solve
	3. Borena Ella	50	94	4	High participation of the community	5	High participation of the community	4	Enough water for long time	5	Top priority of the community	5	
	4. Kalo	96	146	3	Low Community participation	3	Lack of bringing the tools during activity time	3	Not done as a planned	5	Not enough pasture	5	High bush encroachment
	5. Farming (Irrigation)	NA	NA										
	6. Infrastructure	NA	NA										
	7. Construction	20	45	3	Low participation	3	Some construction tools and material were	3		5	To solve education and health center problem	5	
Arero	1. Haro for Human Being	20	45	3	Low community participation because of drought	4	Water carrying capacity of the pond increased from 2-3 month	4	Water availability increased	5	Shortage of water for human is still priority problem	5	Water shortage is a problem in the community
	2. Haro and Guji Ella for Livestock	50	120	4	Good community participation	4	High community participation	4	Livestock can access water nearby	5	Problem of water shortage for livestock is not solved fully	5	
	3. Borena Ella	35	65	5	Strong decision making and management at gosa level	5	Strong gosa participation	5	Enough water for long time & Destroyed Ella's were also renovated	5	Need continues rehabilitation	5	There is still water shortage problem in the area
	4. Kalo	54	85	3	Low community participation because of drought	3	Improper usage of Kalo by Gada leaders	4	Weak livestock get fat	5	There is still pasture problem	5	
	5. Farming (Irrigation)	NA	NA										
	6. Infrastructure	NA	NA										
	7. Construction	NA	NA										
Dhas	1. Haro for Human Being	15	30	3	Low community participation because of overlapping with watershed activities	3	Low participation	4	Water access for human was improved	5	Still shortage of water for human	5	To solve water shortage problem for human
	2. Haro and Guji Ella for Livestock	20	50	4	High community participation	4	Good community participation	4	Depth and width of haro were improved	5	There is still shortage of water for livestock	5	To get enough water for livestock
	3. Borena Ella	NA	NA										
	4. Kalo	18	33	3	Overlapping of work with watershed activities	3	Movement of people because of dry season	3		5	There is shortage of pasture for livestock	5	High bush encroachment
	5. Farming (Irrigation)	NA	NA										
	6. Infrastructure	10	17	1	Low community participation	1	Overlapping of work and lack of follow up from	NA		NA		NA	
	7. Construction	NA	NA										
Teltele	1. Haro for Human Being	25	75	4	Enough tools and high community participation	3	Increased water carrying capacity of the ponds	4	Water accessed nearby	4	Water is priority problem of the community	5	
	2. Haro and Guji Ella for Livestock	35	85	5	High community participation and enough tools	5	Good community participation	4	water accessed easily	5	There is still shortage of water for livestock	5	To get enough water for livestock
	3. Borena Ella	6	14	2	Lack of sense of ownership	3	Low community participation	3	Access of water during dry season is increased	4	Need continuous rehabilitation because it is filled by flood during rainy season	4	
	4. Kalo	65	74	4	Good community participation	5	Enough pasture for livestock for 1 additional month	4	Decreased livestock movement during dry season due to shortage of pasture	5	Pasture shortage problem is not solved	5	
	5. Farming (Irrigation)	NA	NA										
	6. Infrastructure	33	63	4	High community participation	5	Time saving by using displacement road	5	Decrease mothers death and improved road	5	Top priority of the community	5	
	7. Construction	NA	NA										
Dillo	1. Haro for Human Being	15	30	4	High community participation and enough tools	4	Good community participation	4	Pond volume is increased, water holding capacity of the ponds increased & distance for fetching water also	5	Still problem of water shortage for human	5	Water shortage for human is still a problem
	2. Haro and Guji Ella for Livestock	45	75	5	High community participation and timely done	5	Water carrying capacity of the pond is increased from 2 to 4month	4	Water availability is improved and minimized the problem of water shortage for livestock	5	Still problem of water is not solved	5	Water is priority problem of the community
	3. Borena Ella	5	15	2	Low participation	2	Low community participation	3		4	Water is a priority problem of the	4	
	4. Kalo	58	89	5	Good participation of the community	5	Good community participation	4	Pasture availability is increased	5	Top priority of the community	5	Pasture is priority problem during dry
	5. Farming (Irrigation)	NA	NA										
	6. Infrastructure	NA	NA										
	7. Construction	NA	NA										

Note: Haro means pond collecting rain water, Kalo means rangeland usually with fence, Ella means traditional well constructed on shallow ground aquifer.

CHAPTER 3 STRATEGY AND APPROACH FOR RESILIENCE ENHANCEMENT

3.1 Strategy for Resilience Enhancement in Borena zone

In discussing how people can enhance their resilience against droughts, stakeholders should understand nature of their livelihood such as how people live in rural communities, how people manage and accommodate the risks of drought and then recover from it, how people work for development activities and etc. Understanding of their livelihood enables us to know which areas of their livelihood should be strengthened in order to enhance the people's resilience, and whereby we can determine the approach and measures to be taken for the resilience enhancement.

While strengthening of resilience has an engineering aspect such as increasing of pond capacity and improvement of rangeland, it also has a social aspect such as better-off families in the community help poorer families in case of severe droughts. Thus, the stakeholders have to understand rural society and their living and traditional norms as well. Particularly, understanding of the context of community where they live in is very crucial rather than understanding of an individual household in Borena zone since the people there traditionally work together and support each other.

The society there puts the finest focus on collectivism as even nowadays we can still see "Borana *Gada* governing system" in the zone. The JICA team maintains that consolidating of social ties among community members as well as amongst communities would enhance people's resilience against droughts. Consolidating social ties would increases communities' collaborated works, e.g. development activities filling gaps between what they are at present and what should be like in order to stand against drought.

A strategy to 1) enhance people's resilience corresponding to their livelihood, and 2) consolidate social ties of local communities should be the principle of this Component I of the RREP. The Team designs an approach based on this basic strategy. First, the Team examines people's livelihood in the area by analyzing food consumption patterns. This is because availability of food particularly in drought time directly attributes to the peoples' ability to accommodate the risks and to recover from the disaster. And then, a strategy of consolidating the social ties should be integrated with the activities of enhancing the people's resilience.

3.2 Food Consumption Survey in Pastoral and Agro-pastoral Communities

Figure 3.2.1 shows a general picture of people's livelihood in Borena zone. Although priority sector differs from area to area, a series of workshops organized by the Team and field surveys revealed that livestock and water were the core sectors prioritized in this area. Since pastoralist moves for searching water and pasture, their livelihood is always affected by the availability of them. In addition to the core sectors of livestock and water, agriculture has also gradually become an important sector in Borena zone. People in Borena zone think the agriculture is a means of supplementing their livelihood by directly supplying cereals.

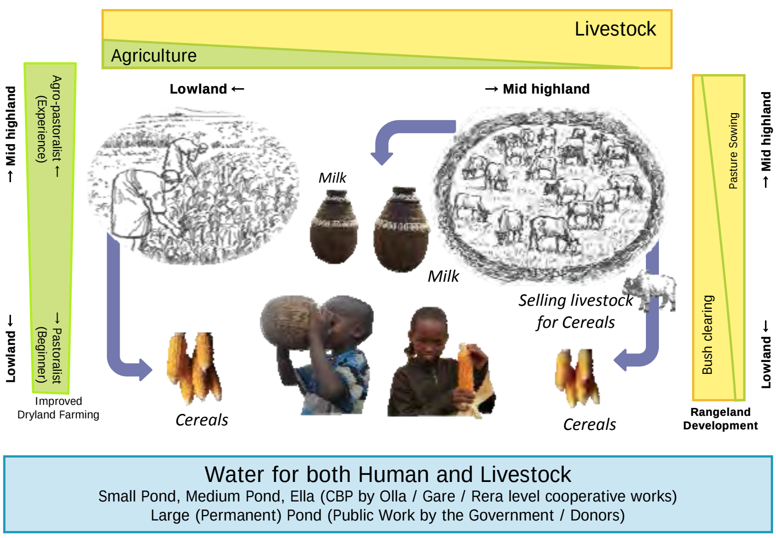


Figure 3.2.1 People's Livelihood in Borena zone
Source: JICA Project Team

Thus, those three sectors are directly attributed to the people's livelihood for resilience enhancement and should be investigated according to the areas they reside.

The pattern of food consumption differs from area to area. Staple foods available to the people at rural communities are basically cereals and milk. They hardly consume vegetables and meats on a daily basis. While livestock can supply milk to the people, people can convert livestock to cereals by selling the animals and purchasing cereals. On the other hand, agriculture can directly supply cereals by producing crops. Thus, it can be said that the patterns of food consumption very much depend on the level of pastoralism and farming in Borena zone.

It is obvious that while food supply by pastoralist is mainly derived from livestock production, agro-pastoralist and farmers can also supply food directly from farming. Borena zone is traditionally pastoral area. However, the zone is nowadays very much diversified in terms of livelihood, and in fact many people have started farming. In general, people in lowland areas mainly rely on livestock production and a few people practice farming. On the other hand, people in middle highland to highland areas place high priority on farming in their livelihood and keep livestock to a lesser extent.

In order to examine such patterns in Borena zone, a level of pastoralism and farming by PA was discussed by the participants at the 1st monitoring WS of Phase II. Based on the results, the Team categorized all the target 32 PAs of Phase I and Phase II into 4 groups, namely areas where the pure pastoralist shares more than 90%, 70-90%, 30-70% and less than 30% (see Figure 3.2.2). Aside from the 4 groups, Malka Soda woreda could stand as a sole group because the area is agro-ecologically different from the lowland areas of Borena zone. It is located in highland of Borena zone and relatively blessed with precipitation.

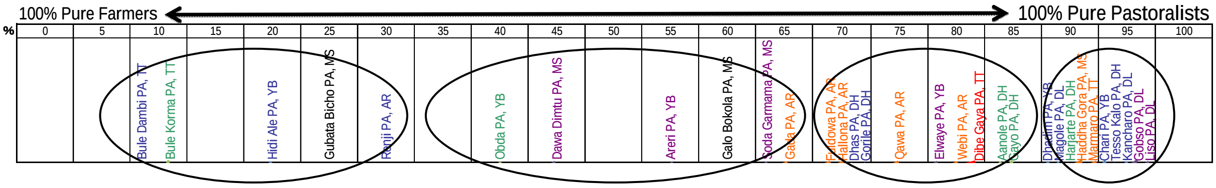


Figure 3.2.2 Share (%) of Pure Pastoralist by PA

Source: JICA Project Team

Table 3.2.1 Amount of Food Consumption by Share (%) of the Pastoralist

% of Pastoralist	No. of HHs sampled	Good Year		Bad Year	
		Milk (ml/HH/day)	Cereals (kg/HH/Year)	Milk (ml/HH/day)	Cereals (kg/HH/Year)
＞90%	39	1,425	878	310	850
70-90%	18	980	995	266	990
30-70%	4	500	990	156	990
＜30%	12	874	1,125	219	**540**
Malka Soda	6	333	NA	333	1,380

Source: JICA Project Team

With reference to the groups categorized, the Team conducted a food consumption survey in all the target 32 PAs of Phase I and Phase II. The results of the food consumption survey were investigated and summarized by good year and bad year depending on the groups (see Table 3.2.1. The table clearly shows that milk consumption in all the PAs, excepting Malka Soda where there is less impact of drought, dramatically drops in a drought year because animals cannot produce much milk when drought comes.

It is also found that the people in pastoral areas less consume cereals in a good year than people in agro-pastoral and farmer areas. In contrast, while pastoral people keep same level of cereal consumption even in drought time, rapid reduction of cereal consumption in a drought year can be seen in the farmers' areas (pastoralist <30%). This is mainly attributed to a fact that pastoralist can procure cereals by selling animals even in a drought year while the crop production in farmers area is severely reduced in the drought year.

Table 3.2.2 further investigates the supply of cereals by group in a good year and drought year. As shown, supply of cereals comes from own production, own purchase, and assistances from community (*olla*) members, relatives mainly living in outside the community, PSNP and NGOs. In a drought year, agriculture production drops sharply irrespective of the area. To complement the drop of the agriculture production, they try to sell their livestock, and with the cash they have got they purchase cereals. However, unfortunately the people who live in farming area do not have many animals for selling and therefore cannot buy enough cereals.

Table 3.2.2 Supply of Cereals in a Good and Drought Year by % of Pastoralist

% of Pastoralist	Supply of cereals in a good year						Supply of cereal in a drought year					
	Production (kg/year)	Purchase (kg/year)	Assistance from olla peers (kg/year)	Assistance from relatives outside PA (kg/year)	Assistance from PSNP or NGOs (kg/year)	Total (kg/year)	Production (kg/year)	Purchase (kg/year)	Assistance from olla peers (kg/year)	Assistance from relatives outside PA (kg/year)	Assistance from PSNP or NGOs (kg/year)	Total (kg/year)
＞90%	446	465	37	23	45	1,016	0	816	81	23	144	1,064
70-90%	1,061	188	13	0	34	1,295	31	875	250	1	148	1,305
30-70%	1,168	160	5	0	210	1,543	50	478	25	38	210	800
＜30%	1,780	50	0	0	0	1,830	63	338	38	15	113	565
M Soda	1,750	333	0	0	100	2,183	17	1,900	0	0	100	2,017

Source: JICA Project Team

In a drought year, people in pastoral dominant areas cannot produce crops. People in agro-pastoral and farmers' areas expect a little production and some people living in agro-ecologically better areas can produce a small amount of crops. Basically, it is advisable that people in Borena zone should consider they can hardly produce any crops in a drought year. Therefore, people should avail of cereals mainly from the purchase in drought years. Thus, it could be said that the people who live in pastoral dominant areas may have more advantages since they have more animals and purchase more crops by selling the animals.

On the other hand, since the people in agro-pastoral and farmers areas have a small numbers of animals, they can sell only a few animals and accordingly can get only a few cereals in a drought year. Thus, the most vulnerable people to the risks of drought in Borena zone are the households owning fewer animals who live in lowland farmers' or agro-pastoral areas. Their livelihood depends on farming to a larger extent which is easily affected by drought, and thereby they have weak resilience against drought.

Table 3.2.3 summarizes current situation of the people's livelihood in a good and drought year according to the share (%) of pastoralist. In sum, it is found that while people in ago-pastoral and farmers' areas eat more food than pastoralist in a good year, the cereal consumption for them rapidly drops in a drought year. On the other hand, the livelihood of pastoralist is much stable and has strong resilience against the risks of drought since they can sell their animals during the drought time, and they purchase cereals. This implies that pastoralism could be the best strategy taken for ages to cope with drought risks by the Borena people.

Table 3.2.3 Summary of Current Situation of People's Livelihood by % of Pastoralist

% of Pastoralist		Food Consumption	Livestock	Agriculture
>90%	**Good Year**	High milk consumption. Cereals are supplied 50% from crop production and 50 % from purchase.	Own a large number of cattle and shoat. Some people sell a part of livestock.	Crop production supplies a half of cereal consumption.
	Bad Year	Rapid reduction of milk consumption. Cereals for consumption are totally supplied by purchase. In drought time, supply of cereals is more than that in	Sell livestock in order to purchase cereals. In addition, people lose animals due to shortage of pasture and water.	Crop yield is almost nil. People cannot expect cereal supply from farming.

% of Pastoralist		Food Consumption	Livestock	Agriculture
		farming areas.	Rapid reduction of animals.	
70-90%	Good Year	High milk consumption. Cereals are supplied from crop production.	Own a large number of cattle and shoat.	Produce crops more than consumption.
	Bad Year	Rapid reduction of milk consumption. Cereals for consumption are totally supplied by purchase. In drought time, supply of cereals is more than that in farming areas.	Sell livestock in order to purchase cereals. In addition, people lose animals due to shortage of pasture and water. Rapid reduction of animals.	Crop yield is almost nil. People cannot expect cereal supply from farming.
30-70%	Good Year	High milk consumption. Cereals are supplied from crop production.	Own a large number of shoat. But own a few number of cattle.	Produce crops more than consumption.
	Bad Year	Rapid reduction of milk consumption. Most cereals for consumption are mainly supplied by purchase, but not much supply of cereals. They can sell a few numbers of animals because they own a small number of animals. Thus, they can buy only a small amount of cereals.	Sell animals for buying cereals. Reduction of the number of animals. Since they initially have a small number of animals, this leads to loss of draughting power.	Crop yield is almost nil. People cannot expect cereal supply from farming.
<30%	Good Year	High milk consumption. Cereals are supplied from crop production. The richest place in terms of consumption during good years.	Own a small number of cattle and shoat.	Produce crops even more than consumption.
	Bad Year	Rapid reduction of milk consumption. Most cereals for consumption are mainly supplied by purchase, but not much supply of cereals. They can sell a few numbers of animals because they own a small number of animals. Thus, they can buy a small amount of cereals.	Sell animals for buying cereals. Reduction of the number of animals. Since they initially have a small number of animals, this leads to loss of draughting power.	Crop yield is almost nil. People cannot expect cereal supply from farming.
Malka Soda	Good Year	Low milk consumption. A large amount of cereal consumption. Cereals are mostly supplied from crop production.	Own a large number of cattle.	Produce enough amounts of crops.
	Bad Year	No reduction of milk consumption. Still a large cereal consumption. Cereals are mostly supplied by purchase.	Sells livestock in order to purchase cereals. In addition, people lose a few animals due to shortage of pasture and water.	Crop yield is almost nil. People cannot expect cereal supply from farming.

Source: JICA Project Team

3.3 Livelihood Strategy of Borena Communities for Resilience Enhancement

Typical livelihood in Borena zone often corresponds to the vertical distribution of altitude. Generally speaking, lowland areas are often called “Pastoralist dominant area” while mid to highland areas are regarded as “Farming oriented areas”. Although the altitude does not always necessarily correspond to the people’s livelihood and there must be exceptions, Figure 3.3.1 provides a helpful perspective to investigate the livelihood in Borena zone to the stakeholders. It could be an entry point of the examination though they need further confirmation with DAs and the communities.

To establish strategy for resilience enhancement, the Team proposes total 5 livelihood models by the share of pastoralist. Four models are corresponding to the vertical distribution as above-mentioned and one model for Malka Soda woreda. On the basis of the events in a good and drought year, the strategy gives indicators in terms of size of farmland and *kalo* a typical community needs to establish. Here it is assumed that a typical community is composed of 30 households as per the standard *gare’s* size. Such indicators would show gaps which have to be filled in by the communities, governments and donors. Note that since water sector does not display distinctive trend in particular models and areas, the Team leaves the sector out of the indicators in the following discussions.

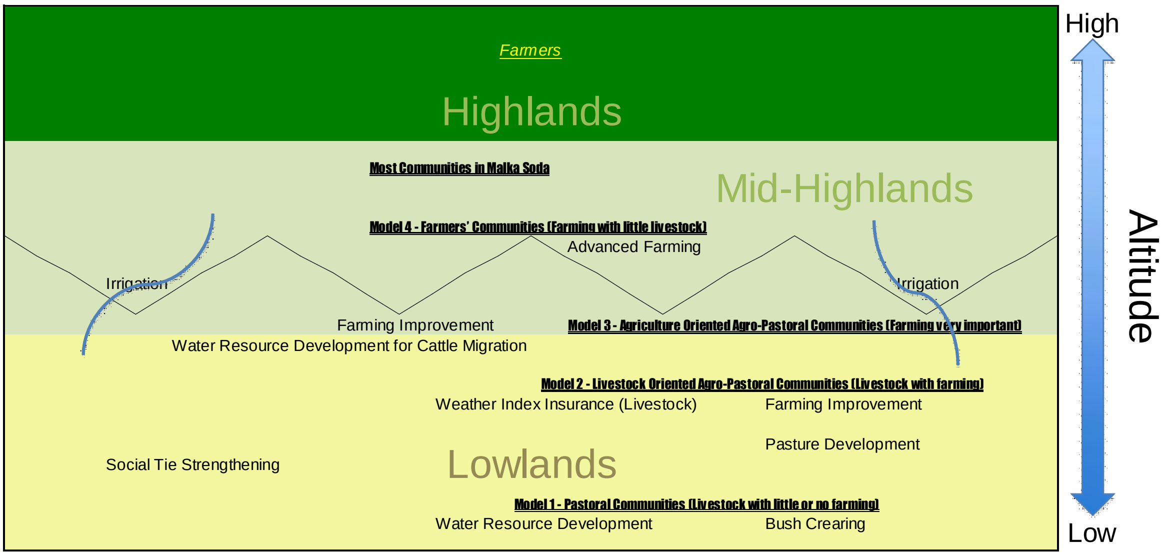


Figure 3.3.1 Relation between Altitude and Livelihood
Source: JICA Project Team

3.3.1 Model 1 - Pastoral Communities (More than 90% Pure Pastoralist)

Model 1 corresponds to the area where more than 90 % of the people are pure pastoralist. According to the typical average number of animals the people own and the cereal supplies they need, Figure 3.3.2 shows the indications that the people in Model 1 community should establish in both normal year (left figure) and drought year (right figure).

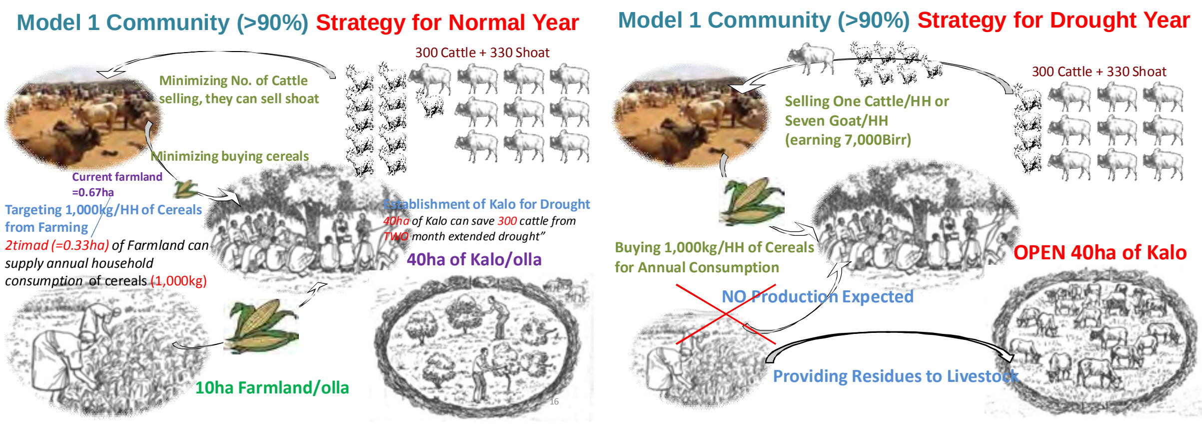


Figure 3.3.2 Livelihood Strategy in a Good Year and Drought Year (Model 1)
Source: JICA Project Team

1) Good Year

Since people in this area usually sell animals even in good years for buying cereals, with crop production they can minimize the number of animals for selling, particularly for households which do not have enough numbers of animals. Therefore, they may make an effort to increase crop yield per faming area in a good year. According to the above-mentioned survey, the pastoralist in this area as average cultivates 0.66 ha of farmland, and with introduction of improved agriculture they can minimize the area to that half, 0.33 ha, still able to keep the required cereal amount of 1,000 kg per family per year.

Concerning agriculture improvement in this pastoralist dominant area, it is noted that proper division of rangeland and farming areas is due necessary. If farming leads to downsizing of rangeland and reduction of animals occurs, it would weaken the resilience because livestock is the one securing their resilience in this area. Expansion of farmland should therefore be avoided and instead increase of crop productivity in unit area shall be stressed. In respect to livestock production, toward drought year, people should establish new pasture land and maintain present *kalo* mainly by bush clearing. An indication is the designation of minimum 40 ha of *kalo* preparing for drought year.

2) Drought Year

In drought years, people should ensure the supply of cereals by selling livestock since they cannot produce crops due to the small amount of rainfall when drought occurs. If a typical household sells one cattle or 7 goats, they can buy about 1,000 kg of cereals, on which the household can survive. In addition, even if the crop yield becomes “0” in such drought years, people should still use the crop residues for feeding animals. In respect to livestock production, they should open the prepared *kalo* to feed animals and avoid the loss of them from the shortage of pasture. Forty hectors of *kalo* can support approximately 300 cattle that a typical community in this area keeps for 2 months period.

3.3.2 Model 2 - Livestock Oriented Agro-Pastoral Communities (70% - 90% Pure Pastoralist)

Model 2 corresponds to the area where 70 - 90 % of the people are pure pastoralist; called livestock oriented agro-pastoralist area. Based on the typical average number of animals the people own and the cereal supplies they need, Figure 3.3.3 shows the indications that the people in Model 2 community should establish in both normal year (left figure) and drought year (right figure).

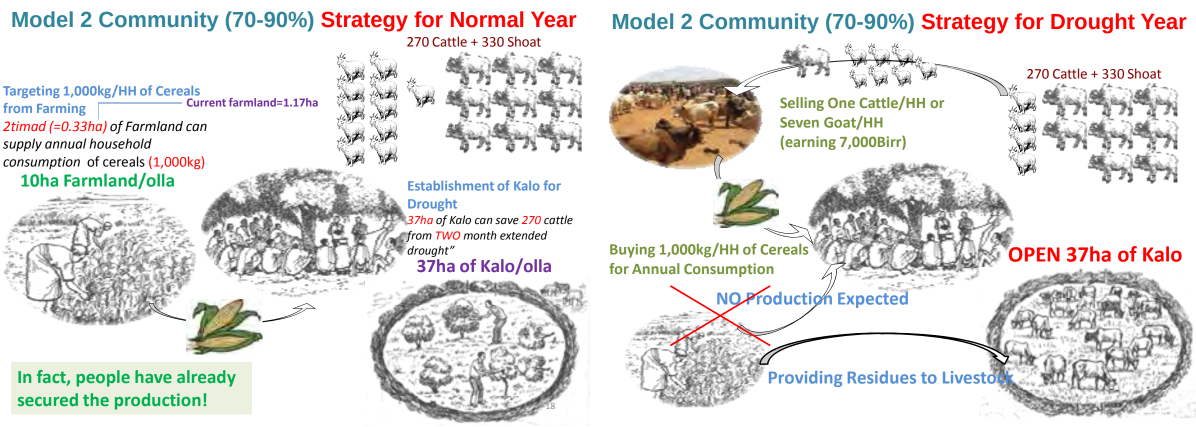


Figure 3.3.3 Livelihood Strategy in a Good Year and Drought Year (Model 2)
Source: JICA Project Team

1) Good Year

In a good year, current situation is stable and people produce enough crops for comsumption by farming. However, the presdent farming area per household is approximately 1.2 ha under very extrnsive farming, and this area can be minimized to as small as 0.33 ha combined with improved agricutre techniques. 0.33 ha of farmland can still produce about 1,000 kg of cereasl that a typical household can need a year. Toward drought year, people should establish new pasture land and maintain present *kalo* mainly by bush clearing. An indication is to establish minimum 37 ha of *kalo* served for 2 months in a drought year.

2) Drought Year

People should ensure the supply of cereals by selling livestock since they can hardly produce crops when drought occurs. If a typical household sells one cattle or 7 goats, they can buy about 1,000 kg of cereals. People should also use the crop residues for feeding animals. In respect to livestock production, they should open the prepared *kalo* to feed animals and avoid the loss of them from the shortage of pasture. Thirty seven hectors of *kalo* can support approximately 270 cattle that a typical community in this area keeps for 2 months period.

3.3.3 Model 3 - Agriculture Oriented Agro-Pastoral Communities (30%-70% Pure Pastoralist)

Model 3 corresponds to the area where 30 - 70 % of the people are pure pastoralist; called agriculture oriented agro-pastoralist area. Based on the typical average number of animals the people own and the cereal supplies they need, Figure 3.3.4 shows the indications that the people in Model 3 community should establish in both normal year (left) and drought year (right).

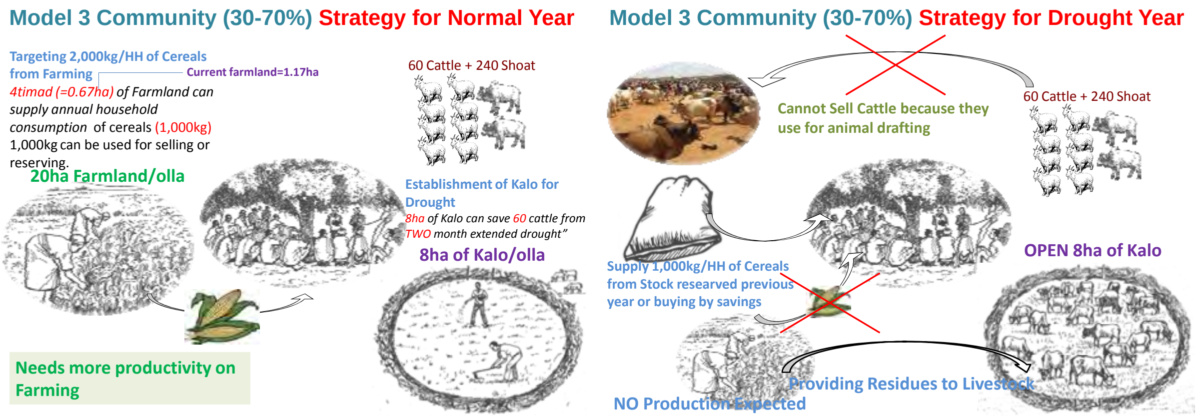


Figure 3.3.4 Livelihood Strategy in a Good year and Drought Year (Model 3)
Source: JICA Project Team

1) Good Year

In a good year, current situation is acceptable and people produce enough crops for consumption by farming. People in this area should prioritize farming in order to produce more crops, e.g. 2,000 kg per family per year, to be reserved for drought years or to sell surplus cereals for making savings. The target cereal production per year should be 2,000 kg per household and not 1,000 kg in above model 1 and model 2 areas. The present farming average area is about 1.2 ha per household, and this can be reduced to 0.67 ha with introduction of improved dryland farming techniques. In addition, toward a drought year, people should establish new pasture land and maintain present *kalo* by pasture sowing and bush clearing. Minimum 8 ha of *kalo* should be prepared for the communites in this area.

2) Drought Year

In a drought year, people should complement deficiency of food supply from the reserved cereals of previous years or buy them with saved money. In fact, people should avoid selling livestock because the selling leads to loss of livestock which means they will lose drafting power for farming. In order to maintain minimum numbers of cattle for their farming, they should not sell them, or they may sell shoat. Furthermore, they should open the prepared *kalo* to feed animals and avoid the loss of them from shortage of pasture. An average number of cattle in this area is only 60 per community, and therefore 8 ha of *kalo* can support them for 2 months drought time. Of course, crop residues should also be utilized as feeding materials.

3.3.4 Model 4 - Farmers' Communities (Less than 30% of Pure Pastoralist)

Model 4 corresponds to the area where less than 30 % of the people are pure pastoralist; namely, almost farmers area. Based on the typical average number of animals the people own and the cereal supplies they need, Figure 3.3.5 shows the indications that the people in Model 4 community should establish in both normal year (left figure) and drought year (right figure).

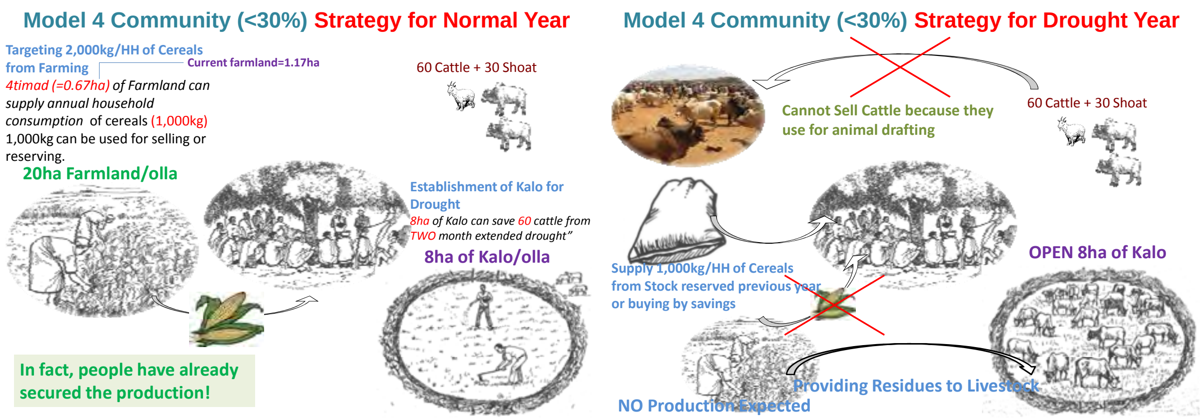


Figure 3.3.5 Livelihood Strategy in a Good Year and Drought Year (Model 4)
Source: JICA Project Team

1) Good Year

In a good year, current situation is acceptable and people produce enough crops for consumption by farming. People in this area should prioritize farming in order to produce more crops, e.g. 2,000 kg per family per year, to be reserved for drought years or to sell surplus cereals for making savings. The present farming average area is about 1.2 ha per household, and this can be reduced to 0.67 ha with introduction of improved dryland farming techniques. In addition, toward a drought year, people should establish new pasture land and maintain present *kalo* by pasture sowing and bush clearing. Minimum 8 ha of *kalo* should be prepared for the communites in this area.

2) Drought Year

People should complement deficiency of food supply from the reserved cereals of previous years or buy them with the saved money. In fact, people should avoid selling livestock because the selling leads to loss of livestock and draughting power for farming. Therefore, people should maintain the current minimum numbers of cattle. Furthermore, they should open the prepared *kalo* to feed animals and avoid the loss of them from the shortage of pasture. An average number of cattle in this area is only 60 per community and therefore 8 ha of *kalo* can support them for 2 months drought time. Crop residues should, of course, be utilized for feeding animals.

3.3.5 Most Communities in Malka Soda

As already explained, aside from the above 4 models, most communities in Malka Soda could be a sole group because the area is agro-ecologically different from the lowland areas of Borena zone. The area is relatively blessed with much precipitation. Besides, *Guji* people are the majority in this woreda who traditionally practice farming. According to the number of animals and needs of cereal supplies, Figure 3.3.6 shows the indications people in Malka Soda community should target in both normal year (left figure) and drought year.

1) Good Year

In a good year, current situation is very much stable and people produce enough crops for comsumption by farming. People practice both livestock production and farming, and their agriculture system is well integrated as livestock-crop farming. Of course, there is a need to improve their agriculture by introducing improved techniques, with which the present average farming area of 1.67 ha per household can be reduced to 0.67 ha only, still able to produce 2,000 kg of cereals per family per year. Toward a drought year, people should establish new pasture land and maintain present *kalo* by mainly pasture sowing.

2) Drought Year

In a drought year, even the people in this area can hardly produce enough amounts of crops. Therefore, the people should meet the cereals requirement by selling livestock when drought occurs. If a typical household sells one cattle, they can buy about 1,000 kg of cereals able to survive one year. People should also use the crop residues for feeding animals. In respect to livestock production, they should open the prepared *kalo* to feed animals and avoid the loss of them. In this area, there are about 210 cattle per community as average, and therefore minimum 28 ha of kalo should be ready for 2 months period in a drought year.

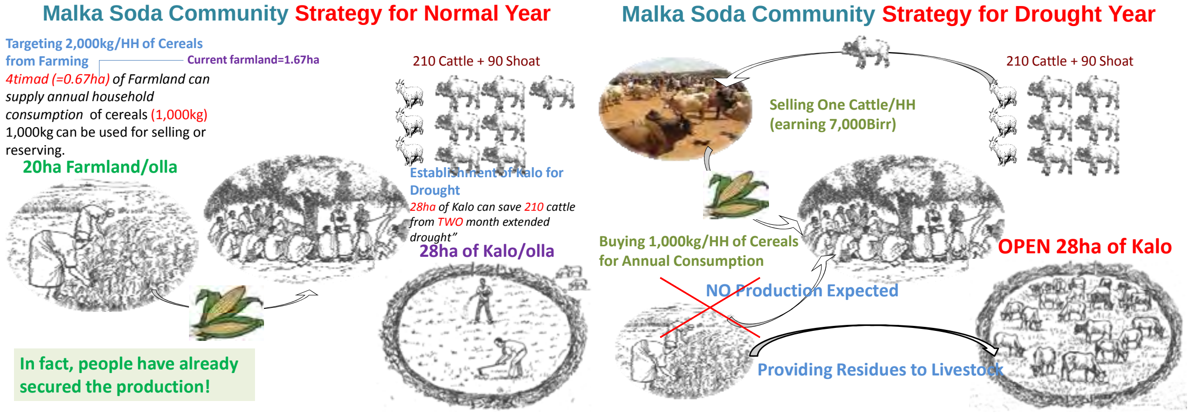


Figure 3.3.6 Livelihood Strategy in a Good Year and Drought Year (Malka Soda)

Source: JICA Project Team

3.3.6 Summary of Livelihood Models

Table 3.3.1 summarizes the indicators for resilience enhancement as above-discussed. Especially, while indicators with *straight underlines* show gaps on agriculture to be filled in by the communities, governments and donors, those indicators with *wavy underlines* show gaps on pasture development. As a whole, the Team recommends the people in pastoral areas should make their maximum efforts not to lose their livestock and prioritize water and rangeland development. On the other hand, people in ago-pastoral and farmers' areas should maximize crop productivity per unit area in good years and reserve the crops, so that they can secure the food supply even in drought years.

Table 3.3.1 Summary of Indications for Resilience Enhancement by Models

% of Pastoralist	Priority	Good Year	Drought Year
Model 1 **>90%**	Minimize loss of Livestock	➢ Ensure 1,000kg of crop yield (maize) from 0.33ha of farmland per household ➢ Toward drought, establish 40ha of reserve Kalo per Olla ➢ Minimize the number of animals for selling	➢ Should not expect supply of cereals from farming ➢ Sell one cattle or seven shoat per household and buy 1,000kg of maize (or other cereals) ➢ Open 40ha of the reserved *kalo*
Model 2 **70-90%**	Minimize loss of Livestock	➢ Ensure 1,000kg of crop yield (maize) from 0.33ha of farmland per household (already achieved) ➢ Toward drought, establish 37ha of reserve Kalo per Olla ➢ Basically, selling of animals are unnecessary for supplying food consumption	➢ Should not expect supply of cereals from farming ➢ Sell one cattle or seven shoat per household and buy 1,000kg of maize (or other cereals) ➢ Open 37ha of the reserved *kalo*
Model 3 **40-70%**	Maximize crop productivity	➢ Ensure 2,000kg of crop yield (maize) from 0.67ha of farmland per household (already achieved). 1,000kg can be consumed while another 1,000kg should be reserved for next year or sold to others. ➢ Toward drought, establish 8ha of reserve Kalo per Olla. ➢ Basically, selling of animals is unnecessary for supplying food	➢ Cannot sell animals because the number is already small ➢ Should not expect supply of cereals from farming ➢ Supply 1,000kg/HH of Cereals from the stock reserved previous years or buying with savings ➢ Open 8ha of the reserved *kalo*

% of Pastoralist	Priority	Good Year	Drought Year
		consumption	
Model 4 **<30%**	Maximize crop productivity	➢ Ensure 2,000kg of crop yield (maize) from 0.67ha of farmland per household. 1,000kg can be consumed and 1,000kg should be reserved for next year or sold to others. ➢ Toward drought, establish 8ha of reserve *Kalo* per *Olla* ➢ Basically, selling of animals is unnecessary for supplying food consumption	➢ Cannot sell animals because the number is already small ➢ Should not expect supply of cereals from farming ➢ Supply 1,000kg/HH of Cereals from stock reserved previous years or buying with savings ➢ Open 8ha of the reserved *kalo*
Model 5 **Malka Soda**	Well Integrated Livestock-crop farming	➢ Ensure 2,000kg of crop yield (maize) from 0.67ha of farmland per household (already achieved). 1,000kg can be consumed while another 1,000kg should be reserved for next year or sold to others ➢ Toward drought, establish 28ha of reserve *Kalo* per *Olla* ➢ Basically, selling of animals is unnecessary for supplying food consumption	➢ Should not expect supply of cereals from farming ➢ Sell one cattle per household and buy 1,000kg of maize (or other cereals) ➢ Open 28ha of the reserved *kalo*

Source: JICA Project Team

3.4 Approach of the Project Implementation

In order to execute on the strategy described above, the Team examined the approach of the project implementation. As already explained, people and communities in Borena zone need to improve the accessibility to the three main life essentials, which are water, livestock and agriculture, and the prioritization of the essentials depends on the livelihood shown as the models. In order to strengthen each of the essentials, the stakeholders should support the communities and people through *RREP approach* and *Project approach* explained in the following section. The Team implemented several pilot projects by those two approaches in Borena zone.

Besides, so as to strengthen people's resilience in Borena zone, we need several scales of activities and projects. This is because that the significant of drought impacts varies greatly from year to year. Small to medium-size activities could be manageable by the communities and initiated by them. Such activities can accommodate risks at not-sever times or the lesser droughts. However, in fact, when the greater drought comes, it would be beyond the capacity of the communities and they may not be able to stand against such severe droughts.

In this case, intervention of the government with donors would be necessary. For example, the communities can rehabilitate or dig small to medium-size ponds reserving water for the lesser drought by mobilizing multilevel communities at *olla*/*gare*, *rera*/*zonii* or *gosa* level flexibly. On the other hand, construction or rehabilitation of a big-size pond would require heavy machineries and advanced skills, so that the government should implements such projects and people may be mobilized for the works. Such several sizes of ponds, as an example, can ensure the coping of all levels of the drought.

3.4.1 RREP Approach and Project Approach

Villagers in Borena Zone dig or rehabilitate *haros* using shovels every season and every year. *RREP approach* is to help these continuous development activities of the villagers (see the down side of Figure 3.4.1). They can do and they are doing these ordinary development activities unless there is a very difficult situation such as a severe drought. Here, initiative is with them and from them, and the outsiders, e.g. the Team, are in the position of supporting their activities. The one who participates is the Team rather than the community members.

When there are rocks in a *haro*, however, villagers cannot dig only with shovels. They particularly need to use a hammer and a chisel to smash the rocks (see the up side of Figure 3.4.1). That can be called a *Project approach*. A project is a set of activities to solve a specific problem people are facing.

Therefore a project has pre-set objectives, timeframe to implement and inputs to achieve the objectives, and is to implement according to the pre-determined project design. Many development projects by the government and NGOs are in this form and usually they are the ones who are at the center, prioritize, design, implement, monitor and evaluate. Villagers see them as government or NGO's projects, whereby they tend to participate in the projects only when there is compensation such as cash-for-work/ food-for-work.

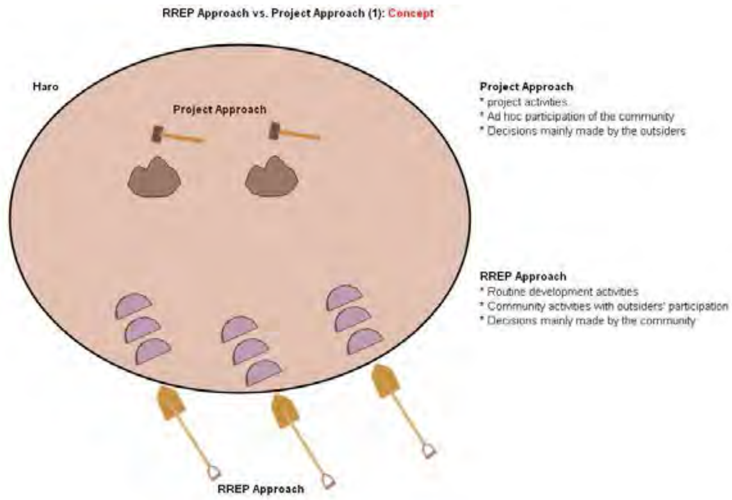


Figure 3.4.1 Concept of RREP Approach and Project Approach

Source: JICA Project Team

On the other hand, *RREP approach* supports ordinary continuous development activities of the villagers that they are doing season by season and year by year. Therefore it is basically up to them what to do, when to do and in which order. Decisions on those activities need to be made by the villagers while the outsiders participate in their activities by supporting them. That is why no compensation needs to be made and/or no compelling force arises. *RREP approach* aims at strengthening their traditional social ties and resilience that they have accumulated over years. It rather utilizes the social ties and enhances them wherever possible.

The operation principle of *RREP approach* is thus not to solve concrete problems like *Project Approach*, but to strengthen people and organizations through the implementation of development activities and projects being supported by the Team. For example, supplies of hand tools and provision of trainings on *haro* rehabilitation, management & development of *kalos* (rangeland) and also improvement of agriculture practices would become means of accelerating the communities' ordinary continuous development activities.

Under *Project Approach* we select a target group first and try to solve the problems that the target group is facing. Under *RREP approach*, however, we do not select a specific target group but just follow the villagers' decisions. Regarding water resource management, for example, villagers usually manage a small *haro* for human drinking with one or several *ollas* or *gares*. If the *haro* is for livestock and is bigger, they usually manage it at *rera* or zonii level with many *ollas* and *gares*. For an *ella*, where larger groups of people use, they manage it at *gosa* level. Villagers work at *olla*/*gare* level, at *rera*/zonii level

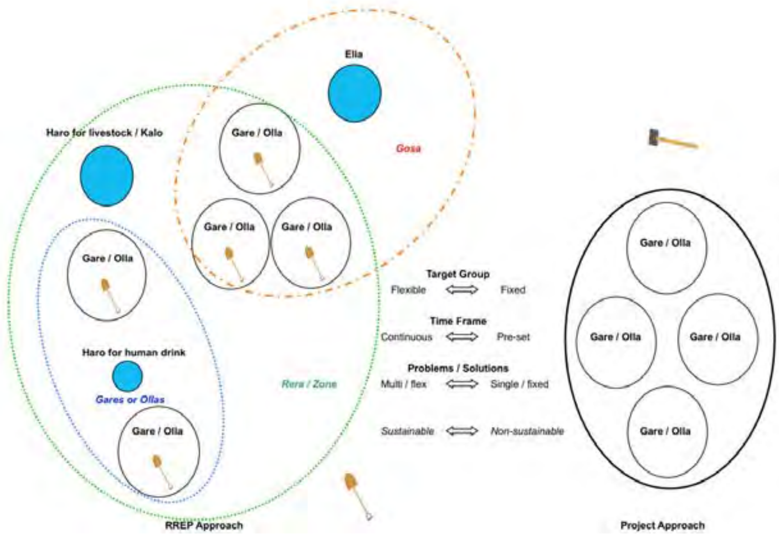


Figure 3.4.2 Definitions of RREP Approach and Project Approach

Source: JICA Project Team

or at *gosa* level flexibly depending on the type of activities afore-mentioned (see Figure 3.4.2).

RREP Approach thus supports these flexible, multi-purpose activities from outside mainly by providing tools and materials with technical assistances as required. It is therefore of non-selective approach and tries to cover the whole ground or whole people concerned. The Team does not select projects, but estimates necessary tools and materials the concerned people are in need and provides them to all the people concerned. The Team provides hand tools and materials as equally as possible to the whole *reras* and *ollas*/*gares* through PA and PA zones. For the problems that cannot be solved by this arrangement, the Team will undertake them with the conventional *Project Approach* as having been practiced.

Further, when new interventions are introduced, first of all, they may have to take a *Project approach* since it may be sometimes difficult for local people to accept and adopt such new ideas. For example, pasture sowing and distribution of improved crop seeds could be introduced as a *Project approach*. Then, if a newly introduced pasture or crop grows in the area and the people produce seeds for a next season, it means that the activities conducted under *Project Approach* have now become communities' ordinary activities and they can initiate and continue them by themselves. Thus, the activities of *Project Approach* should be designed to become conventional activities, which could be sustained by *RREP Approach*.

Figure 3.4.3 indicates examples of activities which are covered by *RREP Approach* and *Project Approach*. Development activities traditionally carried out by the communities could be covered through *RREP Approach*. Relatively small to medium-size activities which are manageable by traditional communities involve such activities as bush clearing, small to medium-size pond construction and rehabilitation at *olla*/*gare*, *gosa* or PA level. Since people have begun to integrate agriculture into their livelihood and experienced for decades to date, it has become their ordinary activities in Borena zone. Therefore, ordinary farming activities could also be initiated and continued by the people and the outsiders can just technically support them.

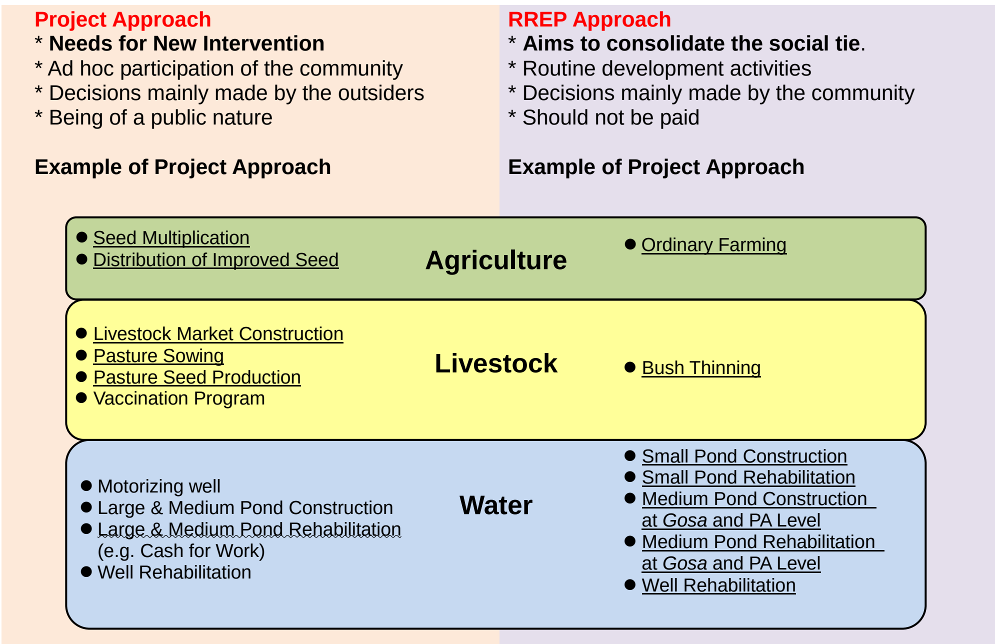


Figure 3.4.3 Project Approach and RREP Approach on Main Three Sectors

Source: JICA Project Team

Remarks: Straight underline shows the activities supported through RREP implementation
Wavy underline shows the activity designed but not undertaken through RREP implementation

3.4.2 Recommendation for Government & Donors' Projects

Activities that the people traditionally have been conducting should not be paid and we should not apply the way of Cash for Work. Rather, we should follow the traditional norms they have been exercising. Misdirected approach would lead to undermining resilience and social ties that the communities have accumulated to date. When donors bring cash into conventional development activities such as rehabilitation of *haros* or rangeland, they would select and pay to particular vulnerable people rather than traditional groups. This leads to an exclusion of some community members from the traditional development activities, and worse would result in undermining the social ties (sense of collaboration in this context) once existed between the participants and non-participants.

Besides, communities in Borena zone conventionally have some regulations in maintaining communal asses, e.g. rangeland, pond. Cash for Work targeting particular groups would disrupt such traditional norms and this would lead to a loss of social ties in or between communities. For example, some *haros* have a regulation that a user of *halo* should first dig/de-silt the pond and then is allowed to water their livestock. If a project simply rehabilitates *haros* by Cash for Work, it would breach such a traditional regulation. Thus, Cash for Work should carefully be examined whether to do or not. Otherwise there may be possibilities of causing negative impacts on the people's resilience and social ties.

Implementation of Cash for Works may be applied to, for example, new construction of medium to big-size infrastructure often categorized as public works like construction of large ponds, livestock markets and establishment of relatively large new area closures. In this context, people can be paid by the government or donors. Since such projects have pre-set objectives, time-frame to implement and inputs to achieve the objectives, and are implemented according to the pre-determined project design, they can be implemented under *Project Approach*. Cash should be paid only to such projects characterized as being of a public nature and not be paid to the communal development activities.

3.4.3 Approach for the Implementation of RREP Pilot Activities

In the context of *RREP Approach*, the Team supports communities' ordinary activities by technical assistance through development agents (DAs) and provision of necessary hand tools. The Team calls this series of pilot activities as Community Based Projects (CBPs). For example, supplies of hand tools and provision of trainings for water and rangeland development and also improved dryland farming could be a means of accelerating the communities' ordinary continuous development activities. The pilot activities of CBPs are thus undertaken so as to demonstrate the *RREP approach*.

Rather than targeting particular activities and thus not solving concrete problems like under a *Project Approach*, the Team focuses on the community's own initiated activities. Therefore, the communities can continue and accelerate their development activities by using such tools together with the technical assistances provided by DAs. For the implementation of CBPs, *RREP Approach* particularly underlines not to weakening the social ties between communities and resilience potentially people have had, and further aims at consolidating them by supporting their ordinary activities.

On top of that, the Team understands that some issues cannot be solved through the implementation of CBPs but need new technical intervention. For example, expansion of bare lands has become a serious problem in some areas of Borena zone. To tackle this issue, pasture sowing would be the best measurement. However, people in Borena zone have never experienced pasture sowing. Likewise, variety of crop seeds currently people are using does not necessarily meet the environment of Borena zone. Therefore, adoption of short-matured varieties suitable to the environment of Borena lowlands is being required nowadays.

In fact, these activities can hardly be initiated by the community themselves because the ideas are still out of their present view. In order to fill such technical gaps in the new practices, the Team has also implemented pilot activities for forage production and improved dryland farming. These kinds of activities could be implemented through *Project Approach*. Although *Project Approach* has a timeframe to commence and to end upon the project phase-out, the Team tries that such pilot activities should become communities' ordinary works and therefore integrated into their conventional development activities.

3.4.4 Relation between Resilience Enhancement and Social Ties

In order to further enhance the people's resilience against droughts, the Team maintains that mutually complementary relationship among people and communities should be strengthened through communities' development activities. There are in fact multi-layered social ties in Borena communities, which particularly work when people are exposed to the risks of drought. A social survey conducted by the Team revealed that during not-severe time, people help each other within *mona/olla* by sharing food. When severe drought occurs, they get help from *gosa* and relatives outside the PA. Namely, the lesser the drought is, the smaller social ties they depend while the greater the drought is, the greater social ties they can exercise. There are different social ties in Borena society depending on the levels of social spheres as follows:

At the level of *Gosa*;	there are 18 *gosa*, which are sub-clans of Borena.
At the level of PA;	which is an administrative village under Woreda.
At the level of *Zonii*;	There are 3 *zonii* under PA.
At the level of *Rera*;	which is a unit of communal pastureland. *Zonii* is made of one to several *reras*.
At the level of *Olla*;	which is a natural hamlet. Traditionally o*lla* moves in *rera* every 10 to 15 years.
At the level of *Gare*;	which is an administrative hamlet introduced by the Government to settle *olla*. Usually *gare* is made of one to several *ollas*, but sometimes *olla* is bigger than *gare*.
At the level of *Mona*;	where villagers keep their cattle together during night.
At the level of individuals;	with relatives and close friends.

Before introducing *RREP Approach*, the Team analyzed the social ties of Borena and the way people work together, communally, voluntary and sustainably. As a result, the Team investigated that Borena people maintain and manage a *ella* and *tula (group of ellas)*, which are traditional wells, at *gosa* level, schools and health centers at PA level, pasturelands at *rera* level, *haros* (ponds) for livestock at either *rera* or multi *olla* level, and *haros* for human beings at one or few *ollas* level. That is why the Team provided tools at *gare* level so that the people can do communal works starting at *gare*/*olla* level, and covering *rera* level, *zonii* level, PA level or even at *gosa* level according to the necessity.

Through the monitoring and evaluation of community based activities, the Team observed that a wide variety of communal activities were being performed after tools were provided. The Team also noticed that *olla* level activities have increased more than other levels, and people tend to start from *haro* for human beings (at one or few *olla* level), then work together on *haro* for livestock and *kalo* (at multi-*olla*, *rera* or *zonii* level), and finally roads and schools (at *zonii* or PA level). They move from smaller ties to larger ties as they progress their communal activities.

The Team, therefore, assumes that the ownership of property, which can be somewhere between 100% private/personal to 100% public/communal, decides the level of social ties and then the level of communal activities. The Team started an intensive interview survey accordingly. The first thing the Team found is that the spatial size of social ties has a high correlation with the frequency of the social ties used, which is rather natural. Some examples are listed below according to the level of social ties.

1) The social ties at *mona* level work on their daily life, and people exchange, borrow or distribute crops, milk and also sugar, coffee beans, tea leafs, tools to make coffee or tea etc. daily.
2) People do the same with crops or milk at *olla* level, but the frequency and volume are lower than *mona* level.
3) Sharing of water sources and pastures is the most important objective at *rera* level and the frequency could be monthly or seasonal.
4) At *gosa* level, there are safety nets such as *Irba*, where *gosa* leaders choose a wealthy pastoralist to provide cattle for the pastoralist who lost all his cattle by a drought, and also *Gabale*, where pastoralists rent or trust their milking cows to their fellows who have many children but no milk. The frequency of *Irba* and *Gabale* could be once in several years.

The following Figure 3.4.4 shows the strata of Borena social ties described above. The scopes of various RREP activities, which are 1) Dryland Agriculture Improvement, 2) Rangeland Improvement, 3) Tools Distribution for community based activities on *haro* rehabilitation, *haro* construction, *kalo* rehabilitation and making, road and school construction, are described at the bottom of the chart corresponding to the strata of Borana social ties:

The Team continued the interview survey and the second important finding is that the properties shared at *gosa* level, the largest social tie, and those shared at *mona* or *olla* level, the smallest social tie, are clearly different. *Busa-Gonofa* is the name for Borena mutual help and *Busa* means milk sharing at *mona* or *olla* level where *Gonofa* means livestock sharing at *gosa* level. Generally speaking, the properties shared become more personal and private when the social ties are smaller. In contrast, they become more communal and public when the social ties are larger.

It is also true for communal activities. *Haro* for human beings, which are maintained and managed by one or a few *olla* level, are relatively more private and personal, where roads and schools are more public and communal. The maintenance and management of traditional *ellas* and *tulas* owned by *gosa*, are the most public and communal activities.

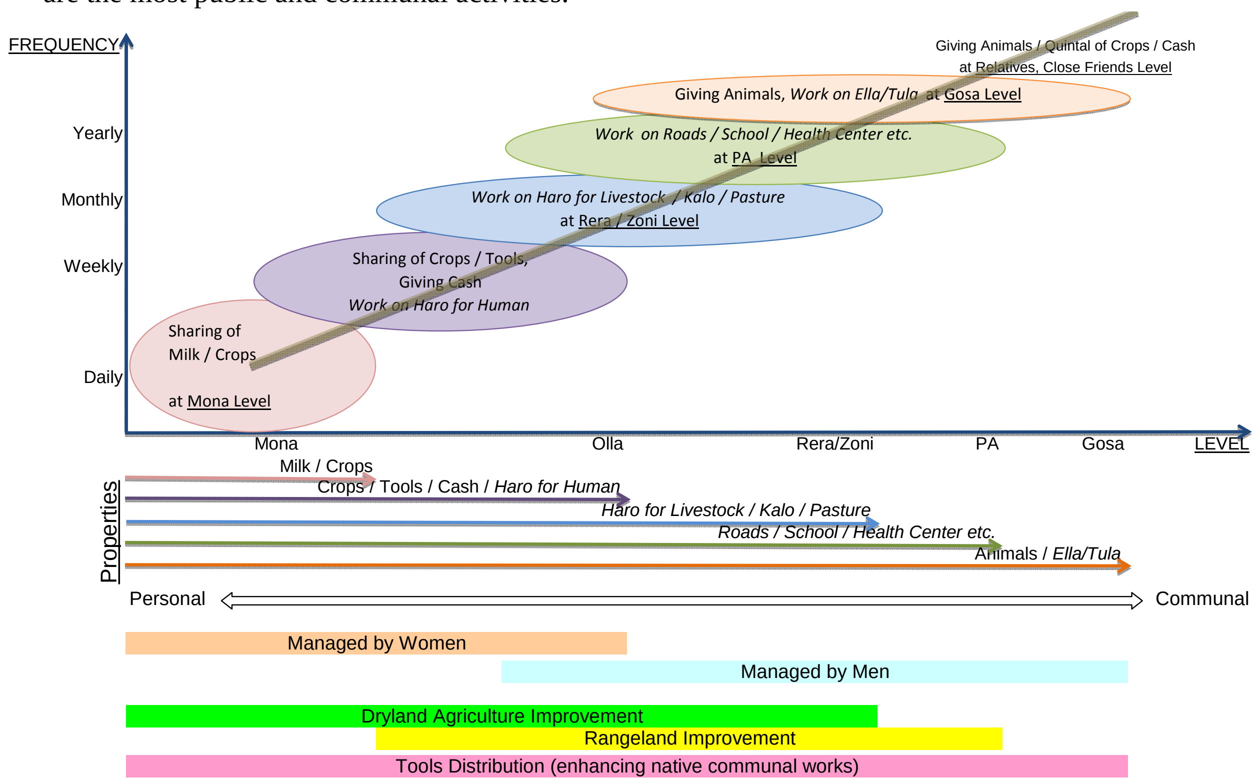


Figure 3.4.4 Social Ties Working in Agro-pastoral and Pastoral Communities in Borena zone
Source: JICA Project Team

Looking at RREP activities, Dryland Agriculture Improvement mainly focuses on *olla* and *rera* level and Rangeland Improvement on *rera*, *zonii* and PA level depending on the location of the PAs. And, the tools distributed by the Team have been used for communal activities at all levels. All the RREP activities introduced were intended not to weaken the social ties which Borena society traditionally possesses but to enhance the sustainable community activities by making the best use of their social ties described above.

The last finding is on the gender differences. Management and decision making on more public and communal property are formal and are men's role, while those on more private and personal property are informal and are women's role. It is men's role to give or distribute part of communal property, where it is women's role to give and take personal property on lends and borrows basis. It is probably a reflection of Borena philosophy, which is "Livestock are communal property because they grow up by drinking from communal water sources and eating from communal pasture land". Even if they keep livestock at home, they still feel part of the livestock is owned by *gosa*.

CHAPTER 4 COMMUNITY BASED PROJECTS (CBPs)

4.1 Rationale and Objectives

Community based projects (CBPs) undertaken in Borena zone aim at strengthening the resilience of the target population such as pastoralist and agro-pastoralist particularly by consolidating social ties the people have accumulated over the years. The project design, during Phase I, had been based on the series of situation analysis and participatory workshops, and it was basically applied in Phase II as well. The CBPs thus undertook the activities such as 1) construction/rehabilitation of ponds, 2) rangeland rehabilitation and development, 3) improvement of dryland farming, 4) water and soil conservation in pond basin, 5) community construction/rehabilitation of school, health post, road, etc.

It was found that the communities have their own initiated projects already having been carried out and the community members work voluntarily in Borena zone. If there are projects funded by NGOs and donors, however, they usually join the projects and sometimes have priority over their own projects. In case no such project is presented in the communities, they actually just continue their regular development activities. Thus, it may have been unnecessary for projects to take approach of "*Cash for Works*" as far as such projects primarily support what the communities had already started or planned by themselves.

In addition, this project, RREP, is positioned as a development project for enhancing people's resilience against drought rather than an emergency support project and/or recovery project. Therefore, communities should play a central role in the CBPs and the JICA team should just support their activities. Therefore, the approach taken here does not mean that the Team designs and operates the projects while the communities participate in them. The Team is not to discharge initiative in this context. Instead, the Team supports the communities through provision of necessary tools, other input supplies and technical supports including series of trainings for the communities' own initiated projects.

4.2 Implementation Arrangement of Community Based Projects (CBPs)

In the context of *RREP approach*, DAs (Development Agents) can be an intermediate of development activities because they are the only frontline government officers working between woredas and communities. For facilitating and supporting the implementation of CBPs, they together with DA supervisors should be equipped with necessary skills, knowledge, hands-on-experiences and norms regarding such development activities as water sources development and rehabilitation, rangeland management and dry farming improvement and others. Therefore, the Team conducted a series of training workshops during the implementation period of Phase I and Phase II in order to provide technical skills and knowledge to DAs and their supervisors. Through the workshops, they have shared their experiences and challenges with colleague DAs for more effective facilitation on the community based projects.

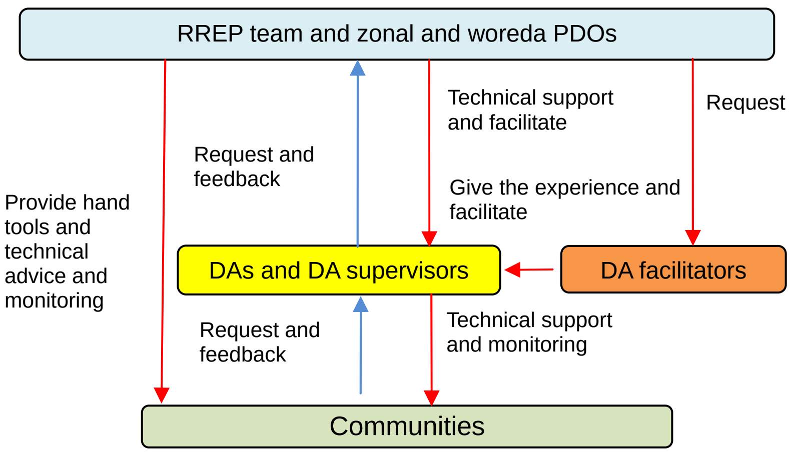


Figure 4.2.1 Implementation Structure of Community Based Project
Source: JICA Project Team

Thus, DAs equipped with necessary skills and knowledge can support the communities being engaged in continuous development activities and conduct monitoring of those activities. Throughout the implementation of CBPs, DAs are the main actors from the project side and play central roles in supporting the communities. The Team and woreda experts also monitor DAs' and communities' activities on CBPs and logistically and technically support DAs. In addition to the technical supports through the DAs, the Team distributes necessary hand tools to the communities in target PAs to accelerate their development activities (see Figure 4.2.1 for the implementation arrangement).

In Phase II of the RREP, the Team arranged a total of 8 facilitators, who were actively involved in CBPs during Phase I, in order to share their experiences with new DAs in charge of Phase II PAs and lead them for smooth implementation of CBPs. During the WS sessions, the DA facilitators positively shared their experiences with others and encouraged the participants to carry out the group works and field practice, and played very crucial roles as WS facilitators. While this enabled the DAs of Phase I to deepen what they learnt through RREP activities, new DAs gained the opportunity to acquire necessary knowledge and skills from their peers. This kind of peer-to-peer learning process enhances their capacity each other over the boundaries of woredas.

4.3 Selection of Target Areas

Community based projects during Phase I (Jan. 2013 – Sep. 2013) had been undertaken in such woredas as; Malka Soda, Yabelo, Arero, and Dhas, which have relatively less ethic conflict. Four PAs (kebeles) were selected from each of the 4 woredas, making the total PAs to be 16 in number (see Table 4.3.1 and Figure 4.3.1). These PAs were selected from the view point of logistics arrangement and also being the entry point for further extension towards Phase II stage (Nov. 2013 to Oct. 2014).

For the Phase II implementation of CBPs, another 16 PAs were added from the 4 woredas of Phase I; namely, Yabelo, Arero, Dhas and Malka Soda, and also from Teltele and Dillo woredas which were included as the new woreda for the Phase II. Taking into account security condition, logistics arrangement, number of the PAs allocated per one woreda, etc., each 2 PAs were selected from the Phase I woredas of Dhas, Arero, Malka Soda and Yabelo, and each 4 from the newly added Teltele and Dillo woredas, as indicated in Figure 4.3.1.

PA is usually divided into 3 zones (called zonii), and then there are villages. Traditional villages are called *Olla* while the administrative smallest units of villages are called *Gare* established for the purpose of settling the people. The CBPs are designed to cover all the rural population in the total 32 PAs, and in fact there are as many as 734 *Gares* composed of 416 *Gares* for Phase I and 318 *Gares* for Phase II. In those *Gares*, there are total 21,311 households composed of 11,873 HHs for Phase I and 9,438 HHs for Phase II. In terms of population, with an average family member of 5.4, approximately 119,000 are benefited from the CBPs.

Table 4.3.1 Location and Priority Sector of Kebeles for Phase I & Phase II CBPs Implementation

Woreda	PA (Kebele)	No. of Gare	Woreda	PA (Kebele)	No. of Gare
Malka Soda	9. Hadha Gora	50	Arero	10. Fulduwa	23
	10. Burka Dagaga	20		14. Halona	24
	11. Gubata Bicho	23		15. Webi	23
	12. Galo Bokala	40		16. Gada	15
	2. Sodda Garmama	32		7. Renji	12
	4. Dawa Dimtu	40		21. Qawa	12
Yabelo	2. Elwaye	19	Dhas	3. Dhas	32
	5. Hid Ale	28		5. Aanole	21
	6. Areri	39		6. Hajarte	10
	7. Obda	17		12. Gorile	32
	1. Chari	27		2. Tesso Kalo	11
	14. Dadim	28		4. Gayo	16
Dillo	3. Magole	10	Teltele	6. Bule Danbi	10
	4. Gobso	16		9. Bule Korma	17

Woreda	PA (Kebele)	No. of Gare	Woreda	PA (Kebele)	No. of Gare
	5. Kancharo	18		10. Dibe Gaya	26
	6. Liso	13		12. Marmaro	30
No. of Gares (Phase I)		416 (11,873 households)			
No. of Gares (Phase II)		318 (9,438 households)			
Total No. of Gare		734 (21,311 households)			

Note: Shaded cells shows the PAs for the implementation of Phase II.
Source: JICA Project Team

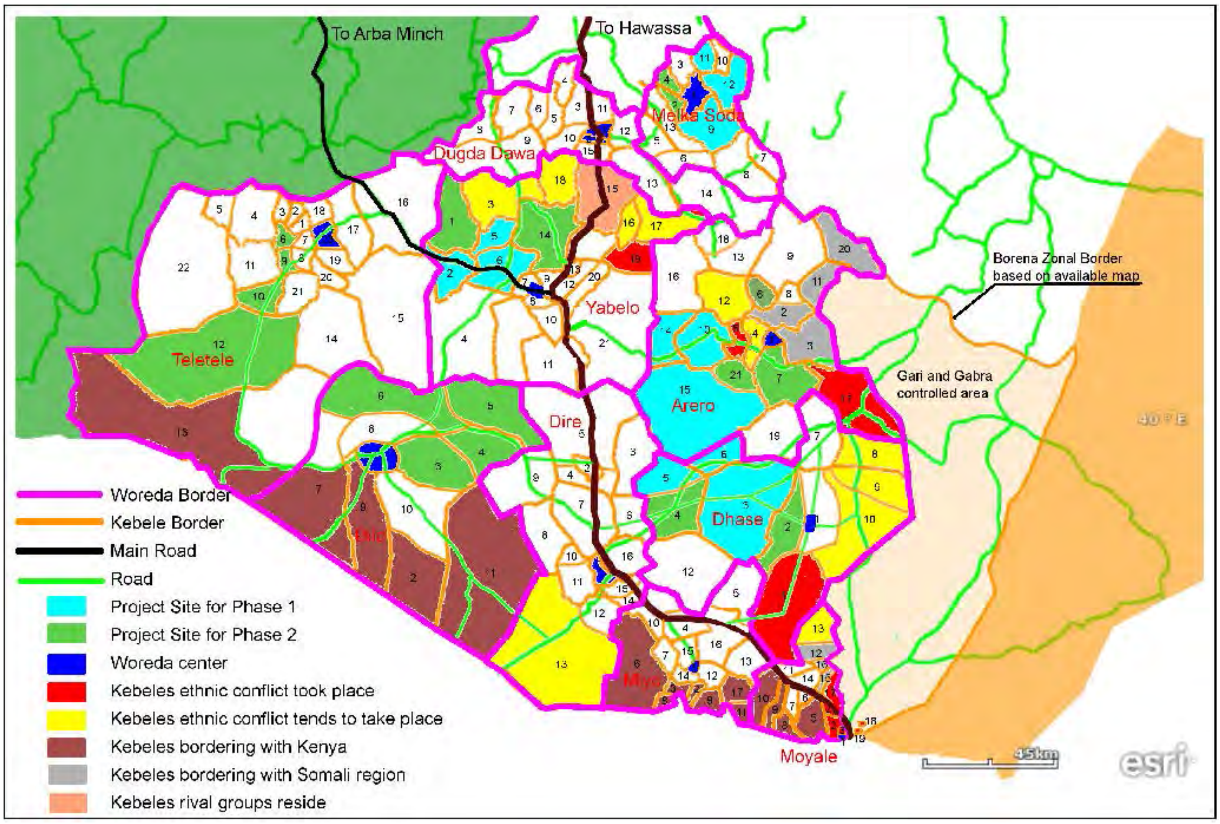


Figure 4.3.1 Location Map of PAs (Kebeles) for Phase I and Phase II CBPs Implementation
Source: JICA Project Team

4.4 Procurement and Distribution of Hand Tools

Major interventions from the JICA team for facilitating community based projects are; 1) provision of hand tools, and 2) technical assistances. As for the hand tool provision, provided hand tools are shovel, pickaxe, hand-cart, sledge hammer, nail hammer, axe, saw, rake, machete, how, digger, and sickles. The Team had distributed the hand tools to all the communities; namely to *gares* if already established or *ollas (natural village)* in the target PAs directly. Table 4.4.1 summarizes the tools distributed in Phase I and Phase II; namely, total 22,880 tools and 19,080 tools have been distributed for Phase I and Phase II, totaling approximately 42,000 tools.

Table 4.4.1 Tools Distributed to the Communities by Phase for Community Based Projects

Particulars			Phase I	Phase II	Total
No. of covered Woredas (PAs, Kebeles)			4 (16)	6 (16)	6 (32)
No. of covered Communities (No. of Gare)			416	318	734
Tools distributed	Distribution per Gare				
Shovel	10	10	4,160	3,180	7,340
Pickaxe	10	10	4,160	3,180	7,340
Hand Cart	2	4	826	1,272	2,098
Sledge Hammer	1	2	416	636	1,052
Nail Hammer	1	1	416	318	734
Axe	10	10	4,160	3,180	7,340
Saw	1	1	416	636	1,052

Particulars			Phase I	Phase II	Total
Rake	5	5	2,080	1,590	3,670
Machete (Panga)	5	5	2,080	1,590	3,670
Hoe	5	5	2,080	1,590	3,670
Crow Bar (Digino)	1	1	416	318	734
Sickle	4	5	1,664	1,590	3,254
Total	**55**	**60**	**22,880**	**19,080**	**41,960**

Source: JICA Project Team

The number of the tools procured was almost same as for both Phase I and Phase II. Some items were however increased in number such as wheelbarrow, sledge hammer and sickle saw based on the monitoring results for the Phase I activities and also according to communities' requests. All the procured tools were once transported to Yabelo town, and assembled there. After the assembling completed, the Team had delivered them to each PA center, from which the respective community members took them to their villages.

4.5 Implementation of Community Based Projects

4.5.1 Activities of Community Based Projects

To monitor all the community based development activities at *gare*, *rera*, PA zone and *gosa* level, the Team introduced work progress monitoring sheet. DAs were requested to fill out the name of the activities, duration of the activities, the number of times they work in a week or month, and the number of participants in terms of person-days. In order to see the changes of intensity of activities comparing to before the Team's intervention, those data for one previous year were also collected. The Team introduced one more monitoring sheet, for which DAs had recorded which *gares* and then how many households were participating in each and every development activity.

The activity period was divided into total 5 periods aside from one-year previous year as below. Period I and Period II fall under Phase I while Periods III to V are under Phase II. Period I and Period IV cover from March to June (4 months) in 2013 and 2014 respectively. Likewise, Period II and Period V cover from July to October (4 months) in 2013 and 2014 respectively. During Period I and Period II of Phase I, the monitoring had not included indicators such as excavated volume for pond, established area for rangeland, etc. while during Period III to Period V which are under Phase II those indicator quantities were also monitored.

Table 4.5.1 Activity Period for Community Based Projects; Period I to Period V

Phase	Period	Duration (each 4 months)	Remarks
Before	I or III	March 2012 – June 2012	Before RREP intervention
	II or IV	July 2012 – October 2012	Ditto
	III or V	November 2012 – February 2013	Ditto
Phase I	Period I	March 2013 – June 2013	Only no. of activities monitored
	Period II	July 2013 – October 2013	Ditto
Phase II	Period III	November 2013 – February 2014	No, of activities & quantities monitored.
	Period IV	March 2014 – June 2014	Ditto
	Period V	July 2014 – October 2014	Ditto

Source: JICA Project Team

Table 4.5.2 summarizes the community based projects undertaken during the Phase II for all the 32 PAs, starting from November 2013 up to October 2014. Number of *Gares* covered was 734 as aforementioned, and as many as 21,311 households had participated and been benefited. A typical *Gare* (village) throughout the periods had undertaken approximately 2 community based projects, i.e. 2.11 projects in Period II, 2.62 projects in Period IV and 1.74 projects in Period V, simultaneously though it varies by time.

The activities that the communities had undertaken were; rehabilitation and construction of *Haro* (pond) for human being, *Haro* and *Guji Ella* (well) for livestock, Borena *Ella* (well) for livestock, *Kalo* (rangeland) management such as establishment of fencing, rehabilitation of rangeland, farming mostly with irrigation, infrastructure such as road and bridge construction, and construction of buildings such as school, health post, and veterinary office. It is noted that all these activities are community based ones; namely no cash-for work has been applied.

Table 4.5.2 Summary of Community Based Projects for 32 PAs from Period III to Period V

Activities	Period III (Nov. 2013-Feb. 2014)		Period IV (Mar. 2014-Jun. 2014)		Period V (Jul. 2014-Oct. 2014)	
	No. of Activities	No. / Indicators	No. of Activities	No. / Indicators	No. of Activities	No. / Indicators
Actual number of Gare		734		734		734
Total No. of Participated Gare		1,548		1,923		1,279
No. of Community Activities / Gare		2.11		2.62		1.74
Actual Number of HHs		21,311		21,311		21,311
Total Number of Participated HHs		42,727		52,852		37,211
No. of Community Activities / HH		2.06		2.55		1.80
1. Haro for Human Beings	129	23,292 m^3	111	39,158 m^3	100	16,692 m^3
Total excavated volume, m^3						79,143 m^3
2. Haro and Guji Ella for Livestock	123	21,991 m^3	93	38,783 m^3	99	23,093 m^3
Total excavated volume, m^3						83,866 m^3
3. Borena Ella for livestock	20	4,778 m^3	23	8,439 m^3	14	2,706 m^3
Total excavated volume, m^3						15,923 m^3
4. Kalo (Rangeland) Management	96	11,188 ha	133	18,595 ha	99	6,693 ha
5. Farming / Irrigation	5	34 ha	1	81 ha	3	12 ha
6. Infrastructure (Road / Bridge)	54	278 km	44	596 km	46	191 km
7. Construction (School etc.)	20	60%	9	20%	13	72%
Total	447		414		374	

Source: JICA Project Team

Water related CBPs (No. 1 to No. 3 activities in Table 4.5.2) share 58% of all the activities, followed by rangeland (*kalo*) rehabilitation and establishment with 27%. Farming shares very minimum as 1 % only, and infrastructure related activities constitute 12%, and lastly construction does only 3%. Since the CBPs are of continuous development activities, it is difficult to say how many projects had been completed. Instead, we have followed up the number of activities together with indicator quantities by period.

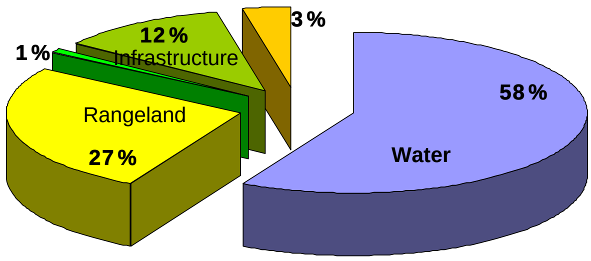


Figure 4.5.1 Type & Share of Community Based Projects
Source: JICA Project Team

Left Photo: Rehabilitation of haro for livestock by using tools provided by the Project. Right: Kalo (rangeland) management by establishing fence and also bush clearing.

For example, approximately 100 to 130 *Haros* for human beings had been undertaken for either rehabilitated or construction. Throughout the one-year activity (Period III to Period V), total 79,000 cum of soils had been excavated or de-silted. For *Haro* and *Guji Ella* for livestock, about 90 to 120 places had been undertaken continuously, and total 84,000 cum of soils had been removed or excavated. 14 – 23 Borena *Ellas* had been rehabilitated by period, and about 16,000 cum of soils had been removed in total. *Kalo* (rangeland) management is very important activity after water. Approximately 100 to 130 *Kalos* had been rehabilitated or under construction simultaneously. 7,000 to 10,000 ha of *Kalo* in total had been worked on. Including farming, infrastructure and construction, a total of 374 to 447 community based projects were under way by period.

4.5.2 Participated Number of Gares by Activity

Figure 4.5.2 shows the number of *Gares* which have participated in different kind of community based projects on which how many *Gares* had worked together. As indicated in the figure, most of the CBPs had been undertaken by just single *Gare* or 2 to 4 numbers of *Gares*. It is noted that CBPs which were undertaken by more than 5 Gares together are not so many in number. In fact, CBPs undertaken by just one *Gare* share 32 % of all CBPs, CBPs undertaken by 2 *Gares* share 25%, those by 3 *Gares* does 3%, and those by 4 *Gares* consist 10%. It means those CBPs undertaken by single *Gare* and by 2 *Gare* share more than half of the projects, 57%.

Looking into detail, *Haro* and *Kalo* community based projects show the highest number in the case that one single *Gare* participates and as the number of *Gares* increases, the numbers of *Haro* and *Kalo* projects decrease. On the other hand, projects for *Haro* and *Guji Ella* for livestock show the highest number in case that 2 *Gares* together participate, and then in case that single *Gare* participates. It implies that many *Haro* and *Guji Ella* for livestock are utilized and managed by more than one *Gare*. For the infrastructure related projects, most of them had been undertaken by a couple to several number of *Gares*. Likewise, construction projects had also been undertaken several to many number of *Gares*. This is in fact because those projects benefit many *Gares* whereby the participation also comes from many *Gares*.

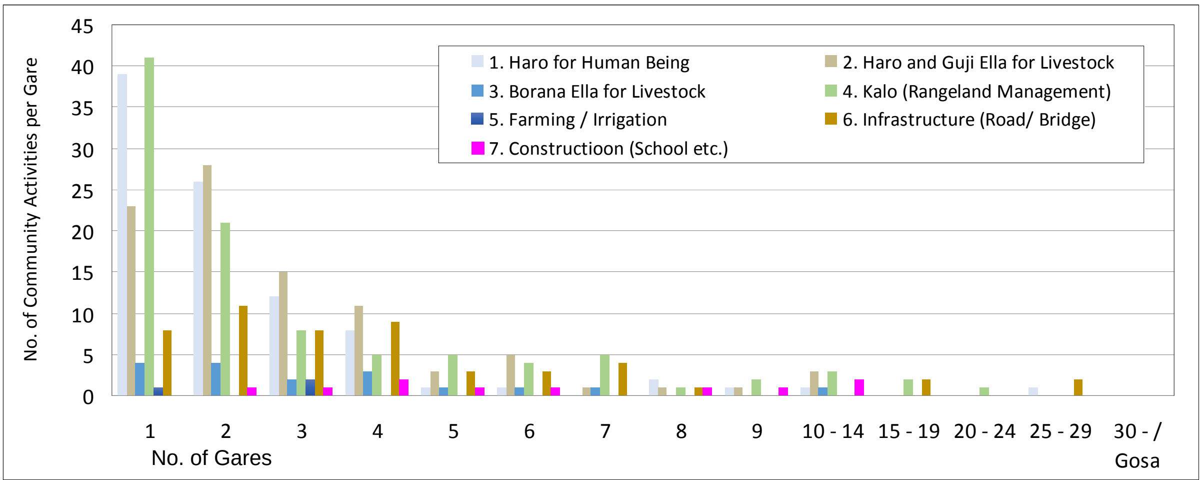


Figure 4.5.2 Participated Number of Gares by Kind of Community Based Projects

Source: JICA Project Team

4.5.3 Work Intensity by Season

Figure 4.5.3 shows seasonal patterns of the community activities in the 4 woredas of Phase I using the monthly average in percentage of person-days data. Though there is variance by PA and by woreda, there is a distinct seasonal pattern for the community activities. They usually start getting active from June and also from November over a year. June is correspondent with about 2 months after the *Gana* rainy season (long rainy season) has started and November does with 2 months after the *Hagaya* rainy season (short rainy season) has started.

At the above times, there are already enough amounts of pasture in and around their homesteads, *Gare* or *Olla*. Most of the pastoralist and agro-pastoralist have come back to their homesteads till the time, and therefore they can very much engage themselves in the community based project activities. Then, over the rainy season and the following dry season and further till sometime after the next rainy season has started, their activities are declining bit by bit though there are spot fluctuations.

In general, sometime after a dry season has started and scarcity of water and pasture gets more acute, young male people with a herd of cattle begin migration to other regions to search for water and pasture. Then, after it has rained enough and pasture has grown up, they come back to their residential areas, corresponding to the seasonal patterns of their work intensity. In addition, since some remaining people there begin farming just after rain comes, the period at the beginning of rainy season (March to May) is quite busy, leading to less participation to the CBP activities.

Among 4 woredas, Malka Soda woreda shows less fluctuation in the work intensity pattern than the other 3 remaining woredas. Since Malka Soda woreda is located in middle highland area blessed with relatively rich rainfall, the people there rarely move. Therefore, the intensity of CBP activities in Malka Soda is relatively stable throughout year.

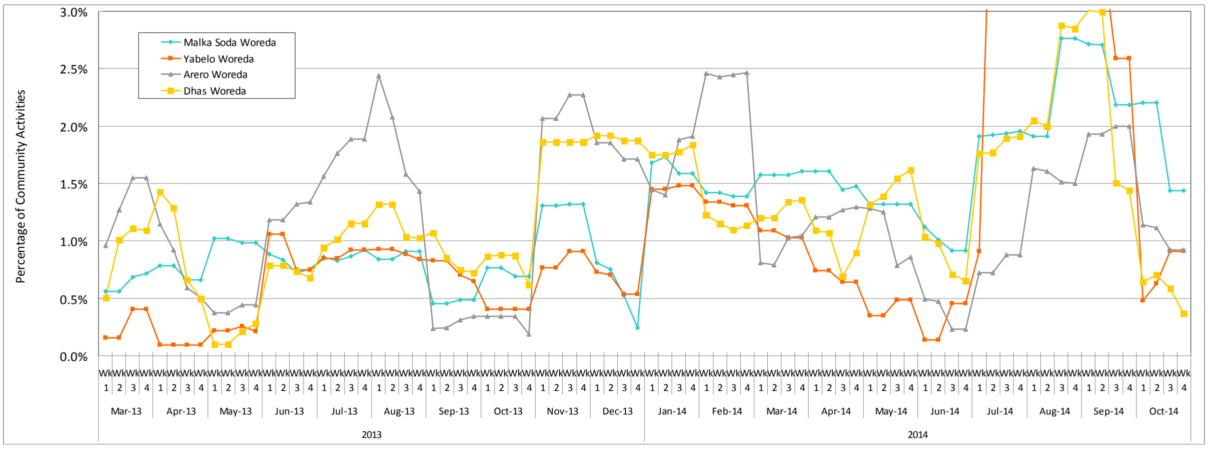


Figure 4.5.3 Seasonal Patterns of Community Based Project by Woreda for the Phase I 16 PAs

Source: JICA Project Team

4.5.4 Change in People's Participation Before and After RREP Intervention

RREP Approach aims at enhancing the people's resilience, e.g. against droughts through facilitating and strengthening of their own initiated activities. Further, the *RREP approach* aims at expanding the people's continuous development activities in terms of size and numbers. The Team has therefore introduced an M&E method for continuous development activities, in addition to conventional project M&E. Figure 4.5.4 shows the way of M&E for both *RREP* and conventional *Project Approaches* conceptually.

In *Project Approach*, we monitor and evaluate the project according to the pre-set objectives, schedule and inputs. We just put up benchmarks with reference to the project design. In *RREP Approach*, however, the activities are being done continuously and also on diversified levels, so that it does not mean much to monitor and evaluate each and every project or set of activities. It is what the villagers have been doing regularly and continuously, hence there is no need of outsiders help.

A participatory M&E and self-rating should therefore be carried out for *RREP approach* and this could be enough for the monitoring purpose. For the outsiders, what important is rather to monitor how capacities of people and organizations concerned have been developed, e.g. by monitoring how many people have increased the participation, for example in terms of person-days, in their initiated activities, what activities they have newly started by themselves, etc., to what extent the participation has enlarged.

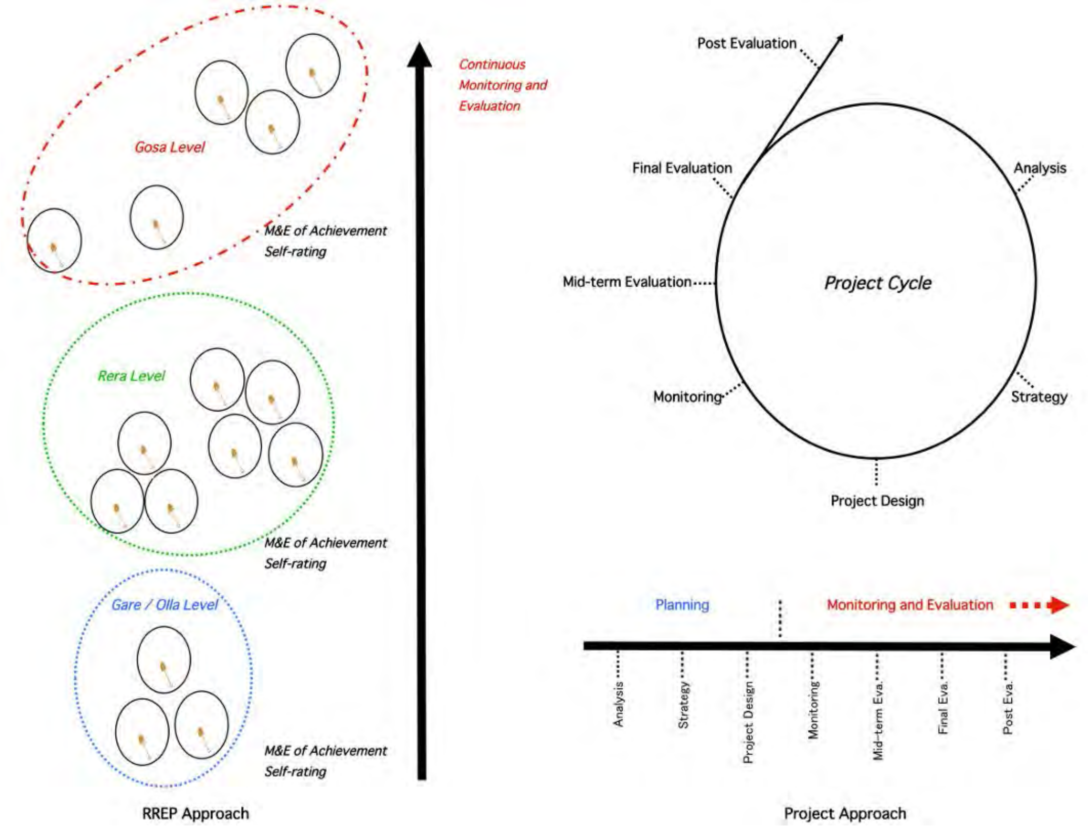


Figure 4.5.4 Monitoring & Evaluation on RREP Approach and Project Approach

Source: JICA Project Team

The Team believes that diversified and multi-layered social ties on different levels such as *olla* / *gare*, *rera* and *gosa* must have been contributing to the safety nets and the social resilience. For example, Team has learned that a *haro* for human drinking is usually managed and rehabilitated by one or two *gare* or *olla*. A *haro* for cattle and a *kalo* are usually managed by all the *gares* or *ollas* in the same *rera* or PA zone. On the other hand, the owners called *Aba Ella* of *ellas* (= traditional wells) are usually *gosa* (= primary sub-clan of Borena people) and they work together as *gosa* for rehabilitating *ellas* (refer to the left side of Figure 4.5.4).

Furthermore, the Team found from in-depth interviews that new social ties of inter-PA zone and inter-PA can be formulated voluntarily especially for the projects of roads, bridges, etc. Hence a *gare* or an *olla* belongs to many diversified social ties in multilayered manner and it goes and backs among the social ties flexibly to enhance resilience. Thus, the main objective of M&E under *RREP Approach* is to monitor how capacities of people have been developed and strengthened and so do social ties. Base on this concept, we focus on the change of the people's activities in terms of participation, range of the participation, etc.

1) Change of Participation by PA

Figure 4.5.5 comparatively shows participation in terms of average person-days per household per month during the period of March 2012 to June 2013 and the period of March 2013 to June 2014 for the PAs of Phase I. The former period, March 2012 to June 2013, is roughly correspondent to before the project had started while the latter period, March 2013 to June 2014, is after the project started. In all the PAs, increase in participation can be observed though it varies by PA. In average of the 16 PAs, the participation of 1.7 person-days per household per month has increased to 3.0 person-days per household per month, equivalent to 170% increase.

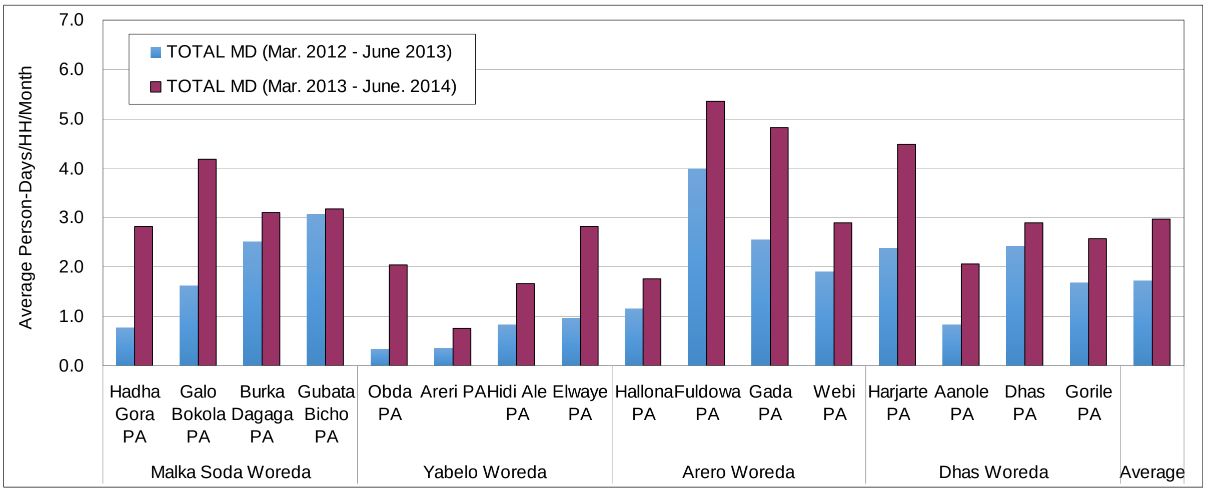


Figure 4.5.5 Comparison of Participation between Before and After the Project for Phase I PAs
Source: JICA Project Team

Figure 4.5.6 shows the same for the 16 PAs undertaken in Phase II between the period of March – June 2013 and the period of March – June 2014. The former period corresponds to before-the-project while the latter period is after the project started. There are 3 PAs whose participation had decreased such as Bule Korma and Mamara of Teltele woreda and Gobso PA of Dilo woreda. The other 13 PAs all showed some increase in the participation though it depends on PA. The overall average participation has increased from 2.24 person-days per household per month to 2.85 person-days per household per month with an increase ratio of 127%. Since the period examined for the Phase II PAs covers only 4 months, the increase may not be as big as that of Phase I PAs.

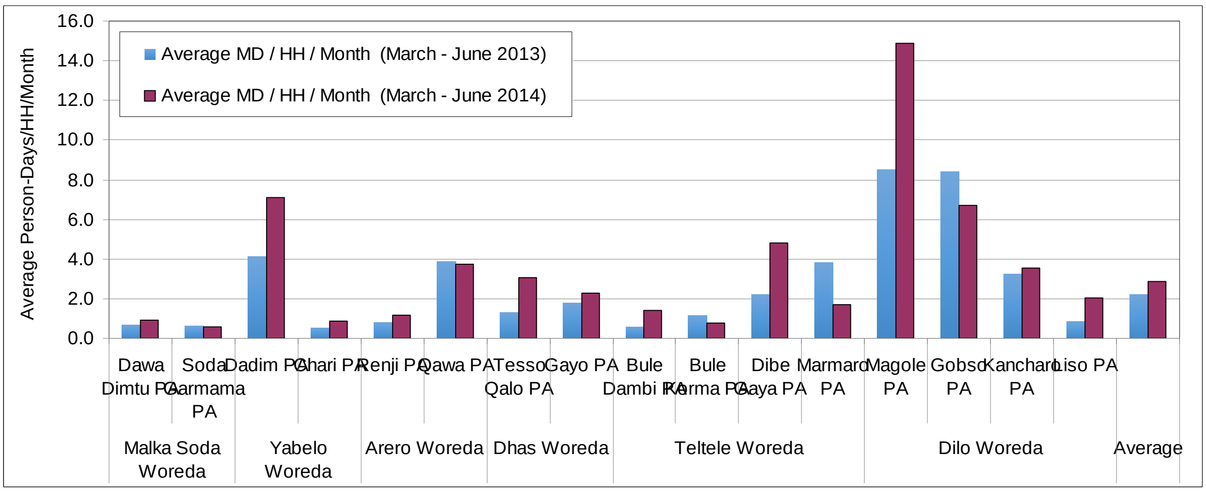


Figure 4.5.6 Comparison of Participation between Before and After the Project for Phase II PAs
Source: JICA Project Team

2) Change of Participation by Woreda over Periods

Figure 4.5.7 (left) shows the average participation in person-days per household per month grouped by woreda over eight 4-month periods including before-the-project for the PAs of Phase I (referred to as old PAs), while right of the figure shows the same for the PAs of Phase II (referred to as new PAs) over six 4-month periods. For the both old and new PAs, first three 4-month periods show the participation before the project, while the 4th bar from the left and onwards show the participation after the project started.

Since intensity of the participation varies vey widely by season, comparison should firstly be made between same periods over years, and then the trend over whole period should be examined. In general, before the project had started, each household used to participate in their own development activities for less than one day to maxim five days per month though it is very much dependent on where they live. The participation had then obviously increased after the project had started to, say, one day to six days per household per month.

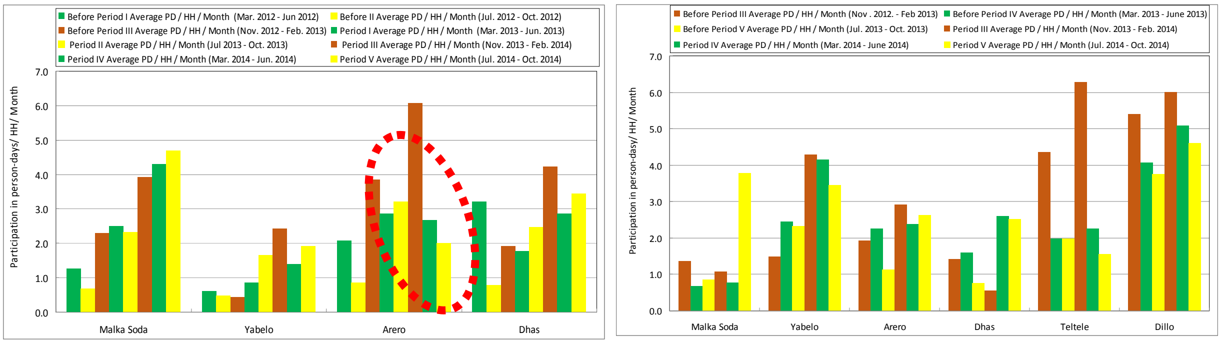


Figure 4.5.7 Participation in Person-days per Household per Month (Left: Old PAs, Right: New PAs)
Source: JICA Project Team

Figure 4.5.8 (left) shows accumulated participation in terms of person-day by woreda for the Phase I PAs (old PAs) and right of the figure shows the same for the Phase II PAs (new PAs). These figures further show whole accumulated participation in person-days at the right end of the charts. The trend of the participation is of course same as those shown in the previous Figure 4.5.7. Looking into the whole accumulated participation (see the right end charts), there is obvious increase between the same periods over years.

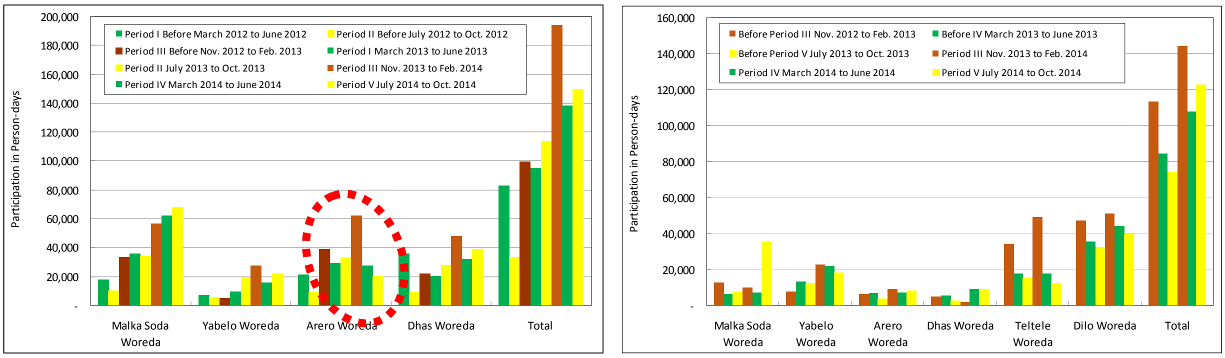


Figure 4.5.8 Accumulated Participation in Person-days by Woreda (Left: Old PAs, Right: New PAs)
Source: JICA Project Team

By woreda, Malka Soda, especially old PAs, shows relatively stable increase of the participation over whole periods. As aforementioned, since Malka Soda is located in middle highland area blessed with relatively rich rainfall, their participation has not been up and own much, rather the participation tended to increase steadily. Other woredas, in general, show a fluctuation in the participation by season, and there are in fact some decreasing periods as compared to the same periods of previous years.

In fact, old PAs in Arero woreda show clear decreasing trend of participation for the last two 4-month periods as compared to the same periods of one year ago. The decrease can be explained by the drought which took place in 2014 *Gana* season. The rainfall of the season was meager over Borena and especially the rainfall in and around Arero woreda was very much small as shown in Figure 4.5.9. As indicated, the rainfall of 2014 *Gana* season in Arero woreda was about one-third of that of *Gana* season 2013. This small amount of rainfall forced the pastoralist not to come back to their homestead, leading to less participation in their community activities.

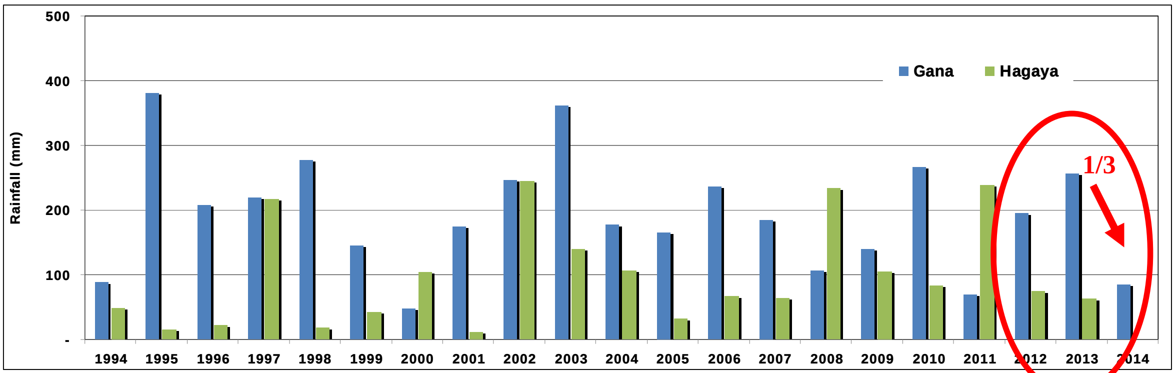


Figure 4.5.9 Trend of Gana Rainfall and Hagaya Rainfall at Arero Woreda

Source: Satellite Data (ARC2 system)

3) Change of Participation by Type of Work over Same Periods

Figure 4.5.10 compares the summed participation in person-days over same periods for all the old PAs (Phase I PAs); namely, the first 3 bars show the participations in the same periods of March – June of 2012, 2013 and 2014 respectively, and second group of 3 bars shows the participations in July to October of 2012, 2013 and 2014, and likewise the last 2 bars indicate the participations in November to February of 2012 - 2013 and 2013 - 2014. Note that since the monitoring had been done till October 2014, the data after the November are not available. The same for the new PAs (Phase II PAs) are shown in Figure 4.5.11. It is noted that since the activities in new PAs had started almost one year later than those PAs of Phase I, the comparison can be done over only 2 years.

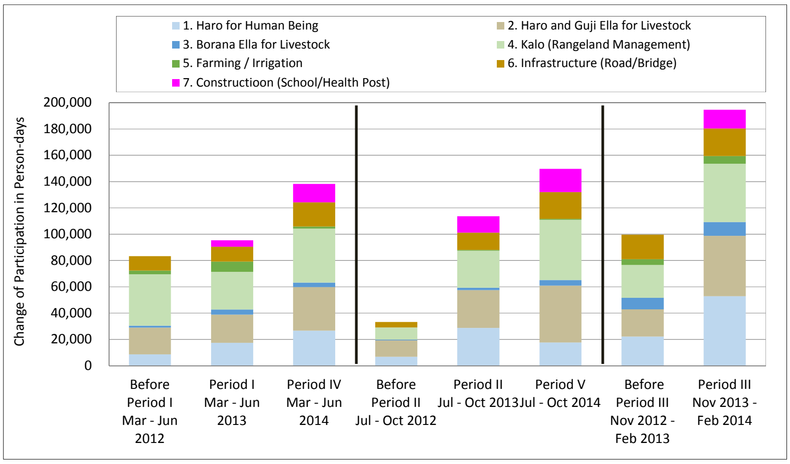


Figure 4.5.10 Comparison of Participation for Phase I PAs

Source: JICA Project Team

The figures clearly show steady increase in all the periods over years for both Phase I PAs and Phase II PAs. Though the afore-mentioned figures indicated some PAs had decreased their participation in latter period due probably to the effect of drought, if we look at overall participation summed up at all the old PAs and new PAs, there is a clear trend of increasing in the people's participation given tools and

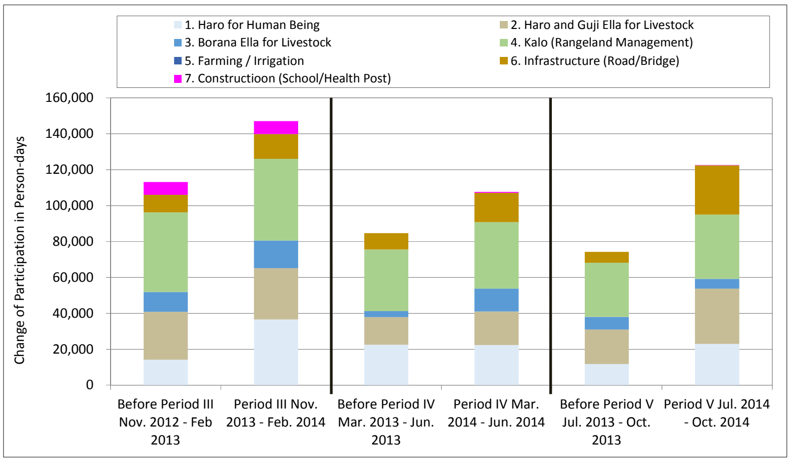


Figure 4.5.11 Comparison of Participation for Phase II PAs

Source: JICA Project Team

technical assistances only.

The ratios of the increase are indicated in the following table; namely, for the old PAs (Phase I PAs), increases over one year for the periods of March – June, July – October, and November – February are 115%, 341% and 195% respectively, indicated the one-year overall increase of 187%. When comparing the increase in the second year (2014) with the before-project, the ratios are 166% and as high as 449% for March – June and July – October, giving the 8 months increase of 247% as compared to the participation of year 2012.

On the new PAs (Phase II PAs), the increases are 130%, 127%, and 165% for the period of November – February, March – June, and July – October respectively as compared to those of before-the-project. Overall increase over one-year period comes to 139%, which is lower than that of the first year's increase for old PAs, 187%. This may be attributed to the effect of drought which took place in 2014.

Table 4.5.3 Change of the Participation in Person-days over Periods

Year	2012	2012	2012/13	2013	2013	2013/14	2014	2014
Phase I PAs Period	Before Period I Mar - Jun	Before Period II Jul - Oct	Before Period III Nov - Feb	Period I Mar - Jun	Period II Jul - Oct	Period III Nov - Feb	Period IV Mar - Jun	Period V Jul - Oct
Total Person-days	83,283	33,349	99,648	95,397	113,627	194,571	138,303	149,712
Increase, %	-	-	-	**115%**	**341%**	**195%**	**166%**	**449%**
Increase, %	-	-	-	**187%**			**247%**	
Phase II PAs Period	-	-	Before Period III Nov - Feb	Before Period IV Mar – Jun	Before Period V Jul - Oct	Period III Nov - Feb	Period IV Mar - Jun	Period V Jul - Oct
Total Person-days	-	-	113,163	84,606	74,274	147,045	107,692	122,582
Increase, %	-	-	-	-	-	**130%**	**127%**	**165%**
Increase, %	-	-	-	-	-	**139%**		

Source: JICA Project Team

Above figures also show the participation by kind of activities, e.g. *haro* for human being, *haro* and *Guji ella* for livestock, etc. Trend of increase by kind of activity may not be clear so much; however it can be said that as time passes by, numbers of activities for infrastructure (mainly road rehabilitation) and construction (e.g. school construction, health post rehabilitation, etc.) have increased. Since these activities cover wider area and therefore need wider participation, there may be a tendency that the people start such activities after they have finished *haro, ella and kalo* which need smaller range of participation. It may therefore imply that as time passes by, their range of cooperation would become wider whereby their social ties becomes wider.

4) Change of Activities over Periods

Figure 4.5.12 shows the compositions of activities by type in comparison between old PAs (Phase I PAs) and new PAs (Phase II PAs) during the period of July – October 2014. Except for Arero woreda, it is found that activity on *haro* for human being is much more in new PAs than in old PAs. *Haro and Guji ella* for livestock do not show clear trend over those 4 woredas. Then, for the activities on *kalo*, the activities for old PAs can generally be said more than in new

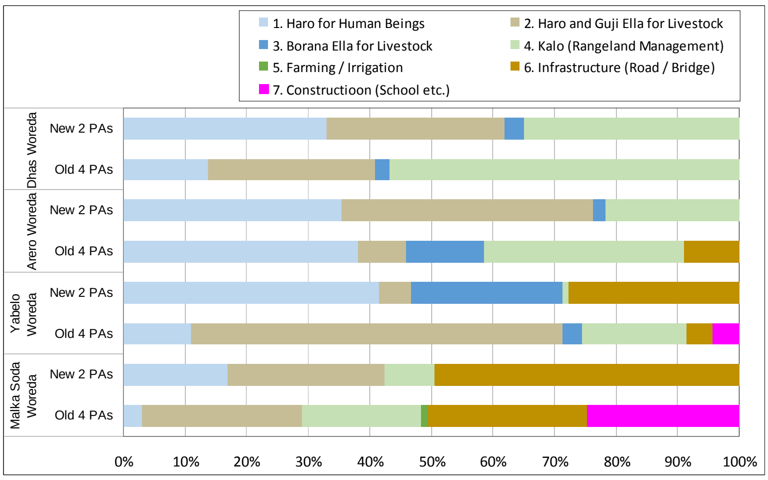


Figure 4.5.12 Comparison of Participation for Phase II PAs

Source: JICA Project Team

PAs. Construction related activity shows up only on old PAs, which requires wider range of participation.

From the above findings, though it differs by woreda, it can be said that the people usually start rehabilitation and construction for *haros* for human being, which in fact are managed by only one to a couple number of *Gares*, requiring smaller range of participation. Then, they gradually may move to such activities which require wider range of participation, e.g. *kalo* which is usually managed by several *Gares*, and then infrastructure and construction needing much more wider range of participation, e.g. PA level.

Figure 4.5.13 shows the change of activities by share for old PAs over 2 years and 8 months including one year before-the-project. With the project intervention commenced, the share of human *haro*s activity started increasing gradually for one-year, and then it started decreasing and instead the share of construction, e.g. school and health post construction/ rehabilitation, has been on the increase trend. This also may imply that till sometime after the project started, the people would undertake water related activities with higher priority which is in most cases very much needed aside from *kalo*, and then they gradually sift to such activities of construction which require wider range of participation.

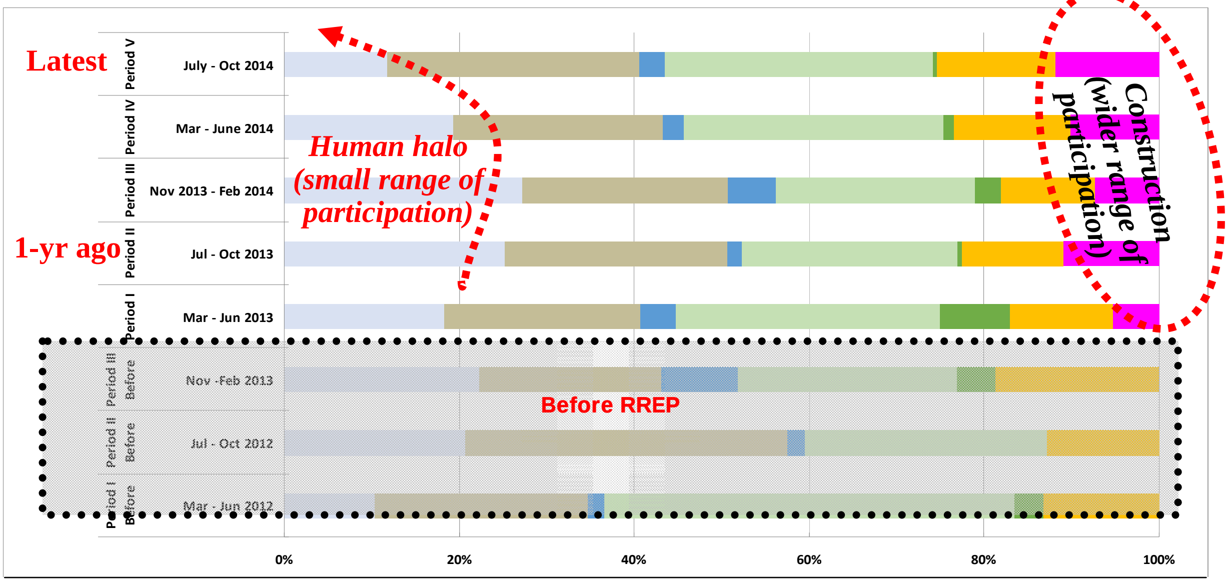


Figure 4.5.13 Change of Activities by Share for Old PAs over 2 Years 8 Months
Source: JICA Project Team

4.5.5 Enlargement of Social Ties based on Range of Users and Collaborative Works

Participants for the final workshop held on October 27 – 30 2014, where there were 101 participants from 16 PAs for Phase II (new PAs), had reported how the social ties through the implementation of community based projects or range of users for *haros*, *kalos*, etc. have been enlarged by area such as farmers and agro-pastoralist area, transition area and pastoralist area by picking up major 3 activities of *haro* for human being, *kalo* management and construction (road and bridges).

As indicated in the table below, the participants recognized the range of the users has enlarged; for example in Group I area (farmers and agro-pastoralist area), *haros* for human beings used to be utilized at *olla* and *gare* level only while after the project had started there are *haros* to which users come from wider areas such as *rera*/ PA zone and even from PA level. In case of *kalo* for Group I, it was mainly managed and utilized by *olla/gare* and with the project there are *kalos* managed and utilized at rera and PA zone level.

Above enlargement of users can be seen in transition area as well as in pastoralist area. Some of the users come from even *Gosa* (primary sub-clan level) level, and also the participation in the rehabilitation and construction works started covering larger areas with the tools given by the project. Though not all the activities show such kind of enlargement of participation or range of collaborative work, at least it can be said that upon the *haros* and *kalos* rehabilitated and constructed, users started coming from wider areas such as *rera* level, PA level and *gosa* level. It can be said that this enlargement in terms of users as well as participation in collaborative works can contribute to strengthening their social ties.

Table 4.5.4 Enlargement of Users and Participation with RREP Approach by Area

Group	Community Activities	The Levels of Social Ties					Change in Levels
		Olla/ Gare	*Ollas / Gares*	*Rera*/ PA zone	PA	*Gosa*	
Group I: Farmers and Agro-Pastoralists Area	1. *Haro* for Human Beings						**+3**
	2. *Kalo* (Rangeland Management)						**+2**
	6. Construction (Road / Bridge)						**+3**
Group II: Transition Area	1. *Haro* for Human Beings						**+4**
	2. *Kalo* (Rangeland Management)						**+1**
	3. Borena *Ella*						**+4**
Group III: Pastoralists Area	1. *Haro* for Human Beings						**+2**
	2. *Kalo* (Rangeland Management)						**+3**
	3. Borena *Ella*						**+1**

Source: JICA Project Team (WS result held on October 27 – 30, 2014, at Yabelo)

4.5.6 Conventional 5-aspect Evaluation

Participants for the final workshop had conducted conventional 5-aspect evaluation by kind of activities. Table 4.5.5 summarizes the result of the 5-aspect evaluation with a rage of 1 being lowest to 5 for the highest. In general, the participants gave very high evaluation results; namely, water related activities were given 4 or more than that in terms of average. Though farming/ irrigation and infrastructure were given a bit lower evaluation results, the marks are still 3.2 each in average.

By aspect, it can be said that the relevant and sustainability were given very high marks such as 4.7 each while efficiency and effectiveness by a bit lower marks. Since *RREP approach* supports the people's ordinary activities, it would obviously entail high relevance and sustainability in line with what the communities have been doing on their own. It is also understandable that the evaluations on efficiency and effectives are bit low, though they are still more than 3, because *RREP approach* does not provide any cash.

Table 4.5.5 5-aspect Evaluation by RREP Activity for new PAs (Phase II PAs)

Activity	Efficiency	Effectiveness	Impact	Relevance	Sustainability	Average
1. Haro for Human Beings	3.7	3.7	4.2	4.8	5.0	4.3
2. Haro and Guji Ella for Livestock	4.3	4.3	4.2	5.0	5.0	4.6
3. Borena Ella for livestock	3.3	3.8	3.8	4.5	4.5	4.0
4. Kalo (Rangeland Management)	3.8	4.0	3.8	5.0	5.0	4.3
5. Farming / Irrigation	3.0	3.0	2.0	4.0	4.0	3.2
6. Infrastructure (Road / Bridge)	3.0	3.0	4.5	4.5	4.5	3.2
7. Construction (School etc.)	3.6	3.7	3.9	4.8	4.8	4.0
Average	3.5	3.6	3.8	4.7	4.7	3.9

Source: JICA Project Team (WS result held on October 27 – 30, 2014, at Yabelo)

In addition, the participants carried out comparison between *RREP approach* and conventional project approach, specifically in this context Cash-for-Work (see the table below). The evaluation was conducted by 3 groups such as; famers and agro-pastoralist area such as Malka Soda woreda and a part of Teltele woreda, transition areas such as Arero and Yabelo woredas, and Pastoralist area such as Dillo and Dhas woredas.

The result shows that *RREP approach* is given high marks in terms of relevance and sustainability in comparison with cash-for work approach as expected. In fact, some participants said that cash-for approach, especially carried out in pastoralist areas, would rather lead to weakening social ties or sense of collaboration, and thus result in lower relevance and sustainability. However, the evaluation result indicates that *RREP approach* would perform less efficient and less effectively as compared with cash-for-work. This is also understandable as aforementioned; namely, since *RREP approach* does not provide any cash for their work, achievement within a specified period of time would be less than what cash-for-work could achieve.

Table 4.5.6 Comparison of 5-aspect Evaluation between RREP Approach and Cash-for-Work

Group	Approach	Efficiency	Effectiveness	Impact	Relevance	Sustainability	Average
Group I: Farmers / Agro-pastoralists Area	RREP	4	4	3	4	5	4.0
	Cash-for-Work	3	4	4	3	3	3.4
	Difference	1.0	0.0	-1.0	1.0	2.0	0.6
Group II: Transition Area	RREP	3	3	4	5	5	4.0
	Cash-for-Work	5	4	3	3	3	3.6
	Difference	-2.0	-1.0	1.0	2.0	2.0	0.4
Group III: Pastoralists Area	RREP	3	3	4	5	5	4.0
	Cash-for-Work	4	4	3	2	3	3.2
	Difference	-1.0	-1.0	1.0	3.0	2.0	0.8
Average	RREP	3.3	3.3	3.7	4.7	5.0	4.0
	Cash-for-Work	4.0	4.0	3.3	2.7	3.0	3.4
	Difference	-0.7	-0.7	0.3	2.0	2.0	0.6

Source: JICA Project Team (WS result held on October 27 – 30, 2014, at Yabelo)

4.5.7 Increase in Tools Available in Communities

A survey was carried out to know how many tools, irrespective of kind, had been used for community based activities in the Phase II PAs before the provision of tools by the project and how many tolls have now been used after the project had provided tools. As Table 4.5.7 shows, there used to a total of 1,510 tools used in the 16 PAs of Phase II before the project, and the total number of the tools came to as many as 5,100 after the project had delivered them. The rate of increase marks as much as 338%, which could be the main driver for the community members to have increased their participation in the relevant activities.

Table 4.5.7 Comparison of Tools Used in CBPs before the Project and After the Project

Activity	Before	After	Increase	Rate of Increase
1. Haro for Human Beings	146	400	254	274%
2. Haro and Guji Ella for Livestock	350	1,338	988	382%
3. Borena Ella for livestock	96	188	92	196%
4. Kalo (Rangeland Management)	491	877	386	179%
5. Farming / Irrigation	40	145	105	363%
6. Infrastructure (Road / Bridge)	235	1,040	805	443%
7. Construction (School etc.)	152	1,112	960	732%
Grand Total / Average	1,510	5,100	3,590	338%

Source: JICA Project Team

Generally speaking, though people have been working on their own development activities such as *haro* rehabilitation, there has always been shortage of tools. The shortage of tools has very much hindered their voluntary works, and also efficiency in terms of work volume able to be done per day, per week and per month was very low. A female interviewee in fact reported that before the provision of wheel carts, they had to carry silted soils out of *haro* on their backs which is a really tough work while with a provision of the carts, they can work much more efficiently. Thus, tool provision has contributed to increasing the people's participation to a great extent.

4.5.8 Contribution to Government Programs with Increased Tools

Tools provided have increased the people's participation in their community based projects. Further, the tools provided by the project have also been used in government programs of watershed conservation and PSNP. Tale 4.5.8 summarizes the tools used in those government programs before and after the project had provided them, and the participation in terms of person-days for the 16 PAs of Phase II (new PAs).

As clearly indicated, number of tolls utilized in the government programs has been increased very much. Overall increase ratios are 141 % for watershed conservation program and 129% for PSNP respectively. In terms of participation, the tools provided have contributed to increasing the people's participation for watershed program but not for PSNP. In fact, PSNP is provided to pre-set beneficiaries, like chronically food shortage families, with specific days of participation, and therefore the participation in terms of person-days cannot be increased. However, there could be a possibility that the PSNP participants would have increased the volume of works with the tools.

Table 4.5.8 Contribution to Government Programs with the Tools Provided by RREP

Group	Activities	Tools Engaged			Participation (person-days)		
		Before	After	Increase	Before	After	Increase
Group I: Farmers / Agro-pastoralists Area	Watershed Activities	1,624	2,362	145%	1,684	2,396	142%
	PSNP	261	350	134%	376	376	100%
	Total	**1,885**	**2,712**	**144%**	**2,060**	**2,772**	**135%**
Group II: Transition Area	Watershed Activities	275	365	133%	300	390	130%
	PSNP	65	78	120%	92	92	100%
	Total	**340**	**443**	**130%**	**392**	**482**	**123%**
Group III: Pastoralists Area	Watershed Activities	250	310	124%	304	312	103%
	PSNP	45	51	113%	51	51	100%
	Total	**295**	**361**	**122%**	**355**	**363**	**102%**
Grand Total	Watershed Activities	2,149	3,037	141%	2,288	3,098	125%
	PSNP	371	479	129%	519	519	100%
	Total	**2,520**	**3,516**	**140%**	**2,807**	**3,617**	**129%**

Source: JICA Project Team

CHAPTER 5 RANGELAND MANAGEMENT AND PASTURE DEVELOPMENT

5.1 Rationale and Objectives

In Borena zone, pastoralists traditionally manage their rangelands by having their own rules among communities and the members. However, rangeland with good native grasses has been shrinking due to bush encroachment and expansion of degraded lands caused by population stress of livestock. To tackle these issues, bush thinning and forage production should be carried out. Also, reserving grasses for a crisis time such as drought would save the people from losing stocks.

Since bush thinning has been carried out by the communities voluntary as one of their ordinary activities, it can be further enhanced by hand tools delivery and technical support from DAs. On the other hand, forage production is a new intervention in Borena zone. Forage seeds have not been brought about in Borena zone so far. Therefore, the JICA team has tried a pilot activity of introducing forage production with seed provision.

The pilot activity of forage production aims “to increase productivity of pasture in communal rangelands by extending improved varieties of forages and multiplying forage seed for the future”. In order to achieve the objective, skills and knowledge for forage production should be disseminated and forage seeds are also supplied to the target communities. Particularly, this activity pursues not only to grow forages but also to collect the seed and expand rangeland by using the harvested seeds.

5.2 Implementation Arrangement of Rangeland Management

Implementation structure of the pilot activity of forage production is illustrated in Figure 5.2.1. DAs, as a frontline extension officer, play a vital role on the implementation of this pilot activity of pasture development. To start up the pasture production, first of all, DAs identified sites for pasture production in their target communities through discussions with their community members. Then, they reported the communities’ needs to woreda PDOs and to the JICA team. Based on the needs, the Team started preparing for training contents, pasture seeds, logistics arrangement, etc.

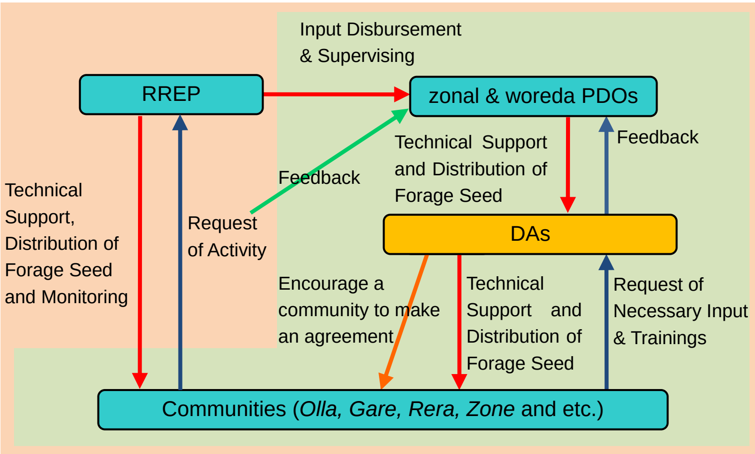


Figure 5.2.1 Implementation Structure of Pasture Development

Source: JICA Project Team

Necessary technical supports and input such as pasture seeds were delivered to the DAs in charge of target PAs. After that, DAs distributed the seed and taught the way of sowing pasture seeds at their target communities. DAs encouraged the communities to undertake the activities and make an agreement among the community members to enclose the areas where the seeds had been sown. In addition, this pilot activity aimed that woreda PDOs establish a system of seed multiplication on forage production.

5.3 Phase I Activities of Rangeland Management and Pasture Development

The JICA team implemented the Phase I forage production activities through two channels. One was the community based forage production directly supported by the Team and the other one was the forage production through woreda PDOs (see Table 5.3.1 and Table 5.3.2). The former channel covered a total of 6 PAs in 3 woredas of Malka Soda, Yabelo, and Arero while the latter one dealt with as many as 55 PAs in 4 woredas of Malka Soda, Yabelo, Arero and Dhas.

Table 5.3.1 Target PAs on Pasture Development (RREP target PAs) in Phase I

	Woreda	PA
Phase 1 target PAs (by Team)	M/Soda	2 PAs (Hada Gora, Galo Bokola)
	Yabelo	3 PAs (Elwaye, Areri, Hidi Ale)
	Arero	1 PA (Gada)
	Total	6 PAs

Source: JICA Project Team

Table 5.3.2 Target PAs on Pasture Development (PDO target PAs) in Phase I

	Woreda	PA
Phase 1 target PAs (by PDO)	M/Soda	12 PAs (Galo Bokola, Burka Dagaga, Gubata Bicho, Hadha Gora, Dawa Bicho, Daya Dawa, Soda Garmama, Dawa Dimtu, Baya Gundi, Dada Oda Budha, Hidi Negele, Halo Madhedha)
	Yabelo	23 PAs (Obda, Yabelo, Ganga, Darito, Abunu, D/Saden, Dikale, Harwayu, Utalo, Adee Gelchat, Hidi Ale, Areri, Elwaye, Dedertu, Chari, Dida Yabelo, Cholkasa, Dhadim, Harboro, Surupa, Tula Wayu, Bildim, Haro Bake)
	Arero	13 PAs (Bobila, Fulduwa, Silala, Halona, Range, Gada, Kara Gumata, Guto, Kafara, Qawa, Haro Dimtu, Webi, Dhidhile)
	Dhas	7 PAs (Borbor, Dhas, Gayo, Anole, Gorile, Woreda Court Office, Tesso Kalo)
	Total	55 PAs

Source: JICA Project Team

5.3.1 Community-based Forage Production (by RREP team)

At the start of the implementation, discussion on rangeland management was made in several communities with DAs in charge of the target PAs. Out of the communities which had such discussion, 10 communities were identified to conduct sowing of forage seeds in communal land or *kalo* already established or to be newly established with enclosure. Trainings and forage seeds were provided to the communities to start cultivation of the forage in *gana* season 2013. The training covered such topics as; 1) how to sow pasture seeds using Rhodes grass, and 2) closure of the areas for 3 to 5 years where the seeds have been sown. Participants and amount of forage seeds delivered are summarized in the following table:

Table 5.3.3 Training Participants and Delivered Amount of Seed

Woreda	PA	Community	Participants			Training Day	Amount of Seed (kg)	Remarks
			M	F	Total			
Arero	Gada	Sele	7	3	10	18/03/2013	36	Area Closure
Yabelo	Elwaye	Kobo, Obe, Kalka	18	8	26	19/03/2013	288	Regeneration of Kalo and Area Closure
Yabelo	Areri	Chana Dika	11	2	13	20/03/2013	0	After training, they decided not to do b/c lack of labor.
Yabelo	Areri	Harburo	6	3	9	25/03/2013	72	Area Closure
Yabelo	Hidi Ale	Halaka	8	2	10	26/03/2013	120	Area Closure
M Soda	Hada Gora	Dedecha Hora	11	0	11	22/03/2013	98	Regeneration of Kalo and Area Closure
M Soda	Galo Bokola	Dhaka Arba, Tile Luka, Bate Selfi	8	0	8	28/03/2013	36	Area Closure
Total			**69**	**18**	**87**		**650**	

Source: JICA Project Team

Table 5.3.4 summarizes the forage production undertaken by the communities after the training. Out of the 10 communities, one community in Arero woreda failed to sow the seed due to lack of consensus building among the community members. Delaying of the sowing was observed in 4 communities out of the remaining 9 communities even though the seed was directly delivered to the target communities on time. Since this was the first attempt for all the communities participated, it may have needed some weeks for them to take action.

The Team conducted monitoring every month from April to August 2013 with DAs in charge and the results are indicated as 1st to 5th progress monitoring (see Table 5.3.4). Progress of forage growth was scored in a scale of "good (forage sown is well germinated or grown in whole)" to "very poor (forage sown is hardly germinated or grown)". At the 1st monitoring, 5 sites out of 9 sites scored "good" and the other sites scored "poor" and "very poor". Low germination at the beginning was due mainly to the fact that the sown seeds were washed away by intensive rainfall. In fact, when the Team interviewed the communities about the causes, they answered that they did not plough compacted parts of land at all, resulting in seeds washed away.

Table 5.3.4 Monitoring of Pasture Production (by RREP team) in Phase I

Woreda	Kebele	Zone	Rhodes grass (kg)	Sowing Day	Germination Day	1st	2nd	3rd	4th	5th	Observation Findings
Arero	Gada	Sele	36	Not sown							Not sown
Yabelo	Elwaye	Obe	96	02 to 06/04/2013	9 to 14/04/2013	good	good	poor	poor	poor	Dropping seed
Yabelo	Elwaye	Kobo	96	01 to 05/04/2013	8 to 12/04/2013	poor	poor	poor	poor	poor	Dropping seed
Yabelo	Elwaye	Kalta	96	05/04/2013	04/12/2013	poor	poor	poor	poor	poor	Dropping seed
Yabelo	Areri	Harburo	72	19/04/2013	26/04/2013	v poor	v poor	v poor	v poor	v poor	Late sown
Yabelo	Hidi Ale	Halaka	120	31/03 to 05/04/2013	06 to 12/04/2013	good	good	poor	poor	poor	Most of grass did not flower
Malka Soda	Hada Gora	Dedecha Hora	98	27 to 29/03/2013	02 to 04/04/2013	good	poor	poor	poor	poor	Stunted and grazed by animals
Malka Soda	Galo Bokola	Deka Arba	12	02/04/2013	09/04/2013	poor	poor	v poor	v poor	v poor	Too stunted
Malka Soda	Galo Bokola	Tile Luka	12	02/04/2013	09/04/2013	good	good	poor	poor	poor	Grazed by Livestock
Malka Soda	Galo Bokola	Bate Selfi	12	02/04/2013	09/04/2013	good	good	good	good	good	Good performance

Source: JICA Project Team

At the 2nd and 3rd monitoring, it was found that the growth of Rhodes grass was suppressed due to high seed density in some sites. The communities and DAs in the areas also recognized this issue and said they would try to avoid sowing too much seed next season. Therefore, although 5 sites scored "good" at the 1st monitoring, 4 sites out of these sites were shifted to the score of "poor". At the same time, it was observed that grown Rhodes grass was grazed by livestock. The community said that there was no consensus among the community members and some people just let animals graze on the grass.

Newly established rangeland by pasture sowing and the areas were regenerated in Yabelo woreda

Furthermore, Rhodes grass sown under this pilot forage production activity did not reached to the harvest of seeds in most cases as of Phase I of RREP. Although the Rhodes grass started flowering and producing seeds and the Team with DAs encouraged the communities to collect the seeds, the community members were not much interested in seed collection and actually hardly practiced. Consequently, the Team found that the seeds were already dropping on the ground.

5.3.2 Forage Production (through Woreda PDOs)

In addition to the forage production directly managed by the JICA team, 4 woreda PDOs of Yabelo, Arero, Malka Soda and Dhas were also engaged in forage production. Table 5.3.5 shows the amount and varieties of forage seeds delivered to the 4 woredas. The amount and varieties were selected by each woreda in consideration of their climate condition through technical advices from the Team. Since some PAs in Yabelo and Malka Soda woreda are categorized into agro-pastoral area where rainfall condition is relatively better, the woredas also tried legume forage requiring more precipitation such as Pigeon pea, Vetch, Alfalfa, Lablab and Cow pea.

Table 5.3.5 Types and Amount of Forage Seed Delivered by PDOs in Phase I

woreda	Rhodes Grass (kg)	Elephant Grass (cutting)	Pigeon Pea (kg)	Vetch (kg)	Alfalfa (kg)	Lablab (kg)	Panicum (kg)	Cow Pea (kg)
Yabelo	237	10,000	175	80	0	78	0	93
Malka Soda	100	0	372	150	100	330	25	300
Arero	333	0	0	0	0	0	0	0
Dhas	250	10,000	100	0	0	0	0	0
Total	920	20,000	647	230	100	408	25	393

Source: JICA Team

After completion of the delivery in March 2013, the Team conducted monitoring on the progress of sowing of seeds, growth of forage and etc. Upon this, it was found that all the woreda PDOs had finished the distribution of seeds and the communities at the target PAs had started sowing seeds at the presence of DAs. As Table 5.3.6 indicates, the pilot forage production through the PDOs covered 343ha in total with an average area of 6.2ha per PA. As a matter of fact, such sites with micro basin or/and soil bands where the communities prepared under a government initiated program in communal lands were selected for the pasture production.

Table 5.3.6 Target PAs and Areas of Pasture Production by Woredas (through PDO) in Phase I

Woreda	No. of target PA	Total Area (ha)	Average area/ PA (ha)
Yabelo	23	92	4.0
Malka Soda	12	100	8.3
Arero	13	83	6.4
Dhas	7	68	9.7
Total	55	343	6.2

Source: JICA Team

Among 55 target PAs, 80% of the PAs in average (Yabelo: 70%, Malka Soda: 100%, Arero: 69% and Dhas: 100%) carried out pasture sowing through participation of communities in their areas. It could be said that most DAs have encouraged the communities to engage them in the sowing and the participation was active despite the absence of “cash/food for work”. On the other hand, 20% of PAs have not conducted pasture sowing and instead stored the seeds at the PA center. As a reason for this, the DAs in charge said that they did not know how to sow the pasture seeds. Other DAs also said timing of sowing had already passed and the seeds were therefore to be sown during the coming *hagaya* season 2013.

Thirty PAs out of 44 PAs, which implemented pasture sowing, were monitored by the Team together with DAs, and were scored from “good” to “very poor” according to the degree of forage growth. As a result, 12 PAs (40%) were scored as “good” and 2 PAs (7%) were scored as “fair”. On the other hand, 13 PAs (43%) were scored as “poor” and 3 PAs (10%) scored as “very poor”. Through the monitoring, the Team realized that the biggest gap of this pilot activity seemed to be technical support to the communities by DAs. The Team also found that many DAs lack the skills necessary for conducting sowing of forage seeds.

Comparing the monitoring results by woreda, Malka Soda woreda showed remarkable performance where there were relatively better precipitations. Besides, many agro-pastoralists with certain knowledge on crop cultivation reside in the area, who can easily practice forage seed sowing. Then, the performance at Dhas and Yabelo woredas followed. The Team realized that Arero woreda needs much more improvement on the forage production since there was much delay of distributing seeds.

Based on these results of forage production through PDOs in *gana* season 2013, the Team delivered trainings to all the DAs in the 4 target woredas in order to improve the shortfalls encountered. A 2-day training program was given to each woreda starting from 16th to 24th August, 2013, and a total of 236 government officers were invited (see Table 5.3.7). The training included practice arranged at a project site of Didam PA in Yabelo where the community started forage production from *gana* season 2013.

Table 5.3.7 Participants of Training held on August 16 to 24, 2013

Woreda	Position	F	M	Total
Yabelo	DA and DA supervisor	21	57	78
	woreda PDO expert	1	3	4
	zonal PDO expert	1	0	1
Dhas	DA and DA supervisor	5	41	46
	woreda PDO expert	1	2	3
Arero	DA and DA supervisor	4	55	59
	woreda PDO expert	0	1	1
M Soda	DA and DA supervisor	5	35	40
	woreda PDO expert	0	4	4
Total		38	198	236

Source: JICA Project Team

Topics undertaken during the training were; 1) assess and review of the progress of pasture and pasture seed production for the last *gana* season, 2) required activities on pasture production, 3) preparation of land for pasture production including manure application, 4) sowing of some specific forage seeds such as grass and legume forage, elephant grass, fodder tree and etc., 5) harvest and collection of seeds for specific forage, 6) characteristics of each forage species, and 6) action plan formulation for the next season.

5.3.3 Area Covered and Beneficial Communities

Table 5.3.8 shows the area covered and beneficiary households managed directly by the JICA team in Phase I. The team covered 49 communities (*gare* or *olla*) where there are about 1,470 households on condition that one community is composed of 30 households. The area covered reached 61.4ha in total. From the observation at Elwaye, Areri and Hidi Ale PAs in Yabelo woreda, it can be said that an average land of 9.6ha was cultivated by 6 communities, suggesting an average forage production area of 1.6ha by one community (*gare* or *olla*).

In order to estimate the number of beneficial communities and households for the pilot forage production carried out by woreda PDOs, the Team adopts the 1.6ha per community (that means one community works for 1.6ha at one season) as the achieved forage production area per community. The area covered by woreda PDOs was 343ha in total, where there are as many as 215 communities engaged and further there are as many as about 6,400 beneficiary households (see Table 5.3.9).

Table 5.3.8 Areas and No. of Beneficiaries on Forage Production (by RREP Team) in Phase I

Woreda	PA	Zone	No. of beneficial communities	No. of beneficial households	Seed Delivered (kg)	Estimated coverage areas (ha)
Yabelo	Elwaye	Obe	6	180	96	9.6
Yabelo	Elwaye	Kobo	6	180	96	9.6
Yabelo	Elwaye	Kalta	6	180	96	9.6
Yabelo	Areri	Harburo	6	180	72	7.2
Yabelo	Hidi Ale	Halaka	6	180	120	12.0
Malka Soda	Hada Gora	Dedecha Hora	16	480	98	9.8
Malka Soda	Galo Bokola	Deka Arba	N.A.	N.A.	12	1.2
Malka Soda	Galo Bokola	Tile Luka	N.A.	N.A.	12	1.2
Malka Soda	Galo Bokola	Bate Selfi	N.A.	N.A.	12	1.2
Arero	Gada	Sele	3	90	36	0.0
Total			49	1,470	650	61.4

*Since the areas are highly degraded, seed rate of Rhode grass is calculated as 10kg/ha. In case of normal level of degeneration, 4kg/ha is applied.
Source: JICA Project Team

Table 5.3.9 Areas and No. of Beneficiaries on Forage Production (through PDOs) in Phase I

Woreda	No. of target PA	Total Areas (ha)	Average area/ PA (ha)	No. of beneficial communities	No. of beneficial households
Yabelo	23	92	4.0	58	1,740
Malka Soda	12	100	8.3	63	1,890
Arero	13	83	6.4	52	1,560
Dhas	7	68	9.7	42	1,260
Total	55	343	6.2	215	6,450

Source: JICA Project Team

5.4 Phase II Activities of Rangeland Management and Pasture Development

5.4.1 Forage Production (by RREP Team and PDOs)

Table 5.4.1 and Table 5.4.2 summarized the target PAs for the pilot activities of pasture development in Phase II. While the Team conducted the pilot activities in 16 PAs which were the same target communities of CBPs, the Team also proposed zonal PDOs to have their own target PAs as done during the Phase I. Based on the discussions the zonal PDO had with 4 woreda PDOs and the Team, the office selected 19 PAs as their targets.

Table 5.4.1 PAs on Pasture Development (RREP target PAs) in Phase II

	Woreda	PA
Phase 2 target PAs (by Team)	M/Soda	2 PAs (Sodda Garmama, Dawa Dimtu)
	Yabelo	2 PAs (Chari, Dadim)
	Arero	2 PAs (Renji, Qawa)
	Teltele	4 PAs (Bule Dambi, Dibe Gaya, Bule Korma, Marmaro)
	Dilo	4 PAs (Liso, Kancharo, Magole, Gobso)
	Dhas	2 PAs (Gayo, Tesso Kallo)
	Total	16 PAs

Source: JICA Project Team

Table 5.4.2 PAs on Pasture Development (PDO target PAs) in Phase II

	Woreda	PA
Phase 2 target PAs (by PDO)	M/Soda	6 PAs (Baya Gundi, Daya Dawa, Burka Dagaga, Hidi Negele, Hadha Gora, Golo Bokola)
	Yabelo	8 PAs (Yubdo, Cholkasa, Dida Yabelo, Hid Ale, Harboro, Dikale, Obda, Elwaye)
	Arero	2 PAs (Halona, Fulduwa)
	Dhas	3 PAs (Dhas, Borbor, Wolensu)
	Total	19 PAs

Source: JICA Project Team

Table 5.4.3 summarizes the variety and amount of forage seeds which had been delivered to each woreda before *gana* season 2014 (March 2014). The Team did not deliver the seeds in *hagaya* season 2014, and therefore the Table shows the total inputs on pasture development in the Phase II. It also summarizes the amount of seeds distributed to both the Team target PAs and the PDO target PAs. Allocation of the seed to each PA was according to the action plan formulated by DAs with their target communities and finalized by PDOs of Malka Soda, Yabelo, Arero and Dhas woreda. The seeds are estimated to cover approximately 1,342ha of pasture land in total.

Table 5.4.3 Distribution of Forage Seed by Woreda in Phase II

Woreda	PA	Rhodes grass (kg)	Pigeon Pea (kg)	Vetch (kg)	Cow pea (kg)	Lablab (kg)	Alfalfa (kg)	Elephant grass (cutting)	Sesbania (seedling)	Luceana (seedling)	Expected Coverage Total Area (ha)
M/Soda	8	458	734	30	42	664	103	0	1,000	1,200	236
Yabelo	10	719	1,537	0	0	1,218	117	6,000	9,700	10,100	406
Arero	4	106	225	0	23	15	33	3,400	0	0	55
Teltele	4	639	1,302	90	34	257	109	4,500	0	0	320
Dilo	4	364	1,225	0	46	135	68	3,600	0	0	230
Dhas	5	190	350	0	46	65	63	3,500	0	0	95
Total	**35**	**2,476**	**5,373**	**120**	**191**	**2,354**	**493**	**21,000**	**10,700**	**11,300**	**1,342**

PDOs and the Team delivered the pasture seed before the *gana* season 2014 had come. The Team finished the delivery of the seeds on 26 February 2014, and also produced nurseries of Sesbania and Leuceana with Yabelo woreda PDO office in parallel. In total, approximately 20,000 of the seedlings were grown and transported to respective communities in March 2014. Then, sowing of forage seeds was carried out by the community members under the supervision of DAs and DA supervisors who received technical trainings of pasture production at the workshops organized by the Team. They had encouraged the communities to launch pasture sowing, participate in their activities at the actual sites and gave technical advices.

Throughout the implementation, the Team continued monitoring on the community activities for pasture production, interviewed the respective target community members and often provided technical supports to them. In addition to the monitoring by the Team, the DAs also confirmed the progress. Table 5.4.4 indicates the date people conducted pasture sowing, sites used for the activities and the number of people and *gares* participated. In addition to the Team's target 16 PAs, 10 PAs were sampled and monitored out of the 19 PAs where forage seeds were delivered through woreda PDOs.

Table 5.4.4 Date of Pasture Sowing and No. of Participants

	Woreda	Kebele	Date of Pasture Sowing	Seed Production Purpose				Pasture Production Purpose			
				Site	Area (ha)	No. of Gare participated	No. of People participated	Site	Area (ha)	No. of Gare participated	No. of People participated
Team Target PAs	M/Soda	Sodda Garmama	28/4/2014	PTC	0.6	2	30	Watershed	10.0	8	85
	M/Soda	Dawa Dimtu	22/4/2014	PTC	1.5	4	50	Watershed	12.0	22	246
	Yabelo	Chari	7/4/2014	NO	0.0	0	0	Watershed	1.0	11	130
	Yabelo	Dadim	28/03/2014	PTC	2.0	3	18	Watershed	3.0	27	640
	Arero	Renji	18/3/2014	PTC	1.0	2	22	Watershed	5.0	10	75
	Arero	Qawa	25/3/2014	PTC	0.3	12	70	Watershed	5.0	5	55
	Teltele	Bule Dambi	16/3/2014	PTC	0.1	3	15	Watershed	5.0	10	303
	Teltele	Dibe Gaya	24/3/2014	PTC	0.0	10	300	Watershed	1.0	54	567
	Teltele	Bule Korma	19/4/2014	PTC	0.5	3	40	Watershed	35.0	17	820
	Teltele	Marmaro	4/4/2014	PTC	1.0	13	60	Watershed	31.5	30	262
	Dilo	Liso	5/4/2014	PTC	2.0	14	61	Watershed	32.5	31	263
	Dilo	Kancharo	12/4/2014	PTC	1.0	8	32	No*	0*	18	160
	Dilo	Magole	3 to 9/4/2014	PTC	2.0	7	70	No*	0*	6	90
	Dilo	Gobso	Elephant grass: 3/4/2014 Other forages: 4-5/5/2014	PTC	0.5	4	47	Watershed	0.5	2	20
	Dhas	Gayo	15/3/2014	PTC	1.0	9	56	Watershed	1.0	16	504
	Dhas	Tesso Kallo	12/3/2014	PTC	0.8	11	66	Watershed	20	11	126
				Sub Total	**14**	**105**	**937**	**Sub Total**	**163**	**278**	**4,346**
PDO Target PAs	M/Soda	Baya Gundi	24/3/2014	Not Sowed				Watershed	12	40	400
	M/Soda	Daya Dawa	30/4/2014	Not Sowed				Watershed	5	6	90
	M/Soda	Galo Bokola	6/5/2014	Not Sowed				Watershed	5	29	210
	M/Soda	Burka Dagaga	16/4/2014	Not Sowed				Watershed	5	20	415
	Yabelo	Cholkasa	16/4/2014	PTC	1	1	9	Watershed	5	32	70
	Yabelo	Dida Yabelo	29/3/2014	PTC	0	1	7	Watershed	5	36	300
	Yabelo	Hidi Ale	20/4/2014	Not Sowed				Watershed	5	29	813
	Yabelo	Harboro	Not Specified	Not Sowed				Watershed	1	17	260
	Arero	Fulduwa	Not Done	Not Sowed				Not Sowed			
	Dhas	Borbor	Not Done	Not Sowed				Not Sowed			
				Sub Total	**1**	**2**	**16**	**Sub Total**	**43**	**209**	**2,558**
				Total	**15**	**107**	**953**	**Total**	**206**	**487**	**6,904**

Source: JICA Project Team

* Although people worked for land preparation, they did not sow pasture seeds.

Since the pilot activity not merely aimed at just pasture production but also pasture seed multiplication in order to enable people to continue expansion of pasture land, most DAs and communities included the sites for seed production. Pastoral Training Centers (PTCs) were taken as the best place for the purpose because they were equipped with demonstration lands of 1 to 2ha. While some DAs actually utilized such lands for farming, the others were just left unused. Therefore, this pilot activity tried to utilize the PTCs for seed production, and a typical PA cultivated pasture for seed multiplication approximately in 1ha of land each.

In most cases, the sites of pasture production were combined with the government watershed program where there were already structures of soil and water conservation such as soil band and micro basin. Out of the 26 PAs which were monitored by the project Team (16 Team target PAs and 10 sampled

PDO target PAs), as a matter of fact 22 PAs have conducted pasture production in such sites of the watershed program. After having finished the land preparation within the program area, people in the 22 PAs received several types of forage seeds from the Team and started pasture sowing from March to April 2014.

Table 5.4.5 Monitoring Results of Forage Production in Phase II

	Woreda	Kebele	1st Monitoring (Apr)	2nd Monitoirng (Jun)	3rd Monitoring (Jul)	4th Monitoring (Aug)	5th Monitoring (Sep)	6th Monitoring (Nov)
Team Target PAs	M/Soda	Sodda Garmama	Poor	Good	Good	Fair	Fair	Good
	M/Soda	Dawa Dimtu	Poor	Good	Good	Good	Good	Good
	Yabelo	Chari	Poor	Poor	Poor	Not Monitored	Poor	Good
	Yabelo	Dadim	Poor	Poor	Poor	Not Monitored	Poor	Good
	Arero	Renji	Poor	Poor	Poor	Poor	Good	Good
	Arero	Qawa	Poor	Poor	Poor	Poor	Poor	Poor
	Teltele	Bule Dambi	Poor	Poor	Poor	Poor	Good	Good
	Teltele	Dibe Gaya	Poor	Very Poor	Very Poor	Not Monitored	Poor	Very poor
	Teltele	Bule Korma	Poor	Poor	Poor	Poor	Poor	Poor
	Teltele	Marmaro	Fair	Fair	Poor	Not Monitored	Poor	Poor
	Dilo	Liso	Fair	Fair	Poor	Not Monitored	Poor	Fair
	Dilo	Kancharo	Poor	Poor	Poor	Not Monitored	Poor	Fair
	Dilo	Magole	Poor	Very Poor	Poor	Poor	Poor	Very poor
	Dilo	Gobso	Poor	Very Poor	Poor	Not Monitored	Poor	Fair
	Dhas	Gayo	Fair	Poor	Very Poor	Not Monitored	Not Monitored	Poor
	Dhas	Tesso Kallo	Poor	Poor	Poor	Not Monitored	Poor	Poor
PDO Target PAs	M/Soda	Baya Gundi	Poor	Not Monitored	Good	Good	Not Monitored	Not Monitored
	M/Soda	Daya Dawa	Poor	Very Good	Very Good	Very Good	Not Monitored	Very good
	M/Soda	Galo Bokola	Poor	Not Monitored	Not Monitored	Not Monitored	Not Monitored	Not Monitored
	M/Soda	Burka Dagaga	Poor	Good	Not Monitored	Good	Not Monitored	Not Monitored
	Yabelo	Cholkasa	Poor	Fair	Not Monitored	Not Monitored	Not Monitored	Fair
	Yabelo	Dida Yabelo	Good	Good	Fair	Not Monitored	Not Monitored	Good
	Yabelo	Hidi Ale	Poor	Poor	Poor	Not Monitored	Not Monitored	Fair
	Yabelo	Harboro	Poor	Not Monitored	Not Monitored	Not Monitored	Not Monitored	Not Monitored
	Arero	Fulduwa	Not Monitored, because seed was not sown					
	Dhas	Borbor	Not Monitored, because seed was not sown					
Summary of Score (%)		Very Good	0%	4%	4%	4%	0%	4%
		Good	4%	17%	13%	13%	13%	29%
		Fair	13%	13%	4%	4%	4%	21%
		Poor	83%	42%	54%	21%	46%	21%
		Very Poor	0%	13%	8%	0%	0%	8%
		Not Monitored	0%	13%	17%	58%	38%	17%

Source: JICA Project Team

Due to the shortage of rainfall in the 2014 *gana* season in Borena zone, some leftover forage seeds were still in the storage of PAs as of June 2014. Approximately 4,300kg of seeds were sown in *gana* season 2014 and all the delivered seedlings were also planted. Since the pasture seed could be stored more than 5 years under cool and dry condition, communities have planned to sow the remaining seeds next coming rainy seasons. Though good performance had been observed in Yabelo and Malka soda woredas where there were certain rainfalls in the *gana* season, as a whole the shortage of rainfall impacted negatively the growth of pasture (see Table 5.4.5)

Most of sown forage seeds in Teltele, Dhas and Dillo woredas had hardly reached flowering stage due mainly to meager and erratic rainfall as of July 2014. In fact, it was reported that many people living in Magole, Gobso, Gayo, Tesso Kalo and Chari PAs migrated to other PAs in order to search water and pasture for livestock. In addition to the shortage of rainfall, the Team also acknowledged such management problems as entrance of livestock into the pasture land and high density of seeds sown. These issues were discussed with DAs in the monitoring and evaluation workshops.

After *hagaya* season started in September 2014, the situation was significantly improved. In fact, the *hagaya* had more precipitation than that of the *gana* season of 2014, and therefore the pilot activity was blessed with much rain water. Pasture sown during the 2014 *gana* season started re-growing after September 2014 particularly observed in Malka Soda, Yabelo, Arero and Dillo. Although only 21% of the sites showed fair to very good performance at the 3rd monitoring in July, performance of fair to very good was increased to 54% at the 6th monitoring in November 2014.

5.4.2 Area Covered and Beneficial Communities

After the works of Phase II started on the ground, the Team investigated the area covered and the number of beneficiaries in the fields. In addition, during the 2nd monitoring workshop, the participants from 16 Team target PAs clarified the number of beneficial communities. The area sown by the target communities was 177ha while the target was 571ha. This low achievement was mainly due to the shortage of rainfall. Number of beneficial communities was 126 by the JICA team and 314 by woreda PDOs, corresponding to approximately 3,780 population and 9,420 population respectively.

Table 5.4.6 Areas and No. of Beneficiaries on Forage Production (by Team and PDOs) in Phase II

	Woreda	PA	Planned Area (ha)	Achievement (ha)	No. of beneficial communities	No. of beneficial households
	M/Soda	Sodda Garmama	8.0	10.6	4	120
	M/Soda	Dawa Dimtu	15.0	13.5	14	420
	Yabelo	Chari	42.5	1.0	3	90
	Yabelo	Dadim	31.0	5.0	10	300
	Arero	Renji	8.3	6.0	10	300
	Arero	Qawa	8.0	5.3	13	390
	Teltele	Bule Dambi	14.6	5.1	5	150
	Teltele	Dibe Gaya	89.5	1.0	6	180
	Teltele	Bule Korma	49.0	35.5	17	510
	Teltele	Marmaro	102.2	32.5	9	270
	Dilo	Liso	59.0	34.5	N.A.	N.A.
	Dilo	Kancharo	38.8	1.0	3	90
	Dilo	Magole	16.0	2.0	3	90
	Dilo	Gobso	55.0	1.0	5	150
	Dhas	Gayo	9.5	2.0	16	480
	Dhas	Tesso Kallo	25.1	21	8	240
		Sub Total	**571.5**	**177**	**126**	**3,780**
PDO Target PAs	M/Soda	6PAs	175.9	N.A.	110	3,300
PDO Target PAs	Yabelo	8PAs	255.7	N.A.	160	4,800
PDO Target PAs	Arero	2PAs	27.0	N.A.	17	510
PDO Target PAs	Dhas	3PAs	43.0	N.A.	27	810
PDO Target PAs		**Sub Total**	**501.6**	**N.A.**	**314**	**9,420**
		Total	**1,073**	**N.A.**	**440**	**13,200**

Source: JICA Project Team

*1: In order to estimate the number of beneficial communities and households for the pilot forage production carried out by woreda PDOs, we adopt the 1.6 ha per community (that means one community works for 1.6ha at one season) as the achieved forage production area per community.

5.4.3 Results of Evaluation for the Pasture Production by DAs

The participant DAs from the 16 target PAs in Phase II evaluated the pilot activity of pasture production from the five aspects of evaluation. Though the group work was carried out by each PA, the results were categorized into three groups; Pastoral communities, Agro-Pastoral communities and Farmers communities. As shown in Figure 5.4.1, PAs in Pastoral communities gave the lowest points to all the five aspects compared to the other two groups and especially their Effectiveness and Impact were less than score 3. As the reasons, most DAs pointed out the shortage of rainfall observed during the last *gana* season 2014.

Many DAs reported that DAs in fact transferred the information they learned during the workshops, disseminated the skills and undertook awareness creation and then communities participated in the activities such as land preparation and pasture sowing. However, the activities did not achieve high performance in rainfall meager areas; 6 PAs from Pastoral PAs scored 2 to 3 on the Effectiveness. Some DAs further said that due to the deficit of the rainfall, DAs and communities did not work as planned and postponed the activities to the next rainy season and therefore gave lower sores of 2 or 3.

Average of Relevance in the Pastoral communities was 4.2 and slightly lower than those in Agro-pastoral communities and Farmers' communities. It was found that most DAs consider the pasture production could improve the rangeland and communities have great interest in it. However, some DAs pointed out that the erratic rainfall condition makes activities difficult in pastoral communities. However, the PAs which successfully established pasture land such as Dhadim and Qawa PAs gave relatively high scores to all the five aspects even though they are categorized as Pastoral areas.

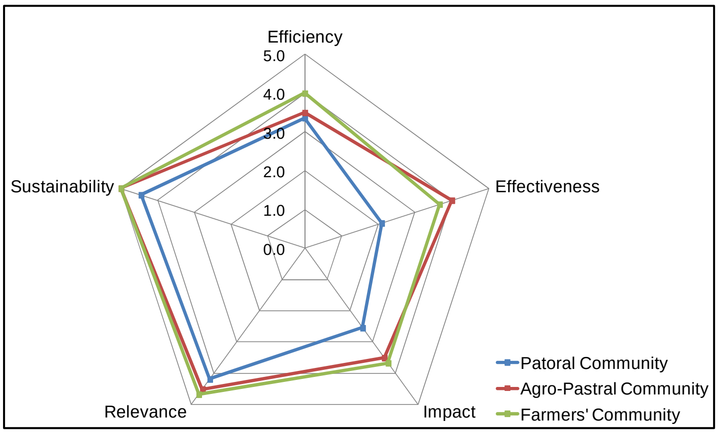


Figure 5.4.1 Evaluation of Pasture Production

Source: JICA Project Team

Average of Sustainability in Pastoral PAs was scored the highest among the 5 aspects of evaluation. As reasons, many DAs pointed out that because the PAs still keep leftover seeds, their communities would sow them in the coming rainy seasons and would continue the activities. In addition, the communities' interest in pasture production is also high due to the shortage of pasture and thereby the communities would continue this kind of activities. In addition, 2 PAs pointed out that the committee of pasture production was established by the communities and therefore it would continue the activities in future.

PAs of Agro-pastoral and Farmer communities gave higher scores as a whole compared to those in pastoral PAs. This result corresponds to the approach taken for the rangeland management. Since degraded and bare lands have been expanding and become a vital issue especially in Agro-pastoral and Farming areas, the pasture production would be one of the best measures against such unproductive lands. Therefore, all the PAs in those areas, in fact, gave score 4 or 5 to Relevance. Especially, the DAs said that pasture production could be a measurement not only for supplying the feed to livestock but also protecting the land from soil and water erosion. No DAs in Pastoral areas actually did mention this point.

In addition, average of Effectiveness and Impact of the pasture production in Agro-pastoral and Farmers communities were approximately of score 4. The DAs in those areas gave more positive comments on the activities that livestock feed problem was also solved to some extent, bare lands were covered by pasture and communities produced some amount of pasture seeds. Regarding Sustainability of the activities, all the PAs in Agro-pastoral and Farmer communities scored 5. Most of them said that since the communities are of livestock producers suffering from the shortage of pasture, they would continue this kind of activities in future.

5.5 Lesson Learnt and Feedbacks towards Future Forage Production in Borena zone

Through the implementation of the pilot activities in Phase I & Phase II, the Team observed challenges and acknowledged lessons learnt on pasture development in Borena zone. Particularly, this session examines them from technical and social points of view and put forward suggestions for the future.

1) **Channel for Dissemination of Skills and Seed;** On the ground, there were some problems related to ownership because most of the sites of pasture production were newly established through the involvement of many communities. In fact, entry of livestock into the newly established sites was one of the issues due to the lack of ownership. In addition, the Team observed that some of community representatives established a cooperative on the sites and then excluded other community members from the newly established pasture lands although the area

had been established by many community members under government-sponsored watershed program.

Since the existing rangelands in Borena zone are decreasing and shrinking, and the carrying capacity of existing rangeland is also weakening, the Team considered that the people in Borena zone should establish new rangelands by using unused bare and degraded lands. This kind of new activities needs consensus formation on the ownership of the newly established rangeland. There are strong traditional structures in Borena people, which are seen at the level of *gosa* (primary sub-clan), *rera* (common rangeland) and *olla* (natural village). In establishing the ownership on the new rangeland, this kind of traditional structure should well be taken into account.

2) **Timing of Sowing Forage Seed;** The most technically appropriate season for sowing the forage seeds is at the beginning of *gana* season (mid-March). However, it overlaps with the most crucial time of searching water and pasture for the pastoralist because the time is just after the long dry season. On the other hand, for agro-pastoralist and farmers it is the time to start ploughing the farmlands and sowing crop seeds such as maize and teff. Thus, priority of sowing pasture seeds could be lower than that of the two practices, leading to delay of sowing the pasture seeds.

   DAs should therefore recognize such possibility of delaying of seed sowing by community members, and it is expected for them to complete the distribution of forage seeds in February. If the forage seeds have been distributed to the target communities by end February, the community members can be more flexible to start cultivation depending upon rainfall patterns. In addition, from the view point of road condition during rainy season, the seed distribution should be completed before the rain comes.

3) **Agreement to Close the Areas Sown;** It was observed that grown forage was grazed by livestock owned by community members before the full establishment of pasture. This was mainly due to the absence of commitment among communities and uncooperative individual behavior which allows livestock to graze on the pasture. In order to avoid such situation, discussion with community members before undertaking forage production with DAs must carefully be arranged. DAs also need to encourage the community members to have discussions and agreement on the use of pasture lands.

   As an example, DAs engaged in forage production in Phase I reported that a community penalized owners of animals which have breached management rules for the sown areas. This is one attempt that a community had agreement on enclosing the areas for pasture production. Furthermore, regular monitoring and supervision by DAs are required, facilitating the communities to find such mismanagement at an early stage and accordingly take countermeasure.

4) **Little Collection of Seed;** Seed collection was rarely practiced by communities throughout the pilot activities. The Team recognized only 10 PAs conducted collection of Rhodes grass seed, Pigeon Pea, Lablab, and natural grasses by November 2014 (See Table 5.5.1). Since forage production was a first attempt for most of the communities, collection of forage seeds has not been progressed. Therefore, encouragement by DAs was due necessary for the communities to undertake such activities. At the 2nd monitoring workshop in Phase II, a topic of

Community members collected Rhodes grass seeds in Dhadim PA, Yabelo woreda seed collection was incorporated into the program and the participants actually practiced the way of harvesting the seeds.

5) **Absence of Female Training Participants;** Though participants of the trainings for forage production at community level were mostly male, the Team found that women were more engaged in actual works on pasture sowing. At Obe zone, Elwaye PA, Yabelo woreda, land preparation and sowing were mainly implemented by women, and further fewer participants of the training attended the actual works. Therefore, the Team considered that it is not necessary to set particular training day in Phase II, and rather it is desirable that DAs can and should teach the way of sowing pasture seeds at the sites on the actual working day.

Table 5.5.1 Forage Seed Collected in 2013 and 2014 by PA

Woreda	PA	Type of Forage Seed Collected	Amount of Seed Collected (Sack, in 2013)	Amount of Seed Collected (Sack, in 2014)
Malka soda	Daya Dawa	Rhodes grass	2	6
		Pigeon pea	0	1
	Dawa Dimtu	Rhodes grass	1	1
		Pigeon pea	0	0.25
		Lablab	0	1
		Cow pea	0	1
		Panicum maximum	1	0.45
	Baya Gundi	Rhodes grass	4	4
		Lablab	2	1
		Sesbania	0	1
	Dawa Bicho	Rhodes grass	1	0
		Pigeon pea	1	0
Arero	Renji	Rhodes grass	0	1.5
	Fulduwa	Rhodes grass	1	0
Yabelo	Dhadim	Rhodes grass	1	0
		Pigeon pea	0.2	0
	Dida Yabelo	Cow pea	1	0
		Lablab	1	0
Dhas	Gayo	Rhodes grass	1	0
Dillo	Liso	Natural grass	0	1
Total	**10 PA**	**6 type**	**17.2**	**19.2**

Source: JICA Project Team

Reviewing the pilot activities conducted during Phase I and Phase II, the Team declared Pastoral Training Centers (PTCs) as the best place for the multiplication of forage seeds since the center has 1 to 2 ha of enclosed farmland that can be effectively used for demonstration purposes. Thus, the Team recommended the use of PTCs for seed multiplication when DAs formulated action plan during the kickoff workshop in Phase II. In fact, 15 PAs actually conducted forage seed production in the relevant PTCs.

6) **Excessive Seed Density;** It was found that the communities very often sowed forage seeds in high density. As a result, forage was stunted because of competition with the other grasses. It would be crucial for DAs to assess capacity of communal rangeland carefully and estimate the areas for pasture production and necessary quantity of seeds to be sown based on the recommended seed rate. DAs shall be well equipped with such

Pigeon Pea was sown in high seed rate. It suppressed the growth.

knowledge, and facilitate the community members not to sow the seeds in high density but according to the recommended ratio.

7) **Intensive Rainfall (Observed in Phase I);** For the forage production, flat sites should primarily be selected so as to prevent seeds sown from being washed away by intensive rainfall. In case that slope land is utilized for pasture production, complete clearing of bushes, shrubs and native grasses are not recommended. They also play an important role in preventing the land from being eroded. Therefore, if level of bush encroachment is moderate and animals still can pass the rangeland, it is unnecessary to conduct thorough bush thinning. In addition, introduction of soil conservation structures such as soil band and micro basin is highly recommended when the forage production is to be practiced on slope lands.

8) **Shortage of Rainfall (Observed in Phase II);** As we observed in *gana* season 2014, the shortage of rainfall affected the forage production very negatively in Borena zone. Generally speaking, although recommended varieties of forage such as Rhodes grass require about 600mm of rainfall, the available rainfall in drought time is very small in Borena zone. For example, people in Chari PA, Yabelo woreda, reported that they had only 3 days rainfall in the *gana* season 2014. Under such situations, forage can hardly germinate. Thus, it is recommended to postpone the sowing of forage seeds if rainfall deficit is clearly observed. In fact, forage seeds can be stored up to 5 years under cool and dry conditions. After the drought has passed and normal rain has started, they can start sowing the stored forage seeds.

9) **Fencing;** In addition to livestock, the Team observed the pilot forage production sites grazed by wild animals. Some communities reported that antelopes completely fed on legume crops such as Cow pea and Lablab particularly at hilly sites surrounded by bushes in such woredas as Yabelo and Malka Soda. Antelopes are a well-known wild animal which feed on sprout of haricot bean in agro-pastoral areas of Borena. In order to prevent the invasion of wild animals, the forage production site should be enclosed with strong fencing. Local bushes with thorns such as *Acasia oerfota* and *Acasia elifera* are often utilized for fence making. Therefore, task of fence making should also be incorporated into the community activities.

CHAPTER 6 DRYLAND FARMING IMPROVEMENT

6.1 Trainings with Improved Variety Seeds Distribution

6.1.1 Rationale and Objectives

Agriculture is one of the countermeasures against the frequently occurring droughts According to the interviews with agro-pastoralist who began the agriculture recently, they started the agriculture because of livestock deaths by severe drought, and farming in fact produces grains for their consumption and the production can be kept over long time. The production can also be sold at market to generate income, and the livestock can feed on the crop residues (stem or leaves). With these reasons, the number of the people who started agriculture has been increasing over times.

The agriculture in Borena lowland area is still primitive. Most of the agro-pastoralist has less than twenty years of experience in farming, which was introduced by other ethnic groups from the highland areas. These agro-pastoralists have only limited knowledge and technics on agriculture. The seeds of crop varieties were also obtained from the highland farmers, thus these characteristics are not suitable for lowland environment. For example, local maize variety can hardly be harvested in severe drought year because of its long maturing character.

The objective of the project is to increase and stabilize the agricultural production of agro-pastoralist in the lowland Borena zone. In order to achieve the objective, the project has been providing two things mainly, i.e., 1) trainings on the improvement of dryland farming practices, and 2) the distribution of improved seeds. A series of three time’s basic agricultural training and one time study tour were conducted in both Phase I (2013) and Phase II (2014). Improved seeds were also distributed major crops in the area such as maize, haricot bean and teff.

To avoid the conflict between agricultural land and grazing land, the beneficiaries were chosen only from agro-pastoralists who have farmlands with several years’ farming experiences. It means that the activities conducted under this sub-component centered on the improvement of the present primitive agriculture but not on the expansion of the agricultural areas. With this understanding, the woredas where dryland agriculture improvement had been done were; Dhas, Arero, and Yabelo in Phase I (2013), and Arero, Yabelo, Teltele and Malka Soda in Phase II (2014).

6.1.2 Contents of the Phase I Activities

In order to achieve the objective mentioned above, a series of three-time basic agricultural trainings and one time study tour were carried out in 12PAs of 3 woredas[1] in Phase I (2013). The number of participant by gender per training is summarized in Table 6.1.1. In addition to the trainings, improved varieties of seeds were distributed to the participants at the occasion of the first training for their trial cultivation.

Table 6.1.1 Schedule and Number of Beneficiary of the Basic Agriculture Training in Phase I

Training	Implementation Schedule	Number of Beneficiary		
		Male	Female	Total
First Training	Mar 14 to Apr 1, 2013 (Before rainy season)	446	68	514
Second Training	May 22 to Jun 10, 2013 (Vegetative growing stage of maize)	282	44	326
Third Training	Aug 1 to 27, 2013 (Harvesting season)	347	49	396
Study Tour	Jul 3 to 5, 2013	128	11	139

Source: JICA RREP Team

[1] Arero Woreda (Fulduwa, Halona, Webi, Gada), Yabelo Woreda (Elwaye, Hid Ale, Areri, Obda), Dhas Woreda (Dhas, Aanole, Harjarte, Gorile)

1) First Training

First training was conducted in March and early April 2013, which was a one-day training session centering mainly on basic technics on crop production and good agricultural practices. The trainers undertook such topics as; 1) problems on crop production and efforts to increase the productivity, 2) soil types and their characteristics, 3) farmland use practice e.g. crop rotation and intercropping, 4) preparation of crop production e.g. plowing and fertilization, 5) sowing e.g. seed selection, timing, recommendation of row planting, and 6) plant management such as weeding, thinning, pest & disease control, water & soil management, etc. The participants were highly interested in the training contents, especially the people in Arero woreda and Dhas woreda as it was the first agricultural training for them.

Two advanced agro-pastoralists, who were one of the trainers in the training, have been technically trained for a couple of years by Yabelo Pastoral and Dryland Agriculture Research Centre (YPDARC). They have been practicing modern agricultural technologies and bearing fruit on crop production. With their experiences, they shared such technologies with the participant that they realized useful and fruitful such as; 1) methods and times of plowing for raising yield, 2) advantage for using improved seed varieties and the management needed, 3) needs of organic fertilizer application, 4) type of weeds and weeding methods, 5) row planting vs. '*Shelshalo*[2]', etc. The participant agro-pastoralists have given a lot of questions to the advanced farmers and whereby the trainings went on in a participatory way.

Sharing his technical experience by showing his products in Obda PA (Yabelo Worda) on the 19th March 2013.

2) Second Training

Following the first training, second training had been carried out from 22nd of May to 10th of June 2013 at the time of vegetative growth stage for maize in *Gana* season. There were a few participants who were given agricultural training by DAs and NGOs so far; however most of the trainings were of theoretical ones, thus it was difficult for them to adopt the leaned technics to their farmland. In order to solve the shortfall, the second training had been done more practically in the actual farmlands. Some farmers' fields whose owner participated the first training were chosen for this practical trainings.

Many participants had tried to use the agricultural techniques given during the first raining; however there were difficulties for them to adapt with appropriate method. For instance, some participants had little experience on teff cultivation before the training, and some teff failed to germinate due to deep sowing and/or late sowing despite the fact that they learned appropriate sowing method during the first training. The trainer gave the participants some insight that teff should be sown as early as possible just like other crops, should not be covered much with soils, and water logging associated with rain cannot be a problem in this moisture stressed area e.g. Borena zone.

During the training, they made comparative observation between well managed farmlands and poorly managed farmlands. Some of the shortfalls raised and observed during the training were; poor land preparation, late sowing, lack of row-planting method for some farmers, lack of timely weeding, wrong plough direction even in accordance with the gradient, lack of manure application, dense

---

[2] Traditional inter-tillage. They usually practice broad casting of seeds very densely, and when the crops have reached to, say, 50cm-70cm height, they conduct inter-tillage to reduce the number of plants.

sowing rate and plant population of row-planting, etc. Though some of the agro-pastoralist have adopted and have been practicing good farming technics, they acknowledged that other farmers still have gaps in these regard.

3) Third Training

At the end of the series of training, the third training was carried out from 1st to 27th of August 2013. The training aimed at transferring the knowledge about pre-harvest and post-harvest technics. According to the interviews with participants, some of them have so far attended agricultural training organized by DAs and NGOs; however they have never been trained on the pre- and post-harvesting technologies such as harvesting period, harvesting method, threshing method, seed selection, seed storage, etc.

A trainer explaining the pre-harvest and post-harvest agricultural technics (in Halona, Arero woreda on 7th August 2013)

A trainer explained some technics useful not only for house consumption but also for the purse of selling at a good price in the markets nearby. Some participants asked the trainer about post-harvesting technics, with which they can sell their surplus products with higher price in the markets. In addition, the agricultural chemicals use was also explained, which is one of the effective technics for disease and pest control. The trainer further explained the riskiness of agricultural chemical use as most of the agro-pastoralists have never used any agricultural chemicals though it is easy for them to buy in a town, e.g. Yabelo.

4) Improved Seed Distribution

Table 6.1.2 summarizes the improved seed varieties distributed 2 times. For the 1st distribution, total 514 agro-pastoralists received the improved seeds such as maize, haricot bean and teff. The seeds were sown during the long rainy season, called *Gana*. The second distribution was done to total 600 beneficiaries in September 2013, right before the short rainy season, called *Hagaya*. The amount of crop seeds distributed per person was 8kg for maize, 5kg for haricot bean, and 1kg and 5kg for Teff for the 1st and 2nd distribution. According to the interviews conducted after the crop season, most of them acknowledged the advantages of the improved varieties, thus they have again cultivated the varieties for the following crop seasons.

Table 6.1.2 Distributed Improved Seed and the No. of Beneficiary in Phase I

Crop (Variety)	Amount / person (Total delivered)	Planned Area (ha/person)	Number of Beneficiaries	
			1st distribution	2nd distribution
Maize (Malkasa- I)	8kg (4.1ton)	0.3	514 person	
Haricot Bean (Nasil)	5kg (2.6ton)	0.1	514 person	
	5kg (3.0ton)	0.1		600 person
Haricot Bean (Hawassa Dume)	5kg (3.0ton)	0.1		600 person
Teff (Tsedey)	1kg (0.5ton)	0.04	514 person	
	5kg (3.0ton)	0.2		600 person

Source: JICA RREP Team

6.1.3 Monitoring and Evaluation for Phase I Activities

Monitoring and evaluation of the dryland agriculture improvement activities were done by beneficial agro-pastoralist and DAs. Total 15 beneficiaries were interviewed and result of applied agricultural technics at long rainy season is summarized in Figure 6.1.1. According to the results, more than 60 percent of the beneficiary farmers employed deep plowing and early weeding method. On the other hand, the beneficiary percentage applied for line planting and intercropping were relatively lower than the others. Though intercropping of maize with haricot bean is common in other ethnic groups around Borena zone like Konso, Burji or Guji, it is still not well adapted among the beneficiary agro-pastoralists in this lowland area.

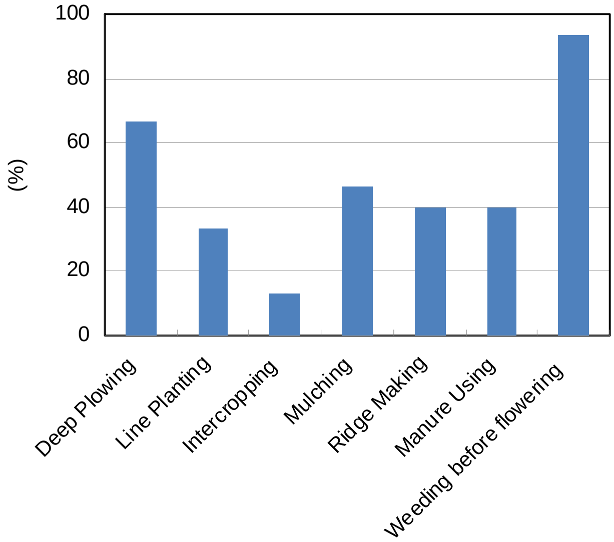


Figure 6.1.1 Application of Trained Techniques

Source: JICA Project Team

Advance points of the improved varieties compared to local varieties are summarized in Figure 6.1.2. All the participants answered that early maturing is the typical advanced point for the maize (Malkasa-1), approximately 30 days of shorter maturing period than local variety. High productivity was the most advanced point of the haricot bean (Nasir). Sweeter taste of maize and haricot bean was also considered as advanced point than local ones. Some agro-pastoralist said that they usually eat boiled maize with haricot bean; however they can eat the improved maize easily by itself because of the sweet taste. They further raised that improved varieties spend shorter boiling time than local ones, and therefore they are suitable in the area thanks to the saving of fire wood.

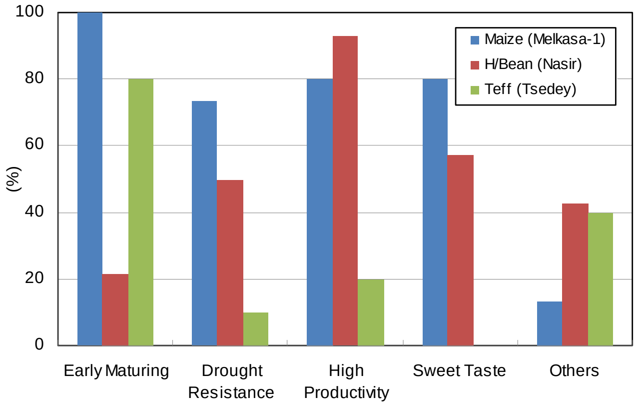


Figure 6.1.2 Advanced Point of the Improved Variety

Source: JICA Project Team

Table 6.1.3 summarizes the result of evaluation by DAs with 5 evaluation aspects. Relevance and Sustainability were given high score through all the PAs. The average scores in Dhas woreda were relatively lower than those of other PAs, caused mainly by late seed distribution. The PAs located far from towns marked relatively higher scores while such PA close to town as Obda, Yabelo, had obtained lower scores. This is because such PA close to town has already experienced some agricultural training and improved seed distribution by NGOs or government, whereby leading to moderate evaluation results.

Table 6.1.3 Evaluation Score of Dryland Agriculture Improved Project in Phase I

Woreda	PA	Efficiency	Effectiveness	Impact	Relevance	Sustainability	Average
Yabelo	Obda	4	3	2	4	3	3.2
	Areri	4	4	4	5	5	4.4
	Hidiare	4	4	4	5	5	4.4
	Elwaye	4	4	4	5	5	4.4
Arero	Hallona	4	4	4	5	5	4.4
	Fuldowa	4	4	4	5	5	4.4
	Gada	5	5	5	5	5	5.0
	Webi	5	5	5	5	5	5.0
Dhas	Harjarte	3	4	4	5	5	4.2
	Aanole	3	4	3	5	5	4.0
	Dhas	3	4	4	5	5	4.2
	Gorile	3	4	3	5	5	4.0
Average		3.8	4.1	3.8	4.9	4.8	4.3

Source: JICA RREP Team

6.1.4 Result of Yield Survey for Maize Production in Phase I

A yield survey of maize was carried out by the JICA team with harvesting method in beneficiary farmlands. Three samples were taken at one farm field and one sample size was one square meters. Thirty samples of improved variety and thirty samples of local variety were collected from 10 farmers. The advantage of improved variety was not clear in terms of the yield and the other components; however, the harvesting index[3] of improved variety was higher than local ones, obviously.

In fact, grain weight of improved variety is higher than local one in Yabelo woreda, almost equal in Arero woreda and lower in Dhas woreda. This is result must have been related with the seed distribution date. The seed distribution was started from Yabelo, then Arero, and finally Dhas. Some farmers in Dhas woreda planted the improved variety in poorly prepared farmlands with late sowing, since appropriate places for farming were already occupied by the local variety early planted.

Overall, harvest index of improved variety is higher than that of local one. Hence it can be said the improved variety can produce grain efficiently than local variety. In fact, the maturing period for the improved one is 30days shorter than that of local variety. Therefore, it can be said that if the improved variety were planted in potential areas, the variety could have ensured higher production. From the viewpoint of the feed producing, on the other hand, improved variety can be said inferior to the local variety due to the low harvest index.

Table 6.1.4 Comparison of Yield and Yield Components Maize(Malkasa-I) in Phase I

Woreda	Variety	Yabelo	Arero	Dhas
No. of Place		2	5	3
No. of Plant per m^2	Improved	10.3	9.5	9.7
	Local	8.3	9	9.8
No. of Cob per m^2	Improved	12.2	10.7	9.8
	Local	7.3	8.5	9.8
Length of Cob (cm)	Improved	13.1	12.3	10.3
	Local	11.6	13.4	11.1
Dry Matter Weight (g/m^2)	Improved	2,216.7	1,760.0	1,305.6
	Local	1,341.7	2,060.0	1,705.6
Grain Weight (g/m^2)	Improved	1,225.0	1,020.0	772.2
	Local	691.7	1,014.7	908.3
Grain Weight per Cob (g/m^2)	Improved	100.7	95.6	79
	Local	94.3	118.9	92.9
Harvest Index (%)	Improved	55.3	58	59.1
	Local	51.6	49.3	53.3

Source: JICA RREP Team

6.1.5 Contents of the Phase II Activities

Phase II activities had covered 10 PAs in such 4 woredas[4] as Yabelo, Arero, Malka Soda and Teltele. The activities under Phase II (2014) had been changed slightly from those of Phase I, e.g. training period and contents. The commencement of training was in fact late for the Phase I, and therefore the training of Phase II was started about 1 month before that of Phase I. Improved varieties of seeds were distributed during the first training. The training contents and seed varieties provided have also been changed by location of PA and the agriculture experiences of those beneficiary farmers. The training schedule and the number of participants are shown in Table 6.1.5.

[3] The term "harvest index" is used in agriculture to quantify the yield of a crop species versus the total amount of biomass that has been produced. Or it is the weight of a harvested product as a percentage of the total plant weight of a crop.

[4] Yabelo Woreda (Dhadm, CHarri), Arero (Qawa, Rnenji), Malka Soda (Soda Garmama, Dawa Dimtu), Teltele (Bule Korma, Bule Dambi, Dibe Gaya, Marmaro)

Table 6.1.5 Schedule and Number of Beneficiary of the Basic Agriculture Training in Phase II

Training	Implementation Schedule	Number of Beneficiary		
		Male	Female	Total
First Training	Feb 19 to Mar 4, 2014 (Before rainy season)	346	43	389
Second Training	Jun 9 to 20, 2014 (Reproductive stage of maize)	257	21	278
Third Training	Sep 4 to 19, 2014	285	33	318
Study Tour	Jul 3 to 9, 2014	151	14	165

Source: JICA RREP Team

1) First Training

The first training was conducted from 20th February 2014, almost 1 month earlier than the Phase I. The training consisted of two parts; theoretical part and practical one. An agronomist of the Team provided the training on the basic agriculture. Advanced farmers from Yabelo woreda were invited as trainer to share their agricultural experience. The model farmers have long experience by working with YPDARC. They shared with the trainee agro-pastoralists how they acquired the farming skill, how they put it into practice and the success they have achieved. The advanced farmers stressed to the participants that accepting the new knowledge and technics of agriculture out of this activity is a chance to improve their future livelihood. Upon completion of the training, improved varieties of crop seeds were distributed to the participants.

The PAs covered were divided into 2 groups; less experienced one and comparatively experienced group. The training contents for the two groups were made separately. For the less experienced agro-pastoralists, the Team provided basic farming techniques same as those of Phase I, e.g. farm site selection, land preparation, sowing method, manure application, crop rotation, etc. In contrast, for those who have accumulated longer agriculture experiences, training contents included advanced ones e.g. agricultural chemical use, chemical fertilizer application and marketing, etc.

The advanced farmer from Yabelo woreda is explaining the manure using in Renji PA in Arero woreda. 21 Feb. 2014

2) Second Training

The second training with more practical sessions was carried out from 9 to 20 June 2014. It is quite important to show them farming skills practically. The training site was therefore selected out of the participant's farmland where technics provided during the Phase I training were well applied. The training contents were of basic agriculture such as row planting, fertilizer application, timely weeding, crop rotation and mixed cropping , etc. mostly same as those of Phase I. In addition, soil conservation and water harvesting technologies were introduced under this Phase II. Though water harvesting method is effective for the crop production in semi-arid area, it is hardly found in the farmland in Borena zone at moment.

3) Third Training

The third training, the last one among the 3-set training, was implemented in September 2014. The training undertook such issues as pre- and post-harvest technics and reviewed all the previous training contents. Most of the time, they harvest crops immediately after the crop changes its leaf color from green to white, and simply pile them without drying. Specially, if the grain is not intended for seed use, they do not give much attention after harvesting. Undried grains can easily be spoiled and are susceptible to weevils. Therefore, the training talked about importance of drying before threshing, appropriate storage, etc.

At the end of the training, the participants shared the result of their agricultural activities in their farmland. Though the amount of rainfall was small in the 2014 long season (*Gana*), the farmers acknowledged the advantage of the agricultural technics and characteristics of improved varieties especially in Malka Soda woreda and Teltele woreda. However, the agro-pastoralists in those PAs where rainfall was much less than that of average year, e.g. Chari PA in Yabelo, could not get the agricultural merit because of its shortage of rainfall.

4) Improved Seed Distribution in Phase II

Improved varieties of seeds such as maize, haricot bean, and teff were distributed to the participants at the end of first training. The JICA team tried to find the shortest maturing variety of maize in Ethiopia called Malkasa I; however it was not available due to the shortage of seed producer taking into account of its small demand. Malkasa IV was instead selected for the improved seed of maize, whose maturing period is 2 weeks shorter than that of local varieties. White color haricot bean variety called Awash I and new teff variety called Boset were also introduced under the Phase II seed distribution.

Table 6.1.6 Distributed Improved Seed and the No. of Beneficiary in Phase II

Crop (Variety)	Amount per person (Total delivered)	Planned Area (ha/person)	Number of Beneficiaries
Maize (Malkasa-IV)	5kg (1.9 ton)	0.2	389
Haricot Bean (Hawasa Dume)	5kg (1.4 ton)	0.1	281
Haricot Bean (Awash-I)	5kg (0.5 ton)	0.1	108
Teff (Tsedey)	3kg (1.0 ton)	0.12	200
Teff (Boset)	3kg (0.9 ton)	0.12	189

Source: JICA RREP Team

6.1.6 Monitoring and Evaluation for Phase II Activities

Total 26 beneficiaries were interviewed to know what kind of improved agriculture techniques they have applied. Figure 6.1.3 shows the percentage of applied agricultural technics. Same as the result of Phase I, weeding before flowering and deep planting were more applied while intercropping was less practiced. The percentage of line planting applied was higher than that of Phase I. It may have been caused by the high application ratio in the new target woredas such as Malka Soda and Teltele. These woredas are located in highland and the people there have longer experiences of agriculture than the counterpart lowland people. In contrast, the lower application of intercropping may be associated with shortage of rainfall. Haricot bean is usually sown about 1 month after the maize sown. Due to the shortage of rainfall, many beneficiaries gave up the haricot bean to intercrop with maize.

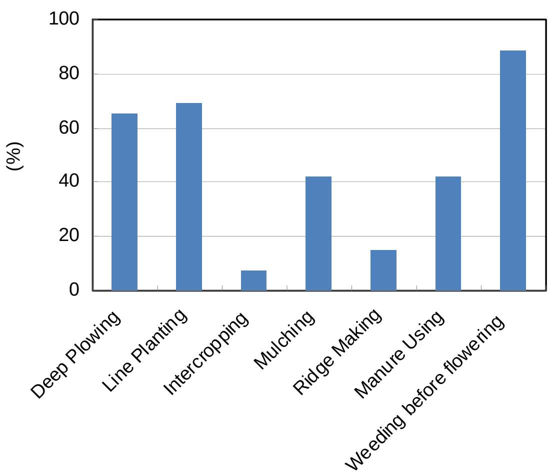


Figure 6.1.3 Application of Trained Technics

Source: JICA Project Team

Advantage points of improved varieties identified by the beneficiaries are somewhat different from the Phase I result because of the crop variety change (see Figure 6.1.4). Maize variety provided, Malkasa IV, has almost 2 weeks longer maturing period than Malkasa I provided in Phase I. Therefore they observed early maturating is not as much as the Malkasa I. More than 80 percent of interviewees commented high productivity and sweet taste on the haricot bean. Despite the small rainfall, haricot bean has presented some production because the maturing period is approximately 1 month shorter than that of maize. More than 70 percent of agro-pastoralist acknowledged the high productivity for the maize due to the number of cob per plant.

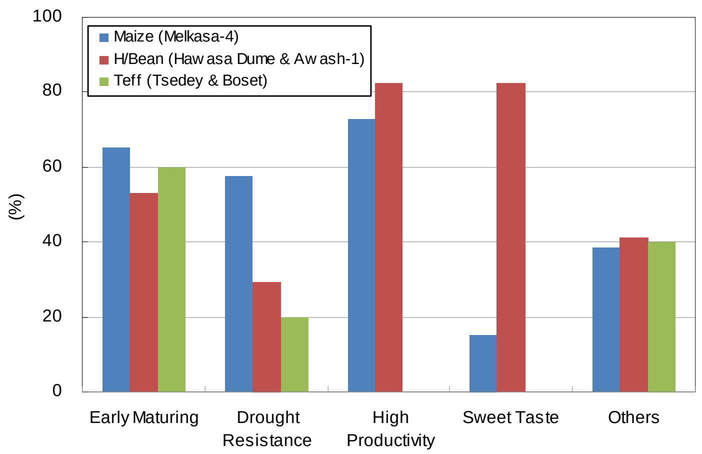


Figure 6.1.4 Advanced Point of the Improved Variety

Source: JICA Project Team

DAs have evaluated the dryland agriculture improvement activities from 5-aspect (see Table 6.1.7 below). The effectiveness and impact scores are lower in some PAs due mainly to the shortage of rainfall. According to the DAs, the amount of rainfall in the long rainy season was quite lower than those of other years. Therefore the beneficiaries could not harvest the crops not only for the local variety but also for the improved short maturing crops. Meanwhile, the score of relevance and sustainability are higher than others through all the PAs. The dryland agriculture improvement is in fact demanded even in the pastoral dominant areas nowadays.

Table 6.1.7 Evaluation Score of Dryland Agriculture Improvement Project in Phase II

Woreda	PA	Efficiency	Effectiveness	Impact	Relevance	Sustainability	Average
Yabelo	Dhadim	3	3	2	4	4	3.2
	Chari	3	2	1	3	3	2.4
Arero	Qawa	4	4	4	5	5	4.4
	Renji	4	3	3	5	5	4.0
Malka Soda	Soda Garmama	4	4	5	5	5	4.6
	Dawa Dimtu	4	5	5	5	5	4.8
Teltele	Bule Korma	4	3	4	5	5	4.2
	Bule Dambi	4	4	4	5	5	4.4
	Dibe Gaya	4	4	4	4	5	4.2
	Marmaro	4	4	4	5	5	4.4
Average		3.8	3.8	3.6	4.6	4.6	4.1

Source: JICA RREP Team

6.1.7 Results of Yield Survey for Maize Production in Phase II

In order to confirm the advantage of Malkasa I maize in the actual farmland, yield survey was conducted by harvesting method[5] (see Table 6.1.8 below). Note that the Team could not take samples in Yabelo woreda on account of low growth caused by rainfall shortage. Due to the erratic rainfall, the yield and yield component show high variation among woredas. However, the improved variety is higher than local variety on number of cob per m2 and grain weight per m2. Thanks to the about 1 month earlier seed distribution in Phase II, all the improved varieties have shown better performance in the farm fields.

The difference between improved variety and local variety is quite clear in Malka Soda woreda. The woreda is in fact located at a little higher elevation and the amount of rainfall here is always higher than those of other lowland woredas. With reference to this result, it could be said that the improved variety can achieve much higher productivity than local ones under such condition where there are at least average amount of rainfall or more than that.

[5] Due to the survey method, all the results are much higher than those of conventional statistical data. However, the data can be used for comparison purpose between improved one and local one.

Table 6.1.8 Comparison of Yield and the Components of Maize in Phase II

Woreda	Variety	Arero	Malka Soda	Teltele
No. of Place		5	4	7
No. of Plant per m^2	Improved	6.3	6.0	6.6
	Local	6.1	6.0	5.9
No. of Cob per m^2	Improved	6.7	6.8	6.4
	Local	6.7	5.3	5.7
Length of Cob (cm)	Improved	13.6	15.8	11.9
	Local	13.9	14.3	12.4
Dry Matter Weight (g/m^2)	Improved	1,982.1	2,600.0	1,338.1
	Local	1,863.3	1,920.8	1,390.3
Grain Weight (g/m^2)	Improved	796.4	1,146.1	491.9
	Local	776.3	691.9	476.0
Grain Weight per Cob (g/m^2)	Improved	118.9	169.1	77.1
	Local	116.5	129.7	83.6
Harvest Index (%)	Improved	40.2	44.1	36.8
	Local	41.7	36.0	34.2

Source: JICA RREP Team

6.1.8 Outcomes, Issues Arisen and Lessons learnt

Concerning the agricultural trainings, the participant agro-pastoralists and DAs mentioned that though they had some oral information about modern farming practices, they had never participated in such a well-coordinated training like the one JICA Team provided. After having had trainings on good dryland farming practices, they were able to build confidences in applying what they learnt into their farming practices. Having applied good farming practices, they could observe a remarkable difference on the performance of their crops, and the yield they achieved has also increased.

Regarding the distributed variety of maize seed in Phase II, called Malkasa IV, agro-pastoralists found that the variety is suitable for their areas. They found drought tolerant characteristics on it. Because of the 2 weeks longer maturing period than Malkasa I, Malkasa IV was firstly believed not appropriate variety for the lowland area. However, it performed well with much higher yield than local variety. The amount of production is in fact higher than Malkasa I where there is good rainfall.

Malkasa I is very short maturing variety, but instead its productivity becomes lower than Malkasa IV and others. Although Malkasa I was already introduced some time ago in Borena area, the agro-pastoralists do not want to use Malkasa I only at their farmlands because of the low productivity. It suggests that farmers using several types of maize variety in their cultivation can maximize the chance of getting high production, and at the same time minimize the miss of harvesting. In other words, it works as a risk hedge over production failure in their farm level.

While keeping several maize types is a good strategy to increase productivity and reduce the risk of crop failure, they have to think about the cross pollination. Maize is wind-pollinated plant, which can easily cross pollinate with other varieties. If a farmer plants different varieties of maize in the same farmland, they have to renew the seed almost every year. In order for them able to renew the seed, it is required to increase the accessibility of obtaining the improved seed. Increasing the accessibility to improved seeds in lowland area will contribute to the increase and stabilization of the crop production of agro-pastoralist areas.

In addition, Malkasa IV was preferred at several points by agro-pastoralists. One thing is the marketability. The Malkasa IV color, clear white, attracted market needs, and accordingly it was easy to sell at markets. The second point is a disease tolerant character. It is stronger to rust as compared with local variety. The third point is early maturing period, approximately 2 weeks early maturing than that of local variety. Fourth point is the height of the plant, which is lower than that of local variety and thus the Malkasa IV maize is tolerant against winds.

The delivered haricot bean variety, Hawassa Dume, has performed well and it was preferred by the agro-pastoralists especially for home consumption. The variety was characterized by its higher productivity, drought tolerance and early maturing. Besides, it can be eaten with shorter time boiling, and the taste is sweeter than local varieties. However the market demand is low. The market of haricot bean in Borena zone refers to the demand of Kenya where they do not prefer the red color haricot bean. For export purpose, Awash-1 variety that was delivered to the agriculture advanced areas is more suitable.

The varieties of teff distributed were Boset and Tsedey. Although both of them have similar characteristics such as high productivity, drought tolerant and short maturing period, Boset is newer variety than Tsedey. The agro-pastoralists usually cultivate local variety of teff brought by neighbouring ethnic groups. For instance, the local variety called Asnakech is widely spread in Teltele woreda where teff crop is commonly cultivated. When the people compared the growth between the local and improved ones, the growth of local variety looked better because of the bigger biomass. However, finally, when they harvested the teff, they realized the advantage of high yield.

Teff is one of the cash crops in Borena zone and it can be used for many purposes e.g. feed for livestock and construction material mixed with mud, etc. In fact, it has shorter maturing period than maize. The trained agro-pastoralists started cultivating teff though it was a new crop. Some of them failed to cultivate because of the different cultivation from maize and haricot bean familiar to them. The teff cultivation in Borena zone has possibility of income generation; however it needs practical agricultural trainings further.

In low land areas of Borena zone, people experienced a shortage of rainfall in the long rainy season 2014 called *Gana*. Under the shortage of rainfall, not only the local variety but also the improved variety failed to harvest in such very dry areas as Chari PA and Dadim PA of Yabelo woreda, yet improved variety performed well to certain level in other PAs. It can be said that simply by changing the crop variety from local to improved ones, the productivity and stability of food production will be improved remarkably.

6.2 Seed Multiplication Trial

6.2.1 Rationale and Objectives

Lack of appropriate improved seed is one of the shortfalls of agriculture sector in Borena zone. Most of the farmers in the area use local varieties with long maturing period and low productivity. On the other hand, drought resistant crops are characterized as their short maturing period and relatively lower productivity. These varieties are only necessary in semi-arid areas such as Borena zone and Somali region, so-called pastoral dominant areas in Ethiopia. Seed suppliers do not prefer to produce drought resistance crops like Malkasa I due to its low seed demand. This situation causes a shortage of the crop seed suitable for the agro-ecology in Borena zone.

One of the activities of dryland farming improvement under this Project aims at establishing a skilful maize seed supplier within Borena zone in order to solve the lack of drought resistant maize seed in the area. Borena zonal PDO acknowledges the demand of the improved variety of maize seed by woreda offices every year; however, the office cannot distribute the improved seed to the farmers because of the situation indicated above for many years. To deal with this condition in Borena zone, the Team has supported farmer groups in Malka Soda in multiplying improved maize seeds with initial input supply and trainings.

6.2.2 Target Areas and Varieties

The seed multiplication sites were designated within Malka Soda woreda, located in relatively hilly place, where there is a perennial river. Two sites were identified and a farmer-group was formed at each of the sites. Dawa Dimtu site was formed by 6 farmers with about 2.3 ha of farmland while Galo Bokora site is established by 2 farmers with 1.7 ha of farmland. Both groups of the farmers belong to Guji ethnic group, and they have experiences of farming more than 20 years.

Malkasa I having the shortest maturity period was firstly planned for the target variety. The JICA team contacted number of agricultural research centers and seed producers in order to obtain the seed of the variety, yet could not get the basic seed. Borena zone PDO instead recommended Malkasa IV variety, an OPV with shorter maturing period than local variety by two weeks as substitute. Malkasa IV variety was therefore selected as the target variety of seed multiplication. The JICA team has provided to the farmer groups input materials such as basic seeds, chemical fertilizers, diesel and diesel water pump, and seed multiplication trainings.

6.2.3 Overall Implementation Schedule

The multiplication activity has been carried out from September 2013 to March 2014 corresponding to short rainy season called *Hagaya* in order to prevent cross pollination (see table right). The first training was conducted on 28th September 2013, just before the cultivation at the beginning of the short rainy season, by inviting the target farmer groups, DAs and woreda experts of Malka soda. It was followed by second training on 30th November 2013 at the vegetation growing stage. Finally third training was administered on 21st to 23rd January 2014, which was just before the harvesting.

Table 6.2.1 Schedule of Seed Multiplication Project

Activities	September			October			November			December			January			February			March		
	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
			Short Rainy Season(2013)											2014							
Land Preparation	■	■																			
Planting			■																		
Weeding					■			■			■										
Watering										▬	▬	▬	▬								
Harvesting																■					
Threshing																		■			
Selling																			■		
Training (1)			▲																		
Training (2)									▲												
Training (3)															▲						

Source: JICA RREP Team

6.2.4 Contents of the Seed Multiplication Program

1) First Training

The first training was carried out by a Borena zone agriculture expert on 28th September 2013 inviting 15 participants such as 8 farmers, 4 DAs and 3 agriculture experts of Malka Soda woreda. The main topics of the training were; basic seed multiplication knowledge and technics different from conventional grain production. One of the important points of maize seed multiplication is how to prevent cross pollination with other varieties to maintain the genetic purity of the variety. The trainer pointed out that the farmer groups and DAs should secure such condition that there is no any other maize farm within the distance of 400m radius from the seed multiplication farm.

Table 6.2.2 Timetable of the 1st Training for Seed Multiplication

Time	Contents	Person in charge
AM	1. Opening/ explanation of schedule 2. Basic seed producer's knowledge 3. Site selection and land preparation method 4. Timing of sowing and watering 5. Planting method (row planting, plant distance) and fertilizing method	JICA Project Team Trainers from Borena zone agriculture expert Trainers from Borena zone agriculture expert Trainers from Borena zone agriculture expert Trainers from Borena zone agriculture expert
PM	6. Weed, pest and insect management 7. Questions and Answers 8. Summary of the training / Closing	Trainers from Borena zone agriculture expert Advanced agro-pastoralists JICA Project Team

Sauce; JICA Project Team

2) Second Training

The second training was carried out on 30th November 2014. The training consisted of theoretical sessions conducted in a training room and practical parts implemented in the seed multiplication fields. Theoretical part included the topic of basic seed multiplication knowledge and techniques, some of which were included in the first training and therefore conducted as a refresher course. For the field training, they visited Galo Bokola site already at the beginning of flowering stage. The maize was planted in row and the weeds were well managed in the field. The trainer taught the farmers that the advantage of the row planting is not only for the convenience of field management but also it ensures equal growth of plant required for quality seed production.

Table 6.2.3 Time-table of the 2nd Training for Seed Multiplication

Time	Contents	Person in charge
AM	1. Opening / Explanation of schedule 2. Definition of Seed Multiplication 3. Process of seed production 4. Characteristic of target variety 5. Site selection 6. Fertilizer application and disease, weed and insect control 7. Questions and Answers	JICA Project Team Trainer from Borena Zone PDO Agriculture Expert Trainer from Borena Zone PDO Agriculture Expert Trainer from Borena Zone PDO Agriculture Expert Trainer from Borena Zone PDO Agriculture Expert Trainer from Borena Zone PDO Agriculture Expert Trainer from Borena Zone PDO Agriculture Expert
PM	8. Field visiting / Discussion 9. Summary of the training / Closing	Trainer from Borena Zone PDO Agriculture Expert JICA Project Team

Sauce; JICA Project Team

3) Third Training

The third training was conducted from 21st to 23rd January 2014. An expert of Asela Seed Quality Control Laboratory Center (ASQCLC) was invited as one of the trainers. On the first day, the trainer emphasized the importance of farmers' activities such as site selection, quality seed use, maintenance of field, seed drying, agricultural chemical application and preparation of the suitable storage. He pointe d out that the produced seed should be bagged and labeled containing the information such as type of the variety, seed lot number, the physical and genetic purity, germination test results and the seed treatments.

The trainer also explained the seed inspection method both at the field and in laboratory. The plant as well as the seed should be inspected in order to ensure the quality of seed. He further mentioned that the field inspection should be done more than three times during the growing period, and whenever a plant with different characteristic is found, it has to be removed from the field. As part of a laboratory inspection, germination test was explained.

Table 6.2.4 Time-table of the 3rd Training for Seed Multiplication for 3 days

Day1	Contents	Person in charge
AM	1. Opening/ Explanation of schedule 2. Principles of seed production and quality control aspects	JICA Project Team Trainer from ASQCLC
PM	3. Field inspection theory (1) 4. Question and Answer for the Day 5. Summarizing and Closing	Trainer from ASQCLC JICA Project Team JICA Project Team
Day2	Contents	Person in charge
AM	6. Field inspection theory (2)	Trainer from ASQCLC
PM	7. Practical field inspection at Garo Bokora site 8. Question and Answer for two Days 9. Summarizing and Closing	Trainer from ASQCLC JICA Project Team JICA Project Team
Day3	Contents	Person in charge
AM	10. Pre-harvest and post-harvest theory 11. Discussion, question and answer	JICA Project Team JICA Project Team

Day1	Contents	Person in charge
PM	12. Practical field inspection at Dawa Dimtu site 13. General discussion 14. Question and answer for the training 15. Summarizing and Closing	JICA Project Team JICA Project Team JICA Project Team JICA Project Team

Sauce; JICA Project Team

The second day started with field inspection method. The numbers of sample, inspection route in the field, field inspection sheet, plant which should be removed, etc., were explained. Inspection route selection is one of the important things for the field inspection. The route should be considered by the farmland shape and it should cover entire field. A field inspection sheet was also provided, which is used in the quality seed center, for field inspection. According to the instruction made in the morning session, the participants made three groups and have done the field inspection.

At the end of the second day, the trainer checked each inspection sheet and gave some comments to the participants. To identify and remove the damaged plants, which were affected by insect, worm and disease, was one of the purposes of the inspection. One group brought a damaged plant, which had been attacked by worm, to show it to the other participants. The participants could learn the field inspection method for seed multiplication not only theoretically but also practically through the second day training.

A trainer is explaining the field inspection method and providing comments on the farmers' field inspection sheet. 22 Jan. 2014.

Pre-harvest and post-harvest management session was administered in the third day's morning. Then, information sharing was done during the last session of the training. There are two seed multiplication sites, Dawa Dimtu and Gare Bokora, and the farmers discussed the advantages and disadvantage each other. Garo Bokora site was planted by row and the weed was well managed, but instead the site was given too much water. On the other hand, Dawa Dimtu site was not planted by row and some farmers have not done weeding well. In addition, water shortage was found in some places. There are six farmers in the Dawa Dimtu site, and they have leaned good practices from Garo Bokora site.

6.2.5 Outcomes, Issues Arisen and Lessons Learnt

1) Output from the Seed Multiplication

Through the activities, there are some outputs achieved. Seed multiplication knowledge and techniques were provided to concerned farmers, DAs and agricultural experts in the woreda. With support from woreda experts and DAs, the farmers group continued seed multiplication, so that sustainable seed multiplication system was established in Borena zone. As afore-mentioned, Malka Soda woreda is blessed with water resource within the Borena zone. Therefore the expansion of improved seed multiplication would contribute to the supply of improved seeds in the zone.

The seed multiplication farmers have harvested the seed from their own farmlands. Total 8,930 kg of seed was harvested by the seed multiplication farmer groups (see Table 6.2.5). The yield of Garo Bokora site was higher than that of Dawa Dimtu site, which was attributed to good agricultural practices in Garo Bokora site. In this Garo Bokora site, the improved maize variety of seeds were planted in row and they have done weeding well, while the seeds in Dawa Dimtu site were planted by broadcasting and some farmer did not weeding as needed.

Table 6.2.5 Results of the Seed Multiplication

Farmer No.	PA name	Area (ha)	Production (kg)	Yield (t/ha)
1	Dawa Dimtu	0.33	530	1.61
2	Dawa Dimtu	0.64	1,400	2.19
3	Dawa Dimtu	0.24	600	2.49
4	Dawa Dimtu	0.44	700	1.60
5	Dawa Dimtu	0.47	700	1.48
6	Dawa Dimtu	0.18	200	1.11
7	Garo Bokora	0.90	2,600	2.88
8	Garo Bokora	0.79	2,200	2.80
Total		3.99	8,930	(Ave.) 2.24

Source: JICA RREP Team

Malka Soda woreda PDO bought the seeds and sold them through PAs to other farmers in the same woreda. According to a report from the office, 11 PAs have received the seeds from the woreda PDO (see Table 6.2.6). In total, 1,323 farmers bought the seed before the long rainy season (*Gana*) of year 2014 apart from the amount the JICA Team procured. The PDO bought the seeds from the seed producer farmers at 9 Birr/kg and the PDO through PAs sold them to the other farmers at 10 Birr/kg. The seeds procured by the JICA team were distributed to the beneficiary agro-pastoralists who participated in the Phase II dryland farming improvement activities.

Table 6.2.6 Distribution of Multiplied Seed in Malka Soda Woreda

No.	PA name	Amount (kg)	No.	PA name	Amount (kg)
1	Gubata Bicho	840	7	Daya Dawa	760
2	Dawa Bicho	940	8	Baya Gundi	820
3	Burka Dagaga	640	9	Hidi Nagale	420
4	Galo Bokola	930	10	Dawa Dimtu	1,000
5	Hadha Gora	640	11	Dada Oda Budhu	320
6	Soda Garmama	520	12	JICA RREP Team	1,100
			Total		8,930

Source: Malka Soda Woreda PDO

The procedure of distribution of the multiplied seed is shown in Figure 6.2.1. Firstly, the multiplied seeds were delivered to woreda PDO through DAs in charge. The seed producer farmers were supposed not to get the profit up to the end of the procedure. Upon delivery of the seeds to the woreda PDO, the office has decided the distribution amount of the seeds by each PA according to the agricultural potential, number of households and the amount of request, and then they transported to the PAs. At the PA level, DAs sold the seed to the needy farmers directly and collected the payment. The payment was back to the seed producer farmers through the woreda PDO, the PA cabinet and then DA. This process took about 1 month.

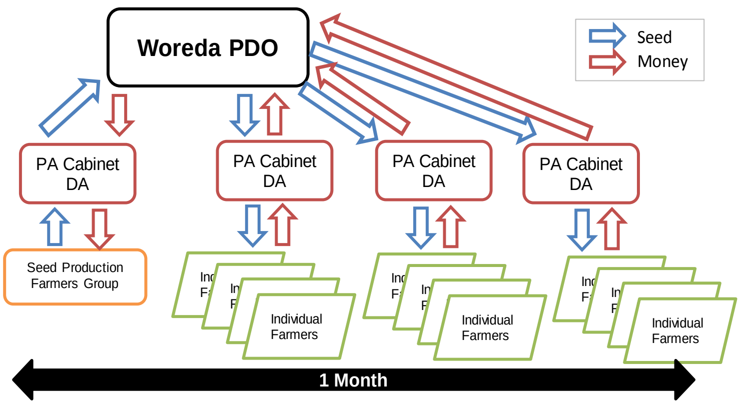


Figure 6.2.1 Procedure of Seed Distribution in M/Soda

Source: JICA Project Team

2) Issues Arisen and Lessons Learnt

There is an issue related to group work. Although the farmers made a group for the multiplication program, the activities in the actual farmlands were done individually like agriculture as business usual. This individual working has led to unequal seed quality. If the group intends to sell the seeds as group brand, they should work as group endeavoring to produce equal quality of seeds. They are already aware of the importance of group works for the seed multiplication, so that they would work in so doing for the next season's cultivation.

Storage is also an issue concerned. The farmer groups do not have storage facilities for keeping the quality seed. To solve this issue, they can use communal storage place such as pastoralist training center, plant nursery station and storage of woreda PDO. However, in the long run, they need to build the group storage to keep multiplied quality seeds for their own purpose if they really intend to embark on the production of quality seed as business.

The seed price is concerned for sustaining the seed multiplication. The produced seed price, 9 birr/kg for seed producer and 10 birr/kg for buyer, is thought suitable for both of them. In fact, the price is higher than the local market price and cheaper than the improved seed sold by agricultural cooperatives. Thanks to the advantage of the price, all the seeds multiplied were sold with high demand. However, the price may have to be increased taking into account fertilizer, chemicals, etc. which under the program were provided by the JICA team. The farmers should manage these inputs themselves from the next time.

3) Way-forwards

Both farmer groups have started seed multiplication in the short rainy season (*Hagaya*) of year 2014 without support from any project/program (see left photo). The groups started cultivation using the agricultural technics that they had learned from the trainings administered by the JICA team in 2013 to early 2014. The members in fact expanded the farmlands for the seed multiplication. To sell the produced seeds outside of the woreda, seed inspection should be upgraded including germination test, water content test and color test. Technical assistances for these issues should still be provided.

Seed multiplication group's farmland in Malka Soda woreda, 5th November 2014.

To further extend the seed multiplication program, seed renewal system should be established. Maize can cross-fertilize easily, meaning that it is difficult to keep their characteristics over generations. The seed producers should purchase pure basic seed from research center every few – several years. In order for the producer farmers to buy the new basic seeds, they have to prepare for the plan, budget and the logistics.

In the afore-mentioned multiplication program, produced seeds had been distributed with the Malka Soda woreda because of the limited amount of seeds produced. However, the main objective of the seed multiplication is to produce short maturing variety not only for Malka Soda but rather for the lowland Borena area. In fact, Borena zonal PDO requested Malka Soda woreda PDO to provide the seeds to other woredas located in the lowland but it was not possible due to the limited amount of seeds produced. In addition to expanding the seed multiplication sites, connecting the produced seeds to the supply system covering lowland areas is also an important task for the next step.

CHAPTER 7 SECONDARY LIVESTOCK MARKET OPERATION

7.1 Rationale of Secondary Livestock Market

Livestock market provides pastoralist with the opportunity of selling their livestock whereby they can get cash which is in turn spent on their staple food. In fact, the staple food for the most population of the Borena zone is already cereals such as maize. They cultivate maize, and to a lesser extent teff and sorghum where the natural condition allows for farming. However, in dry lowland such as southern and eastern parts of the Zone, farming can hardly be practiced. In this situation, they need a place to sell their livestock, and get cash, which is in turn spent on securing the cereals.

Borena zone has been hit by frequent drought. The pastoralist has lost a great number of livestock depending upon the magnitude and prolonged period of drought. As the drought becomes deeper and harsher, they usually start moving and looking for water first and then pastures. Water is essential for both human and animals, without which cattle can hardly survive over 3 days even if there are pastures. Many of pastoralists have ended up in losing the stock during the past droughts.

In that case, if they can have an access to a livestock market, there could be a chance for them to get at least some cash which can be used to re-build the herd upon over the drought. The selling price during drought period is in fact not high due to much more supply than demand. However, if they can sell their livestock before they lose, they can stay with some cash and they themselves can survive over the drought and start re-building the stock after the drought has passed. This is also one of the main points why there should be livestock markets in Borena zone.

7.2 Construction of Secondary Livestock Markets

Selection of the construction sites for secondary livestock market at first referred to what the Borena Market and Trade Development Office had in proposal. The office had proposals to construct total 5 additional secondary livestock markets such as Elwaye (Yabelo), Malka Soda (Malka Soda), Arero (Arero), Moyale (Moyale), and Mega (Dire). Taking into account the present livestock dealing number at primary markets around the potential 5 proposed sites, finally Elwaye (Yabelo) and Malka Soda (Malka Soda) had been agreed and selected as the places where JICA was to construct the secondary market. Concerning the design of the secondary livestock markets, Trade and Market Development Bureau of Oromia has a standard design. According to the standard, following facilities were planned and designed as;

Figure 7.2.1 Location of Elwaye and Malka Soda
Source: JICA Project Team

1) Fence (100 m x 100 m = 10,000 m^2), three partitions
2) Tax and Veterinary Office (1)
3) Tax Check Points and Inspection Points (6)
4) Detention Pen (Quarantine) (1)
5) Crush (1)
6) Loading Ramp (Loading Pen) (1)
7) Foundation Site for Large Animal Scale Plantation (1)
8) Cattle Water Troughs (2)
9) Cattle Feed Troughs (2)

10) Shoat Water Troughs (2)
11) Shoat Feed Troughs (2)
12) Toilet (2 m x 3 m) (2)
13) Guard House (2)

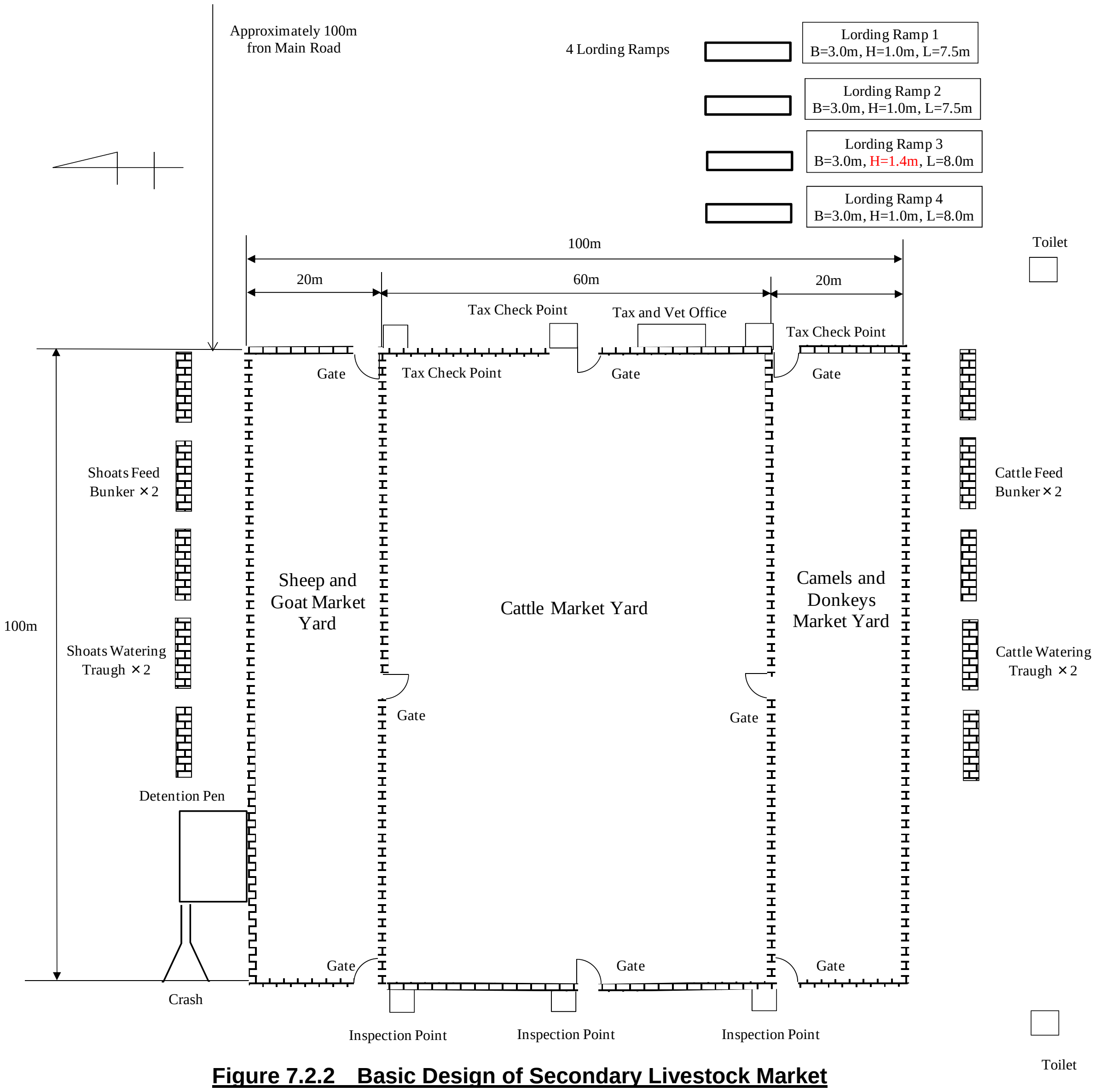


Figure 7.2.2 Basic Design of Secondary Livestock Market
Source: JICA Project Team

For the construction of secondary livestock market, a pre-qualification and the tendering had been carried out from November 2012 to March 2013. Out of the 8 companies who received pre-qualification documents and submitted the required forms of the documents, 6 were allowed to participate in the tendering. Based on the bidding results, JICA team agreed with 2 contractors, one for Elwaye market and the other one for Malka Soda market. The JICA team and the contractors concluded with the contract prices of 2,757,014 ETB and 2,737,585 ETB for the markets of Elwaye and Malka Soda respectively.

The site for the construction of Elwaye livestock market was handed over to the contractor on March 23, 2013. Most of the construction works for the Elwaye market had been completed until August 25, 2013. Based on the contractor's request, the JICA team conducted on September 9, 2013 temporary handing-over inspection at the presence of relevant government officers. The inspection was finished successfully and provisional hand-over was accepted. After one year has passed since the provisional hand-over, final inspection was conducted on September 30 2014, and with minor repairs done, the Elwaye market was finally handed over.

The site for the construction of Malka Soda livestock market was handed over to the contractor on March 22, 2013, and the contractor started the construction. Most of the construction works had been completed until mid-September 2013. The JICA team conducted on September 21 temporary handing over inspection, and based on the result the site was temporarily handed over to the relevant government office. With one year having passed, final inspection was conducted on October 24, 2014, and the final acceptance was agreed by the concerned officers with minor repairs.

7.3 Capacity Development for Operation of Secondary Livestock Markets

The Team designed a capacity development plan for the relevant officers and staff in operating, maintaining and managing the secondary livestock markets in the areas of registration, taxation, accounting and etc. Based on the plan, the Team carried out a first and refresher trainings targeting officers from Trade and Market Development Office of Borena zone and woredas and also staff to be assigned for the operation of the livestock markets. In addition, necessary equipment for the smooth operation of the markets were procured and rendered to the newly constructed secondary livestock markets.

7.3.1 First Training for Relevant Officers

First training was designed for zonal and woreda experts from concerned government organizations in order to enhance their capacities on livestock market operation. It was a 5-day program held in Yabelo town from 17th to 21st of July 2013 and total 29 participants attended from zonal and woreda Trade and Market Development Offices, Revenue Offices and township municipalities of Elwaye and Malka Soda. The program aimed at capacity-building for the participants in the topics of; 1) concepts, principles and functions of livestock markets and marketing system, 2) livestock marketing facilities and networking, 3) livestock health and sanitary improvement, and 4) livestock production as business venture.

Day 1; The Team started a session with discussion about overview of livestock sector in Ethiopia and definition of basic livestock markets, marketing system, etc. Then, the training focused on marketing systems including market demands, supplies and prices at livestock markets. The facilitator gave a detail on roles of livestock markets which are particularly exchange, physical and facilitation function and how these functions affect whole marketing systems. The participants discussed that how market supplies, demands and prices are affected by different factors such as season and information in detail. In addition, the facilitator elaborated about market margin and explained how it affected benefits of producers in an inefficient livestock market supply chain.

Day 2; Four trainees from Haro Bake, Milami, Dubluk and Moyale markets presented a situation of livestock market infrastructure and related services in their respective woredas, which were shared with and discussed among the participants. Then, the participants further discussed importance of market facilities, services and networks, and how these issues constrain a market supply chain, prices and efficiency of livestock marketing systems. In the afternoon session of the second day, the Team highlighted mainly the need of having integration among livestock markets, market actors and also institutions mandated working on market operation and management.

Day 3; The morning session of the third day was devoted to livestock sanitary improvement, which mainly dealt with management techniques including livestock movement restriction and proper handling of animals when transporting animals. Since a large number of animals gather at livestock markets, livestock markets may become the best place for the vaccination programs. However, there may possibly be infected animals. Thus, knowledge of disease control is essential for the officers operating the markets. In the afternoon, the presentation focused on regulations, values and principles of livestock marketing cooperatives.

Day 4; The training continued the discussion on the livestock sanitary improvement focusing on veterinary techniques. It comprised the quarantine, vaccination and prevention of internal and external parasites followed by disease monitoring and surveillance. Then, a topic of livestock production for marketing was discussed by explaining importance of planning, budgeting for production, synchronizing production to sales and benefits of the producers. As last training program at the classroom, the participants were given a group work to develop an action plan for short term to carry out their livestock marketing duties in their working areas.

In addition to the classroom sessions, a field visit was organized on the last day of the training. The participants moved to Haro Bake secondary livestock market located in Bake town, Yabelo woreda and observed the activities carried out in the market day. At the beginning of the field visit to Haro Bake, one of the trainees, who is the staff of Haro Bake livestock market, gave a brief introduction to the participants. And then, the participants were divided into small groups and each group checked the facilities and discussed the findings at the market center. The groups later shared their feedbacks of the field visit such as what worked well and what did not work and what are needed for improvement in future.

7.3.2 Refresher Training for Relevant Officers

Refresher training was just continuation of the first training being designed to deepen the understanding of the trainees and ensuring the trainees to be able to transfer what they had learnt to the actual operation. The objective of the refresher training was therefore to; deepen the understandings of the trainees, ensure them to have captured knowledge and skills provided and become motivated to consistently involve in the marketing operation and management. It was a 3-day program held in Yabelo town from 19th to 21st of August 2013 and total 28 participants joined from relevant government offices.

Based on the action plan formulated in the previous training, the participants discussed achievements and constraints of the plan and presented their efforts in executing it. This was followed by reviewing marketing terminologies through group exercises, and presentations were conducted about the functions and constraints of existing livestock marketing system in Borena zone. Besides, the trainees were given group exercises to identify the available and missing basic market structures and market support services in their livestock markets and the impacts of such structures and services on the market operation and management.

The refresher training also had a practical session in Finchewa secondary livestock market. After the market officers in Finchwa briefed about current situation of livestock market, the participants examined some topics such as available market structures and services in Finchawa market via discussion with the market actors. In addition, the participants reviewed the hygienic practices of livestock markets through livestock movement restriction and proper livestock handling during transportation and veterinary interventions.

7.4 Operation of the Elwaye Livestock Market

7.4.1 Livestock Trading

After completion of the construction of Elwaye secondary livestock market, officers from Trade and Marketing Development Office, Yabelo woreda, kept a record of dealing number of livestock by animal species with average prices on a weekly basis. On the market day, they stand near the gate of the market and count the number of animals entering. Since there is a case that some producers or brokers brought their animals back to home without selling them to traders, the number does not exactly correspond with the sales of livestock. Rather, the number implies the supply of animals to the market.

Figure 7.4.1 indicates monthly dealing number of animals at Elwaye secondary livestock market from August 2013 to September 2014. Elwaye secondary livestock market was upgraded from a primary market called Elwaye primary livestock market. The dealing number of August 2013 in Figure 7.4.1 was obtained from the Elwaye primary livestock market before opening of the secondary market. It was found that the dealing number of cattle was increased rapidly after the construction and more than doubled in a short period of time. In July 2014, the number reached to the highest point which is 4,000 in cattle.

That of goat has also risen sharply and was doubled in a few months. The dealing number of goat in March 2014 became a triple of that in August 2013 which is before the construction of the secondary livestock market. After March 2014, the dealing number became stable and slightly increased. Unlike the dealing number of cattle, there was no rapid reduction in August 2014 but a light decline in the following month of September. On the other hand, those of sheep, camel and donkey remained almost unchanged throughout the period.

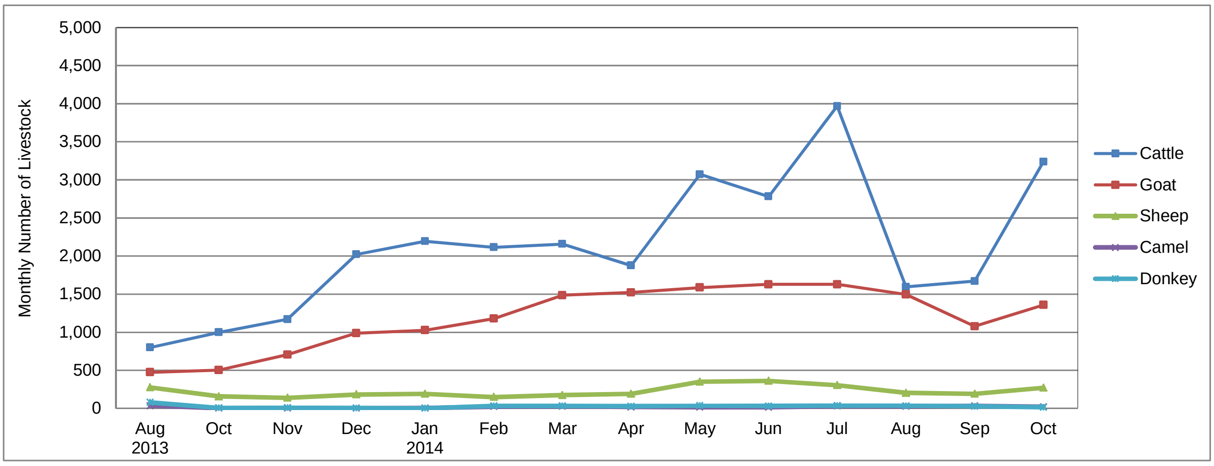


Figure 7.4.1 Monthly Dealing Number of Livestock (Elwaye Market)

Source: Trade and Marketing Development Office, Yabelo Woreda

Note: Aug, Oct 2013, Jan, May, July 2014 have 5 weeks in a month while Nov, Dec 2013, Feb, March, April, June, August 2014 have 4 weeks.

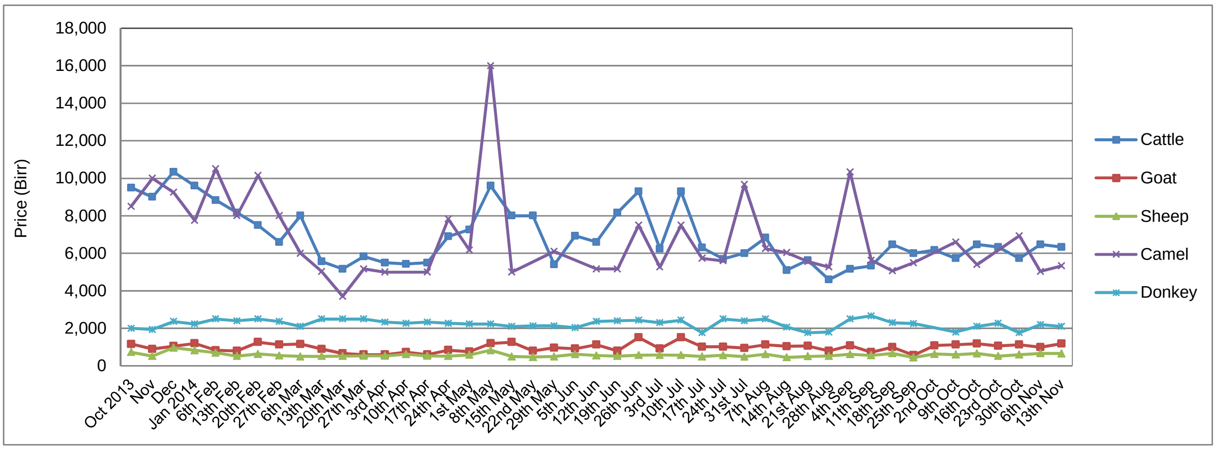


Figure 7.4.2 Monthly Average Price of Livestock (Elwaye Market)

Source: Trade and Marketing Development Office, Yabelo Woreda

Note: Big camels are not traded at the Elwaye Market. Therefore, the price is much lower than that of other markets.

Figure 7.4.2 shows monthly average price by animal at the Elwaye secondary market after the construction. Gradual drop in the price of cattle is found from December 2013 to the end of February 2014. This can be attributed to the dry season in Borena zone which ends in middle March. People tend to sell more animals to save livestock from losing toward the end of dry season. In fact, it corresponds with rapid increase of the dealing number after November (see Figure 7.4.1). Since many people are willing to sell animals, the price is likely to drop and the traders have more advantages than producers during dry season.

Generally, the price of cattle recovers after rain has started. However, because of poor rainfall observed during the 2014 *gana* season, the price has not recovered much even after March 2014. After March, the price has fluctuated and it is difficult to know the factors which determine the price. Although the price of camel has fluctuated more sharply, the pattern of the price change is similar to that of cattle. Basically, when the price of cattle increases, that of camel also increases and vice versa. There was no big fluctuation seen on the price of goat, sheep and donkey.

7.4.2 Outcome from the Livestock Market

Figure 7.4.3 shows a record of service fee collected at Elwaye primary market (before October 2013) and Elwaye secondary market (after October 2013). Since there is a big fluctuation of seasonal patterns on the number of animals traded, same months on different years should be compared each other in order to examine the changes after the construction. As shaded areas of Figure 7.4.3 shows, 48 weeks from 10th October 2012 to 12th September 2013 and 48 weeks from 17th October 2013 to 11th September 2014 are further examined.

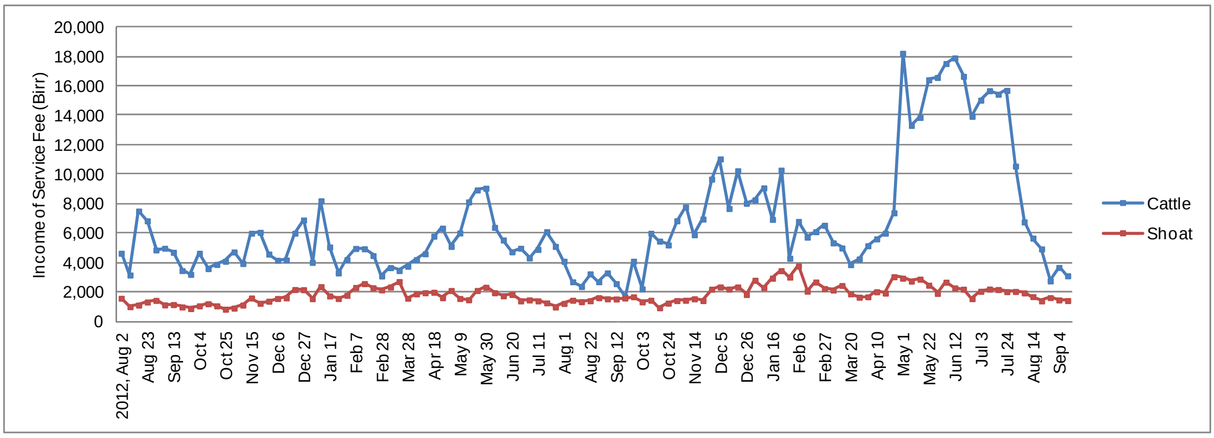


Figure 7.4.3 Weekly Income of Service Fee (Elwaye Market)
Source: Revenue Office, Yabelo Woreda

During the former period (before the construction), total amount of the market fee collected was 313,630 ETB (232,522 ETB from cattle and 81,108 ETB from shoat). On average, 6,534 ETB was collected every week. Meanwhile, 537,937 ETB (435,185 ETB from cattle and 102,752 ETB from shoat) was collected during the latter period (after the construction). On average, officers collected 11,207 ETB every week after the construction of the Elwaye secondary livestock market.

Compared to the primary market, increase of 172% is observed on the collection of the fee at the secondary market (187% increase from cattle and 127% increase from shoat). This increase is attributed to two main reasons; one is increase of livestock sale and another is ease of service fee collection. In respect with the latter reason, the officers from Revenue Office, Yabelo woreda, said that they are now able to collect the service fee more properly than before thanks to the fence surrounding the market. There used to be some people who in fact sold animals without paying the service fee.

Figure 7.4.4 estimates the number of animals sold at Elwaye primary market and Elwaye secondary market based on the service fee collected shown in Figure 7.4.3 and the average animal prices shown in Figure 7.4.2. Before the construction of the secondary market (a period of former shaded areas), weekly number of livestock sold was 483 (242 cattle and 241 shoats) on average while the number after the construction (a period of latter shaded area) was 759 (453 cattle and 306 shoats). The increase is by 157 % for both cattle and shoat, consisting of 187% for cattle and 127% for shoats.

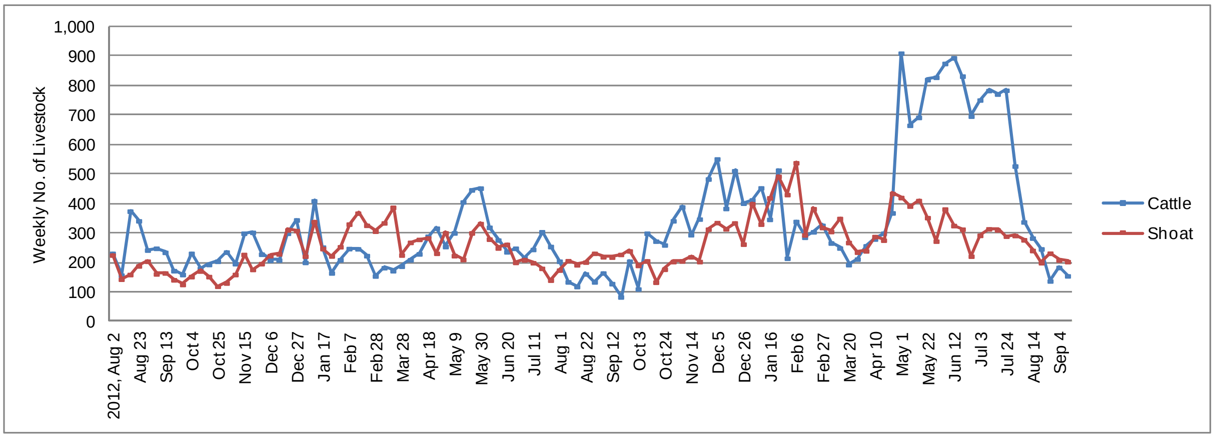


Figure 7.4.4 No. of Sold Animals Estimated from Service Fee (Elwaye Market)
Source: Revenue Office, Yabelo Woreda

7.4.3 Interviews to the Market Actors

Through the interviews to the market actors, the Team examined the change of livestock trading in Elwaye secondary livestock market after the construction. In the Elwaye market, the Team interviewed brokers and producers. The brokers for Elwaye market live in Yabelo woreda and purchase animals from the producers in the woreda or at the market. Then, they sell animals to the traders who are assigned by large traders in Addis Ababa and Nazreth (see Figure 7.4.5 showing value chain of livestock marketing in the Elwaye market). In the Elwaye market, the brokers generally have agreement with some particular traders and sell animals only to them. They seldom look for buyers on the market day.

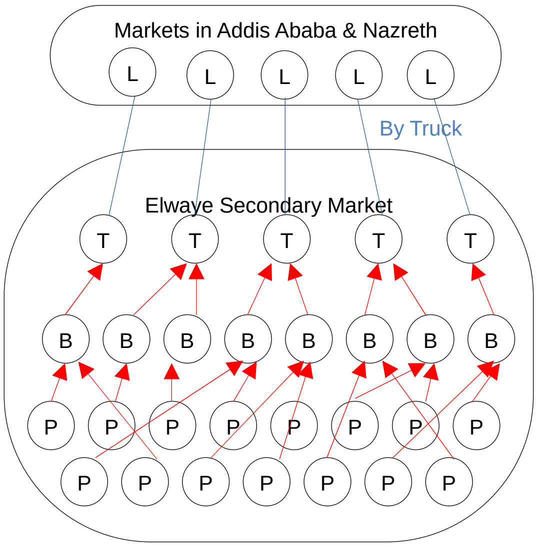


Figure 7.4.5 Value Chain of Elwaye Secondary Livestock Market
Source: JICA Project Team
L: Large Trader, T: Trader, B: Broker, P: Producer

The brokers have recognized such benefits on the secondary livestock market as; 1) increase of the traders, 2) increase of the brokers, 3) market service fees (tax) properly collected and the system is fair for everybody, and 4) after purchasing, animals can be gathered in one place and easily handled. Regarding 1) increase of the traders, though there used to be only 2 to 3 traders, now 6 to 8 traders come to the Elwaye secondary market. In respect of 2) increase of the brokers, the number of brokers dramatically increased from 20-30 to 130-100.

The Team further interviewed 30 producers who have used the Elwaye secondary livestock market, asking advantage, disadvantage and necessary functions to be introduced (see Table 7.4.1). Regarding changes of trading upon construction of the secondary market, the producers pointed out the increase of the traders and brokers, upgrading of market facilities, suitable location of livestock market for trading, reduction of thefts of animals and some said no special changes seen. In sum, though most interviewees gave positive answers about the secondary livestock market, there were concerns about reduction of livestock price and in fact a few producers said this reduction was attributed to the construction.

Table 7.4.1 Advantage and Disadvantage of Elwaye Secondary Livestock Market

Advantage		Disadvantage		Necessary Function	
・ Good fencing system	19	・ No disadvantage	23	・ All function is fulfilled	16
・ Good partition of the compound	10	・ Price decline	2	・ Water access	7
・ Reduce the act of theft	7	・ Charging, even if not sell	2	・ Shadow	3
・ Good system of service fee collection	7	・ Compound is far from town	2	・ Selling and buying should be weighed by a scale	2
・ Good site selection	5	・ A large number of brokers	1	・ Need to attract big traders	1
・ Good income for government	3	・ No advantage	1	・ Road to Market	1
・ Construction itself is advantage	1				

Source: JICA Project Team

7.5 Operation of the Malka Soda Livestock Market

7.5.1 Livestock Trading

Likewise, officers from Trade and Marketing Development Office of Malka Soda woreda kept a record of dealing number of livestock by animal species with average price on a weekly basis. Figure 7.5.1 and Figure 7.5.2 show those of monthly figures. Malka Soda secondary livestock market was also upgraded from a primary market. The dealing number of August 2013 in Figure 7.5.1 was obtained from Malka Soda primary livestock market before opening of the secondary market. It was found that the dealing number of cattle increased rapidly, and became triple and then six times of that of August, 2013 in a short period of time after the construction. That of goat also rose sharply and became six times within a few months.

After October 2013, there was reduction in the dealing number for both cattle and goat toward February 2014. And then they increased and the line for cattle actually became a maximum in October 2014. The line for goat also started recovering after June 2014. In addition, the dealing number of sheep also gradually increased after February 2014. On the other hand, the dealing number of camel and donkey remained, except for the camel in October 2014, unchanged throughout the survey period and kept a low level of the number in the Malka Soda market.

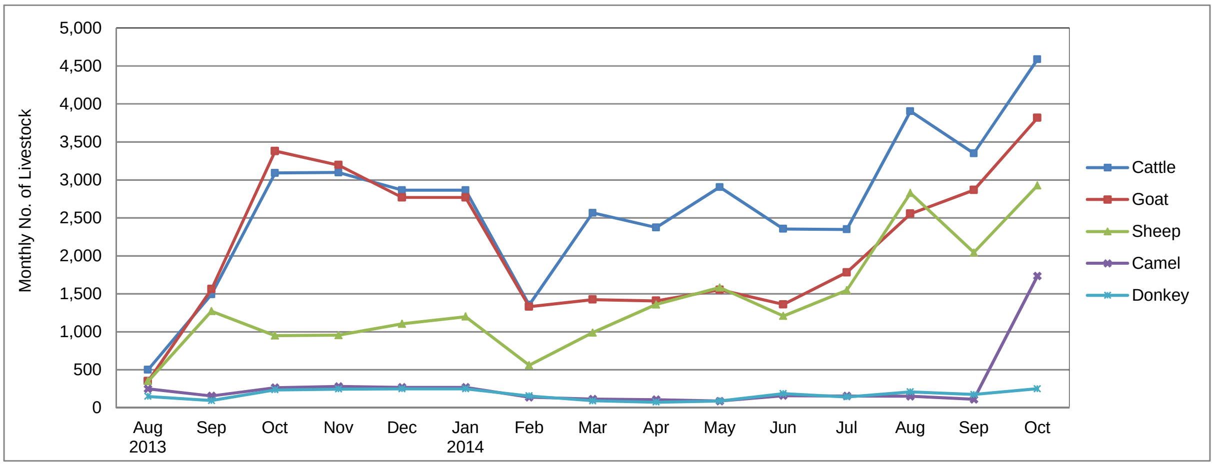


Figure 7.5.1 Monthly Dealing Number of Livestock (Malka Soda Market)

Source: Trade and Marketing Development Office, Malka Soda Woreda
Note: Aug, Oct 2013, Jan, May, July 2014 have 5 weeks in a month
while Nov, Dec 2013, Feb, March, April, June, August 2014 have 4 weeks.

On the price of livestock at Malka Soda secondary market, there was no big fluctuation seen from the one at the Elwaye market though camel price has been fluctuating somewhat in a wide range (see Figure 7.5.2). Especially, the price of cattle has been relatively stable and has not been affected much even during dry season. This may be because Malka Soda woreda is often categorized as agro-pastoral area where the impact of dry season is relatively moderate and therefore the price drop towards the end of dry season may not be same as that in Elwaye.

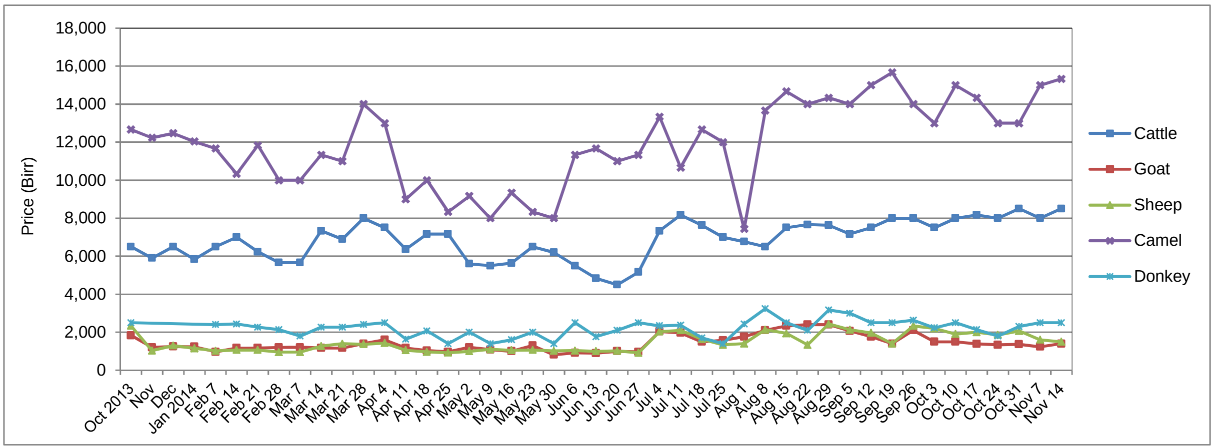


Figure 7.5.2 Monthly Average Price of Livestock (Malka Soda Market)
Source: Trade and Marketing Development Office, Malka Soda Woreda

7.5.2 Outcome from the Livestock Market

Figure 7.5.3 shows record of service fee collected at Malka Soda primary livestock market (before October 2013) and Malka Soda secondary livestock market (after October 2013). Since there is a big fluctuation of seasonal patterns on the number of animals traded, same months on different years are compared in order to examine the changes after the construction. As shaded areas of Figure 7.5.3 shows, 49 weeks from 12th October, 2012 to 13th September 2013 and 49 weeks from 11th October 2013 to 12th September 2014 were examined.

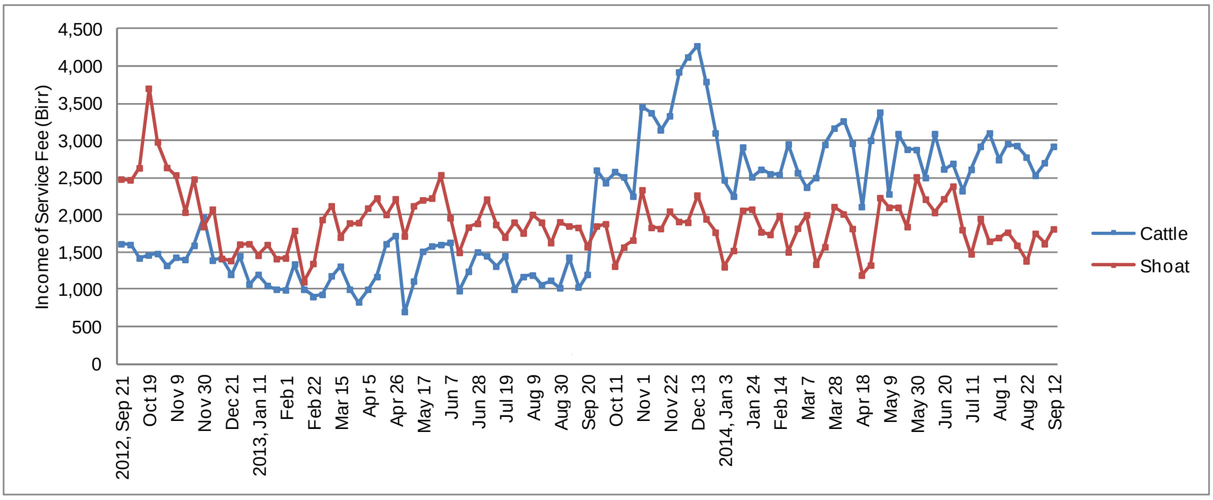


Figure 7.5.3 Weekly Income of Service Fee (Malka Soda Market)
Source: Revenue Office, Yabelo Woreda

During the former period (before the construction of the secondary market), total amount of the market fee collected was 15,7542 ETB (61,900 ETB from cattle and 95,642 ETB from other animals). On average, 3,215 ETB was collected every week. Meanwhile, 230,964 ETB (141,399 ETB from cattle and 89,565 ETB from shoat) was collected during the latter period (after construction). On average, officers collected about 4,714 ETB every week.

Compared to the primary market, increase of 147% is seen on the fee collection by Revenue Office. This increase is attributed to two main reasons; one is increase of livestock sales and another is the ease of service fee collection as already afore-mentioned. On the other hand, the fee collected from the trading of shoat decreased by 6%. This may have attributed to a reason that the Revenue Office included the fee from other animals such as camels, donkeys and mules in that of shoat from 21th September 2012 to 27th September 2013. However, as the trading of cattle dramatically has increased, as a whole, the total fee collected marked an increase.

Figure 7.5.4 estimated the sales of animals at Malka Soda primary market and Malka Soda secondary market based on the service fee collected. Before the construction (period of former shaded areas), weekly number of livestock sold was 405 (126 cattle and 279 other animals) on average. The number increased to 550 (289 cattle and 261 shoat) after the construction (period of latter shaded area). The number of traded cattle per week became more than double. On the other hand, that of shoat slightly decreased and keeps almost similar levels. As explained above, as the figure of the shoat included the number from other animals from 21th September 2012 to 27th September 2013, it could be assumed that actual increasing rate of shoat may be more than that shown in Figure 7.5.4.

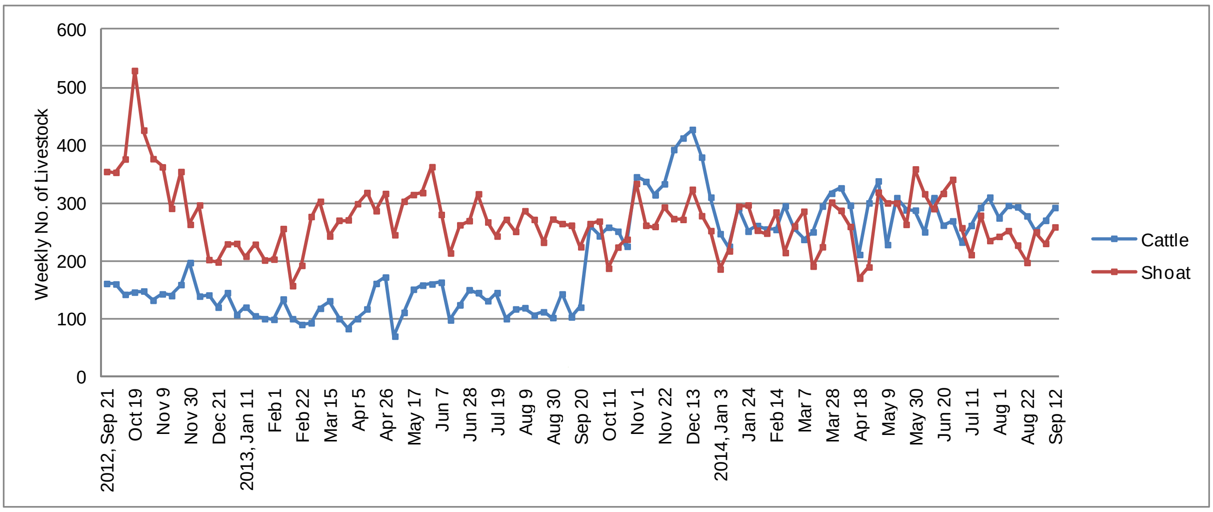


Figure 7.5.4 No. of Sold Animals Estimated from Service Fee (Malka Soda Market)

Source: Revenue Office, Yabelo Woreda, Note: Revenue Office included the fee from other animals such as camels, donkeys and mules in that of shoat from 21th September 2012 to 27th September, 2013.

7.5.3 Interviews to the Market Actors

In the same way at the Elwaye secondary livestock market, the Team examined the change of livestock trading in Malka Soda secondary livestock market after the construction. In the Malka Soda market, the Team interviewed to traders and producers. The traders in the Malka Soda market usually live in Malka Soda woreda. They move animals they purchased at the Malka Soda market to Surupa or Haro Bake secondary livestock market and sell those to the big traders from Addis Ababa or Nazreth (see Figure 7.5.5 for the value chain of livestock marketing). The traders from the Malka Soda market do not sell the animals to pre-agreed big traders; rather they always negotiate and decide the big traders to sell the animals.

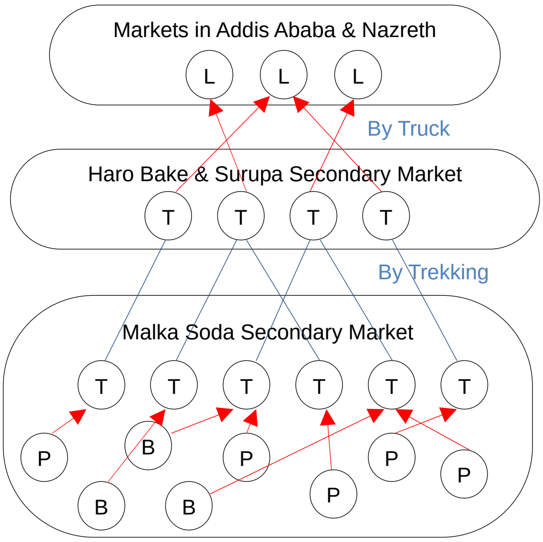


Figure 7.5.5 Value Chain of Malka Soda Secondary Livestock Market

Source: JICA Project Team

L: Large Trader, T: Trader, B: Brokers, P: Producer

Since the road from the Malka Soda market to the main road heading Addis Ababa is unpaved, every trader hardly transports animals by trucks, and rather they have to trek the animals over long distance.

Such poor accessible road for the trucks makes big traders from Addis Ababa and Nazreth not to come to the Malka Soda market or local traders not to transport animals directly to such big cities. This would be one of the top priority issues to be solved in order to increase the accessibility to the Malka Soda market.

All the traders answered to the interview pointed out the rapid increase of the brokers and producers on the market day. Some traders said although there used to be 50 to 60 brokers, the number increased to about 100 after the construction. Further, some said the number of the producers increased from 400 to approximately 1,000. As the Malka Soda market is a new market, they tended to come and use the facilities. Besides, the Team inquired the traders whether they prefer to purchase animals from the brokers or producers. Many answered that they prefer to buy animals from the producers because the price offered by the brokers is higher than that by the producers.

The traders in the Malka Soda market recognized benefits of the construction as; 1) after purchasing, animals can be gathered in one place and easily handled, 2) market service fees (tax) are properly collected and the system is fair for everybody, and 3) the act of thieves has been reduced. Regarding 2) market service fees, some said that the traders as the payer of the fee also thank the system because the collected service fees are used for the development activities of municipality and this would benefit the residents.

The Team further interviewed total 28 producers, who have been to the Malka Soda secondary livestock market (see Table 7.5.1). All the interviewees said they have good impression on the market. Regarding the change of trading associated with the transition from the primary market to the secondary market, as the whole, though people gave positive answers on the secondary livestock market, there were also concerns about reduction of livestock price and in fact some producers considered this reduction was due to the construction just like producers at the Elwaye secondary market.

Table 7.5.1 Advantage and Disadvantage of Malka Soda Secondary Livestock Market

Advantage		Disadvantage		Necessary Function	
· Good fencing	17	· No disadvantage	21	· Equipped	13
· Reduce the act of theft	7	· Charging fee, even if not sell	6	· Water access	13
· Good system of service fee collection	6			· Shadow	9
· Good income for government	5				
· Good partition	5				
· Good site selection	1				
· Business opportunity for the communities	1				

Source: JICA Project Team

7.6 Summary of the Market Operation

As a summary, it was found that the trading of livestock at the Elwaye and Malka Soda secondary livestock markets became much active in terms of the livestock dealing number, the service fees collection and increase of the market participants as compared to before. In comparison with the Malka Soda market, the Elwaye market had more dealing numbers of animals and stronger relationships with big traders from Addis Ababa and Nazreth.

In this regard, the Elwaye market functions as a secondary market supplying animals to the terminal livestock markets and is a very important channel for the producers to meet and trade with big traders from the cities. As the Elwaye market is located along a major road, it has the great opportunity to become a secondary market. Meanwhile, the Malka Soda market plays a role in supplying animals to Haro Bake and Surupa secondary livestock market and therefore seems to still work as a primary market.

Many sellers and traders flocked the Elwaye market, now fully operated by the municipality (November 28, 2013)

Huge flocked mob of people gathers at the Malka Soda market (November 22, 2013)

Though most producers who are the pastoralist and agro-pastoralist from the rural communities very much welcomed the newly constructed secondary markets, in fact, some people think that drop of the price observed was due to the construction. The decline of the livestock price seems to have been caused by external factors because similar decline had also been observed at the terminal market in Nazreth (Adama). In Nazreth, there has been a gradual decrease in the price of cattle since June 2013 and the trend has still continued. As an example, the price was 12,000 Birr in June 2013, but it came to 8,000 Birr only in July 2014. During this period, increase of the price was never seen.

In addition, most areas of Borena zone had received poor *gana* rains in 2014. This may also have been one of the reasons causing the decline of livestock price, particularly at the Elwaye market. In Malka Soda, on the other hand, it relatively rained well. Thus, the price of animals at the livestock markets is always influenced and determined by various factors such as the prices at other domestic or export markets, occurrence of drought and livestock disease pandemics, etc. Thus, fluctuation of price should be examined comprehensively; otherwise many people may misread the reason of the price decline. The relevant offices, in this regards, should take appropriate measures for the dissemination of marketing information.

CHAPTER 8 DEVELOPMENT; PASTURE AND AGRICULTURE

To enhance resilience for the Borena population, there should be intervention in such a way that community based projects (CBPs), tried under this Project, further be extended. With the CBPs implemented, water points (*haros*) can be more constructed and maintained, and likewise rangeland (*kalos*) can be maintained and expanded. However, pasture production and agriculture improvement still need technical assistances since these activities are quite new in the Borena communities.

With regard to rangeland, they think it has to be managed rather than to be established by cultivation. Thus, sowing pasture seeds on their rangeland is uncommon at present among the Borena communities. Therefore, there should be a guide to promote pasture production. Regarding agriculture, farming is still a new practice in Borena zone and the practices on the farming need to be improved. Following discussion centers on the guidelines of how to promote pasture production and improve dryland farming:

8.1 Categorization of the Area: 4 Models

In order to identify the actual livelihood activities and farming practice at the lowlands of the Borena zone, a group interview was conducted in total 54 kebeles of 7 woredas by JICA team. The livelihood activities are defined by the natural and social condition including ethnic group distribution, and also these changes. Having observed these conditions and situation, the peoples' livelihood activities can be classified into 4 models (types) in the zone. The following table and figure show the characteristics of each model and their distribution by PA (kebele):

Table 8.1.1 Models Classifying Livelihood Activities in Borena zone

Particular	Model -I	Model -II	Model- III	Model -IV
Natural conditions	High temperature, little rain, dry climate, bushes	High temperature, little rain, bushes, grassland	Relatively cool weather, sometimes heavy rain, springs and rivers partially existed	Cool weather, sometimes heavy rain, springs, rivers and woods partially existed
Social conditions	Borena,Gabra	Borena< Gudji	Borena> Gudji	Migrants, Konso, Gudji
Main productive activity	Livestock rearing	Livestock rearing and crop production for self-consumption	Livestock rearing and crop production for cash	Crop production (for self-consumption and cash
Purpose of livestock rearing	Savings /cash income	Savings /cash income	Savings /cash income and for agricultural practice	For agricultural practice, partially for cash income
Main livestock rearing and raising methods	Cattle, Goat, Camel : Extensive pasture on the property and the surroundings, transhumance during the dry season	Cattle, Goat, Camel : Extensive pasture on the property and the surroundings, transhumance during the dry season	Cattle, Goat, Sheep: Extensive pasture on the property and the surroundings, sometimes transhumance while lack of pasture	Cattle, Sheep: Extensive pasture within the property and surrounding, barely transhumance
Purpose of crop production	Self-consumption	Self-consumption	Self-consumption & Cash income	Self-consumption & Cash income
Faming type	Extensive farming of maize and pulse crops	Extensive farming of maize, pulse crops and vegetables	Partial intensive farming of maize, pulse crops, tef, and vegetables	Intensive farming of maize, tef, wheat, beans, veges & permanent crops
Other livelihood	Livestock trade, commodity sale, apiculture, collection of incenses gum and trees	Livestock trade, commodity sale, apiculture	Livestock trade, commodity sale, apiculture	Livestock trade, s commodity sale, apiculture

Source： JICA team

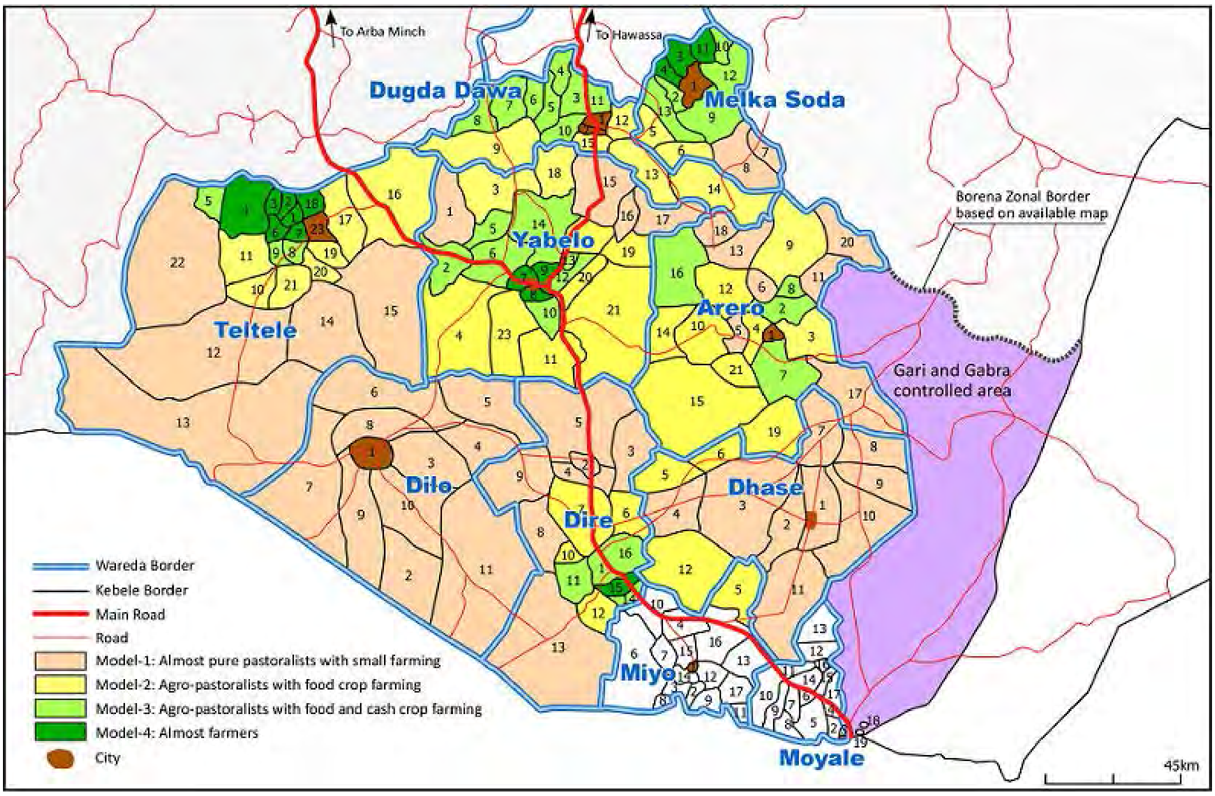


Figure 8.1.1 Distribution of 4 Models by PA (Kebele)
Source: JICA Project Team

8.2 Rangeland Management and Pasture Production in Borena zone

In order to increase productivity of pasture in communal rangelands, there are three types of approach to be taken; namely, 1) bush thinning, 2) regeneration of existing *kalo*, and 3) establishment of new *kalos* by pasture sowing. For the commencement of the pilot activity of forage production under this project, the JICA team observed several communal rangelands people were managing and conducted a survey on the condition of the rangeland and availability of pasture. Especially, the JICA team first examined the communal rangelands identified in the PAs undertaken under Phase I, where people were working, through the implementation of the CBPs.

Those 3 approaches were investigated in terms of adaptability according to the natural and present conditions. In order to select the best approach among the three approaches, three types of activities; namely bush thinning, fencing and pasture sowing were undertaken during the pilot project implementation period. The results of assessment on the communities' rangeland suggested the following 3 types of approach to support forage production in the target PAs.

Bush Thinning; Since natural vegetation is already established in their communal rangelands, communities need only to clear bushes which disturb livestock entrance to the area. Most of the target rangelands in Dhas and Arero woredas require this kind of measure. However, this does not mean that all of the bushes should be cleared. The communities need to select some bushes to be left, particularly economically and environmentally valuable bushes.

Yabelo Pastoral and Dryland Agriculture Research Center recommends that 30 to 50% of bushes should be thinned according to the condition of the land rather than clearing totally. JICA team supported the target communities by providing hand tools for slashing bushes through a subcomponent of community based projects (CBPs). In addition, intensive trainings on selective bush thinning were organized by the JICA team in Phase I and Phase II, targeting DAs.

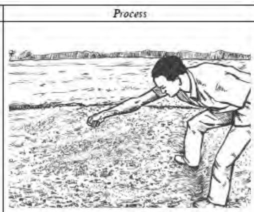
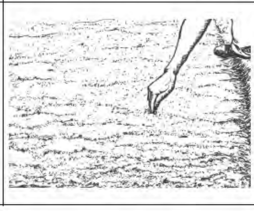
Step	Process	Description	Remarks
5		**Steps of Cutting Bushes** **In Case of Bushes with One Stem:** ➢ Cut at 0.5m height (knee height) above the ground by using machete or axe.	Scientifically appropriate seasons for thinning/ cutting are during long rainy and short rainy seasons or just after both rainy seasons. Specially, wet season after *gana* season around July is highly recommended in Borena zone.
6		**Steps of Cutting Bushes** **In Case of Bushes with One Stem:** ➢ Immediately debark.	Fully debarking and chopping the cut left should be done to kill the plant and avoid regrowth.

Left: Bush encroach areas in Teltele woreda requiring bush thinning.
Right: Guide of bush thinning (refer to Technical Manual for Community Based Projects in Borena zone)

Regeneration of Rangeland; Sowing of forage seed should be applied to the areas where it basically keeps natural vegetation, however a part of them has been degraded. The right picture clearly shows such condition wherein forage seed should be sown. A part of land does not have grass at all and remains just as bare land. It was observed that even during the rainy season, natural grass did not germinate in such parts. The seeds could be sown during long rainy season (March to May) and also short rainy season (September to October) in Borena zone for the purpose of regeneration.

A Part of rangeland has spot bare land and needs regeneration, Malka Soda woreda.

Establishment of Area Closure; When communities are interested in establishment of new rangeland using bare/degraded areas as the picture below shows, they can sow pasture seed after clearing unnecessary plants. In addition, they must agree to close the area after the sowing for 3 to 5 years to establish a good pasture land.

Step	Process	Description	Remarks
5		**Pasture Sowing** ➢ In general, depth of sowing seed should be considered as 3 to 5 times of seed size (e.g. if a seed is 5mm, the depth should be 15mm to 25mm). ➢ 2cm is the maximum depth for grass forage. For bigger seeds such as forage legumes, 1.5 to 2cm is enough. Many of seeds will not germinate when the depth is deeper than 3cm. ➢ The left picture shows **"sowing grass forage seed"** such as Buffel grass and Rhodes grass. At the level of knee, you can spread seed.	**The way to sow grass seed is similar to "Teff"**. On the other hand, the way to sow **legume forage is similar to "Haricot Beans"**. Most people may know how to plant Teff and Haricot Beans in Borena. Don't hesitate to sow pasture seed.
6		**Pasture Sowing** ➢ The left picture shows **"sowing legume forage seed"** such as cow pea and lablab. Drop a seed one by one at the level of ground. ➢ Seed rate differs according to the types of forage (e.g. grass forage, legume forage, and fodder tree). Please check the rate for each forage species as a following section explains. However, in general, too much seed rate suppresses the growth of forage. Therefore, low seed rate is more preferable than high seed rate.	Seedbed for legume forage needs to be ploughed more than that for grass forage. To minimize problems of too much seed sowing in small areas, we can mix the seed with animal dung, soil and sand.

Left: Highly degraded land with structure of soil band and micro basin in Yabelo woreda.
Right: Guide of pasture sowing (refer to Technical Manual for Community Based Projects in Borena zone)

8.2.1 Approach for Each Model Area

Generally speaking, types of approach to be taken for rangeland management very much relates to site locations. As the Team proposed 4 types of livelihood model in Chapter 3 and above Figure 8.1.1, the model would also give indications for the activities of rangeland management. Pastoral people (Model 1 to Model 2 indicated in Figure 8.1.1 and Table 8.1.1) need to focus more on bush thinning because density of the population in lowland areas is relatively small and it is difficult for the people to work over vast areas of rangelands.

The rangelands in such areas are now being encroached by invasive bushes, and in fact bush encroachment is the most prioritized issue. Meanwhile, people in agro-pastoral and farmers areas (Model 3 to Model 4 indicated in Figure 8.1.1 and Table 8.1.1) should introduce the activities of pasture sowing because expansion of bare or degraded land has become an acute problem nowadays. Further to soil erosion, population stress of livestock causes such issues as well.

Figure 8.2.1 summarizes of the results obtained from the 1st monitoring workshop conducted in Phase II, which shows the DAs' answer to a question of "which activities of rangeland management should be given a high priority?". The participants of the workshop from each PA were given 10 "peas" and allocated them based on their perception. Since DAs and their target communities had experienced three types of activities through the implementation of RREP pilot projects, it did not seem to be difficult for them to allocate the "peas" in such 3 priority issues of fencing, bush clearing and forage production.

	% of Pastralist	Woreda	PA	Fencing	Bush Clearing	Forage Production
Model 1	95-100%	Dillo	Liso	●●●	●●●●●	●●
	95-100%	Dillo	Gobso	●●	●●●●●●●	●
	95-100%	Dillo	Kancharo	●●	●●●●●●●	●
	95-100%	Dhas	Tesso Kalo	●●●	●●●●●	●●
	95-100%	Yabelo	Chari	●●●●	●●●●●●	
	90-95%	Teltele	Marmaro	●●	●●●●●●●	●
	90-95%	Arero	Harjarte	●●●●	●●●●●	●
	90-95%	Dillo	Magole	●●	●●●●●●●	●
	90-95%	Yabelo	Dhadim	●●●●●●	●●	●●
Model 2	85-90%	Dhas	Gayo	●●●●	●●●●●	●
	85-90%	Dhas	Anole	●●	●●●●●●●	●
	85-90%	Teltele	Dibe Gaya	●●●	●●●●●	●●
	80-85%	Arero	Webi	●●	●●●●●●	●●
	80-85%	Yabelo	Elw aye	●●	●●●●●●	●●
	70-80%	Arero	Qaw a	●●●	●●●●●●	●
	70-80%	Dhas	Gorile	●●	●●●●●●	●●
	70-80%	Arero	Hallona	●●	●●●●●●	●●
	70-80%	Arero	Fuldow a	●●●●	●●●	●●●
Model 3	50-60%	Arero	Gada	●●	●●●●●●	●●
	50-60%	Malka Soda	Soda Garmama	●●●	●●●	●●●●
	40-50%	Malka Soda	Daw a Dimtu	●●●	●●	●●●●●
	40-50%	Yabelo	Obda	●●●●●●●		●●●
	30-40%	Arero	Renji	●●●	●●●●●	●●
Model 4	20-30%	Yabelo	Hidi Ale	●●●	●●●	●●●●
	10-20%	Teltele	Bule Korma	●●●	●●●	●●●●
	10-20%	Teltele	Bule Dambi	●●●●●●		●●●●

Figure 8.2.1 Priority Activities on Rangeland Management

Source: JICA Project Team

It was obvious that the most of the participants acknowledged the importance of bush clearing due to the expansion of bush encroachment leading to shrinking Borana rangeland. In fact, this awareness was more significantly acknowledged in pure-pastoral areas (Model 1) than in agro-pastoral (Model 2 to 3) or farming areas (Model 4). In contrast, people in agro-pastoral and farming areas appeared to have concerns on forage production over bush clearing. As described in Chapter 3, bush thinning and fencing had been taken by *RREP approach*, since the communities ordinarily practiced those activities at their *kalos*. Meanwhile, the latter practices needed new intervention lust like a *Project approach*.

8.2.2 Recommended Varieties of Forage Seed for Each Model Area

Since the pilot activity under forage production was the first attempt to disseminate its output widely to the pastoral and agro-pastoral communities in Borena zone, the Team examined 11 varieties of forage seeds. At the commencement of the pilot activity of forage production, the JICA team, DAs in charge of the target PAs and both zone and woreda PDOs determined the varieties of the seeds in consideration of the natural condition of each target PA. Table 8.2.1 summarizes the Team's observation and recommendation on examined varieties of forages in 6 target woredas.

Because some PAs in Yabelo and Malka Soda woredas could be categorized as agro-pastoral area (Model 3 indicated in Figure 8.1.1) where rainfall condition is relatively better, the woredas tried more legume forage requiring more precipitation such as Vetch, Alfalfa, Lablab, Cow pea, Sesbania and Luceana. Meanwhile, more pastoral areas (Model 1 to Model 2 shown in Figure 8.1.1) such as PAs in Arero, Teltele, Dilo and Dhas woredas tried small amount of those seeds or not tried at all. Therefore, even though the Team did not examine some varieties of seeds in particular PAs as Table 8.2.1 shows, they are not recommended.

Table 8.2.1 Recommended Varieties of Forages in 6 Woredas Based on the Team' Observation

woreda	Rhodes Grass	Elephant Grass	Pigeon Pea	Vetch	Alfalfa	Lablab	Panicum	Cow Pea	Sesbania	Luceana
Yabelo (Model 1 to 4)	◎	○	◎	△	△	△	Not examined	△	△	△
M Soda (Model 3 to 4)	◎	○	◎	△	△	△	○	△	△	△
Arero (Model 1 to 3)	◎	△	◎	Not examined	×	△	Not examined	×	Not examined	Not examined
Teltele (Model 1 to 4)	◎	○	◎	×	×	△	Not examined	×	Not examined	Not examined
Dilo (Model 1)	◎	×	◎	Not examined	×	×	Not examined	×	Not examined	Not examined
Dhas (Model 1 to 2)	◎	×	◎	Not examined	×	×	Not examined	×	Not examined	Not examined

Source: JICA Project Team

Remarks: ◎(highly recommended), ○(Recommended), △(Recommended but need cautions), ×(Not recommended)

As Table 8.2.1 shows that the most recommended varieties of forage are Rhodes grass and Pigeon Pea able to be sown in all the Model areas. Both of them are drought tolerant perennial grass/legume species and easily established by simple methods. Since both of them produces a large amount of seeds every year after having been establishes and very much stable even in a drought year, the community members can collect and multiply the seed and expand their pasture land by themselves. Therefore, if the government and donors launch pasture production in Borena zone, it is advisable for them to start producing Rhodes grass and Pigeon Pea first.

Then, Elephant grass ranks third. Elephant grass is perennial and very much stable after the establishment as well and the grass has big biomass. However, because the cuttings are commonly used for planting the elephant grass rather than sowing the seed, the distribution to the communities is difficult in terms of logistics. This is because that after harvesting the cutting from the matured Elephant grass, people should plant them at least within 2 weeks. Otherwise, they dry up and cannot take root in the pasture land. It cannot be stored and therefore Elephant grass is linked to a high risk of being spoiled if drought comes. Especially, Elephant grass should be introduced to Model 3 to 4 areas first.

Annual legume crops such as Lablab and Cow Pea were introduced as dual purpose crops which benefit both human beings and livestock. In fact, it is unsuitable to sow in the bare and degraded land. Rather, they require well-prepared seed beds for sowing the seeds. The JICA team recognized that introduction of annual legume crops should have been combined with farming activities and difficult to let the communities acknowledge the potentials of such crops at least at the beginning.

It is found that cultivation of such dual purpose crops is still difficult in Model 1 to Model 2 areas since agriculture there is primitive or has not yet experienced. Particularly, since the pilot activity was the first attempt, it took long-term for local people to accept the idea of pasture production. Some PAs in fact seemed to be confused the difference between perennial and annual crops. They must collect the seeds every year. Therefore, if they fail to produce some seeds, such activities will possibly end. Thus, they were given "△" or "×". The trial should be started at Model 3 to Model 4 areas.

Fodder trees such as Sesbania and Luceana were also introduced in Yabelo and Malka Soda woreda where more Model 3 to Model 4 PAs is present. Because they are fodder trees requiring more water than grass and legume forage, the JICA team distributed the seedlings of them only to those woredas. The seedlings were produced at the nursery sites in Yabelo town and transported directly to the target PAs. Generally speaking, Sesbania and Luceana were known as drought tolerant fodder trees requiring minimum 500mm and 650mm rainfall.

However, after the Team reviewed the outcomes of the pilot activities and assessed their adaptation to Borena environment, we acknowledged planting of those trees were difficult in the areas and definitely required structure of water conservation structures such as micro basin. The JICA team observed that even though the trees were well-established after the rainy season, once they were exposed to shortage of rainfall, they easily dried up during the drought time. Therefore, they are recommended to produce only in areas and sites which can harvest the rainfall and water.

8.3 Dryland Farming Improvement in Borena Zone

8.3.1 Characteristics of Farming Practice and Crop Production by Model

Borena population mostly depends on livestock raring for their major livelihood. However, their staple food nowadays is already cereals such as maize. Thus farming can be seen at many places within Borena zone especially where there are more amount of rainfall and also fertile soils. Further, farming as can also be seen even in very dry areas such as those ones bordering with Kenya, which is tried as a supplemental means for survival of their life. The farming practice and crop production by livelihood model is shown in the following table.

Table 8.3.1 Farming Management and Crop Production by Livelihood Model

Particulars		Model I (Mostly livestock rearing)	Model II (Livestock rearing and crop production for self-consumption)	Model III (Livestock rearing and crop production for cash)	Model IV (Mostly crop production)
Farming practice	Water resource for agriculture	Rain fed, Temporary water retention	Rain fed, Temporary water retention	Rain fed, Temporary water retention, water spring and rivers *1	Rain fed, Temporary water retention, Spring and Rivers *1
	Characteristics of cultivation land	Around the house and compound(Olla), slope - flat, sandy, loam soil	Water logging lowland, Flat, Sandy or Sandy-loam soil	Lowland, River basin, Slopes, Sandy-loam soil	Lowland, River basin, Slopes, Fertile soil
	Farmland size	1 - 4 ha	1 - 3ha	0.5 - 2ha*2	＜1ha*2
	Planting times	1time	1 - 2times	2times	2times
	No. of crops	0 - 3 crops	2 - 4 crops	More than 4 crops	More than 5 crops
Situation of crop production	Agriculture input investment	Seeds, Agricultural tools, Dabo*3	Seeds, Agricultural tools, Dabo	Seeds, Fertilizer, Agricultural tools, Dabo	Seeds, Fertilizer, Agricultural tools, Herbicides, Dabo
	Cultivation	Mostly by draft animals	Mostly by draft animals	By animals and hands	Mostly by hands
	Practiced agricultural techniques	Measures for water harvesting, water and soil conservation in some parts	Water & soil conservation and Line planting practiced in part but mostly not applied new agro techniques	Partially water and soil conservation, Started applying new techniques but hardly seen intercropping, Crop rotation	Water harvesting, Water & soil conservation. Fertilizer application, Line planting, Intercropping, Crop rotation and Agroforestry
	Grain harvest	Very few (High frequency of crop failure)	Few (High to medium frequency of crop failure)	Plent to Few (Crop failure recently)	Plenty except in big droughts
Example of corresponding PA		Chari, Gayo, T/kalo, Maromaro All Dillo wareda	Elaye, Qawa, Hallona, Fuldowa, D/Gaya	B/Dagaga, H/Gora,Dadim, H/Ale, Gada	G/Bicho, D/Dimitu, Obda, B/Dambi

*[1] Ponds, spring and rivers are mostly seen in the living areas of Konso and Guji, but the water resource is barely used for agricultural irrigation

*[2] Cultivation area at settled areas is less than 1ha but the people have large farmland in other PAs in case of Borena.

*[3] Dabo is a traditional work sharing system with relatives and/ or neighbors mainly during weeding and harvest. The host family should provide food and drink for the participants. It corresponds to the Japanese “Yui”.

Source: JICA Team

1) Model –I: New Large Scale and Extensive Farming Practice

This model is found in the areas with a difficult condition for crop production. For that reason, it less contributes to people's livelihood. According to interviews, maize grain harvest is possible only once in every 3 to 4 years. It is due to the location of farmland and extensive farming system out of natural condition. Most of the farmlands are located close to their villages (*Ollas*) in order to protect animal attacks, and located in higher areas. It is therefore difficult to use rainwater flows from tops of the hills or moisture stored in certain time in the case of lower hollows. Additionally, in order to increase crop production to compensate little productivity, they usually cultivate larger areas.

However, even under such conditions, there are some farmers who started the activity and show a lot of interest in crop production in order to secure food and feed. They are trying to practice a line planting and to apply manure (animal dung) within their possibilities following DA's advices. Also they are making efforts to increase productivity by themselves; for instance, during the time they move cattle, they acquire seeds and learn farming techniques as they find a model farm on the course. They also sometimes apply soil and water conservation measures to collect somewhat water and moisture even if the field location is not good. As a result, it was possible for some farmers to harvest grains even during the *Gana* season in 2014 when there was drought.

2) Model –II: Conservative Farming Practice with Medium and Large Scale Farmland

The areas where this model is present have little rain, but there are some places, usually lower part of area where rainwater flows and stays for several days or weeks after certain rain. Even though the people have some information regarding modern agricultural techniques, but these are barely practiced. For instance, the manure application to the farmland is recommended but they believe that the application of manure impedes the rainwater penetration into the soil and also the manure encourages weed growth. growing. As for the line planting, the people believe it is time and labor consuming. Thus, broadcast sowing with a traditional tillage '*Shilshalo'* are practiced, which often causes thinning out of strong seedlings.

Missing good timing for crop production causes the reduction of productivity. Before the rainy season, most of the male adults in charge of the plowing are away for searching pasture, and it is not possible to start cultivation right after the rain. In addition, since a pair of drafting oxen is usually shared by 6 to 10 households, waiting a turn to use them for plowing lead them to miss the good timing of rainfall. For these reasons, the production of grains is low. It is also important to produce crops as an animal feed. However, even if a plant starts drying and dying due to lack of rain, it is still left in the field by the belief that the plant can recover and get somewhat grains if it rains later. In this case, the residue and stems are to lose nutritional value as a feed, meaning the residues not used efficiently.

3) Model-III: Vulnerable Farming Practice toward Climate Change

This model was commonly seen in the areas which have a good condition for crop production; relatively cool weather and enough rainfall and some parts have water resources. Certain harvest could be realized even with extensive agriculture practices. However, due to erratic rain in term of the amount and the pattern, floods often occur and cause the destruction of the fields and plants especially in recent years.

To improve above situation, the people have constructed simple structures to change the channels of floods or to slow its speed and they have started using early matured varieties which can fairly grow in short rainfall condition. Nevertheless only few people practice crop rotation and intercropping which take advantage of the characteristics and physiological features of the crops so that the soil fertility decreases as a result the crop productivity reduces. Moreover, in the case of Borena people, they have been used to cultivate by a pair of draft oxen sharing with *Olla* members. It limits to work in the field on time with rainfall, which also causes the reduction of productivity.

Destructed farmland (Cholkasa, Augast 2014)
Source: RREP team

In spite of the situation, the people make their lives with crop production; maize, haricot beans and wheat mainly for self-consumption and the surplus of haricot beans and teff[1] for cash income. Vegetables and fruit have been recently introduced but those productions are not enough for family income to sustain due to missing of the rainfall timing and also the occurrence of pest and diseases. The people who do not have animals to sell have to reduce the portions of their own self-consumption in order to sell to get some cash.

4) Model-IV: Intensive and Mixed Small Scale Farming Management

For the majority of the people in this model-IV area, crop production is the main livelihood activity but their farmland per household is less than 1 ha. The reasons are; 1) the fields are located in slopes, and as a result farming management requires a lot of work; 2) because of shortage of draft animals, all work should be done by manual; 3) there is no land to expand due to increase of population. The first 2 reasons are common at areas inhabited by Konso and Guji ethnic people, which is one of the reasons for the low rate of draft animals used for farming. The last reason is usually seen at Borena dominant areas, and most of those who have small farmland in their residential place possess a certain area of field in neighboring PAs where there is still unused place suitable for crop production.

The people of this model try to use rainfall as much as possible for crop production. In the sloping field, terraces and soil band are made to keep the moisture from water flow or banana trees and sugar cane are planted to slower water speed of flowing rain. However, it is said that the crop has failed in case of big droughts. In order to avoid such risks, various crops are grown in narrow space, e.g. maize, teff, wheat and barley as a staple food, and also haricot beans, chickpea, pepper, kale, papaya etc.. Permanent crops like ensert (false banana), coffee and chat can be seen in some areas as same as kind of agroforestry practices.

Unorganized Planting (Bule Hola, June 2012)
Source: JICA team

Almost all the plants in this model area are roughly mixed, and rotated but not efficiently. Another characteristic of this model area is to entail various kinds of weed, pest and diseases because the environment where model-IV is seen is also favorable for such pest and diseases. For instance, the *Parthenium* (*Parthenium hysterophorus*), which is a foreign species, is hard to protect. In addition, African armyworm/ stalk borer in maize and rust in such cash crops as haricot beans and teff cause decrease in the production.

8.3.2 Farming Practice Improvement

1) Common Challenges of Farming Practice

The levels of farming practice and situation of crop production differ among the livelihood models but three common challenges can be observed in the Borena zone namely; 1) low productivity due to the

[1] Teff is the main staple food for the migrants and the population around urban areas but for most Borena and Guji, it is the main cash crop directed for urban areas.

erratic pattern and meager amount of rainfall, 2) inappropriate land use and agricultural techniques, and 3) monolithic use of crops and the residue. The following figure shows the issues to be improved regarding farming management by model presented before and the relations with the common challenges.

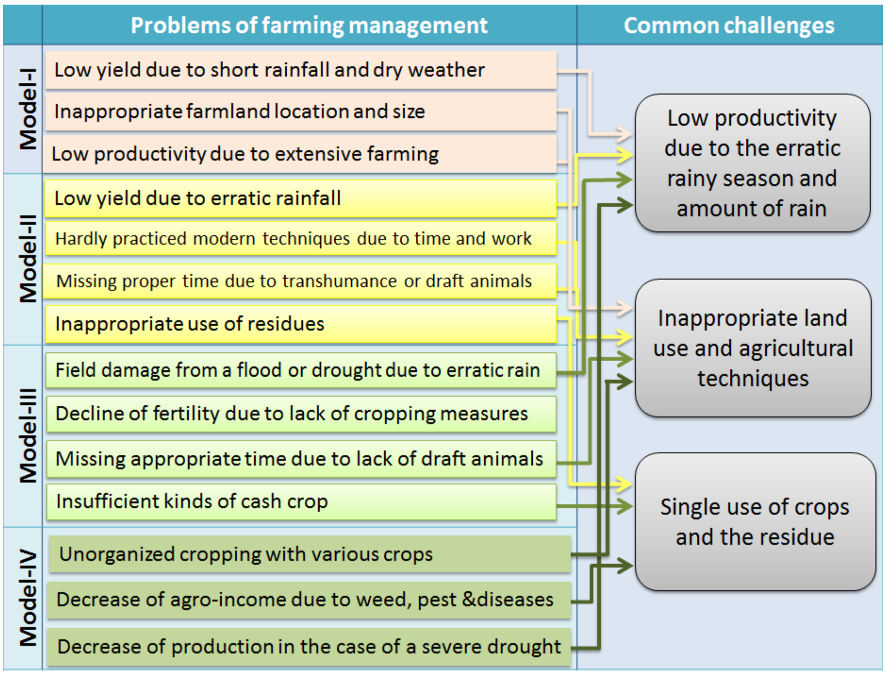


Figure 8.3.1 Problems of Farming and Common Issues by Model
Source: JICA Team

Due to the erratic pattern and the meager amount of rainfall for the model I and model II areas, the probability of getting return (harvest) can be lower despite the dedicated laborious farming works. As a result, many people do rarely work hard and longtime in the fields, which results in extensive farming in a large area. On the other hand, in the areas where model III and IV are seen, the people are lavish in working hard for crop production in the field.

However, the people in model III and model IV area cannot try to introduce new crops or different usages of crops because they do not know how to react to the change of rainfall. Also while expecting somewhat grain yield, the people are waiting the rainfall until the plant totally dies, which is not efficient way as fodder production. Under the present circumstances, it is necessary to improve this farming practice to secure the production of food and cash crops, as well as nutritional animal feed, by coping with this irregular rainfall regime.

2) Principles for the Improvement of Farm Management System

In order to tackle to the above 3 challenges, a basic principle is to introduce measures and techniques to be implemented only with small scale investments and labor by the communities and the relevant people. Therefore, it is required to optimize rainwater for crop production, together with the capacity development on agricultural techniques. According to the present conditions and the results obtained by the pilot projects implemented under RREP, the principles of the technical measures are summarized in the following:

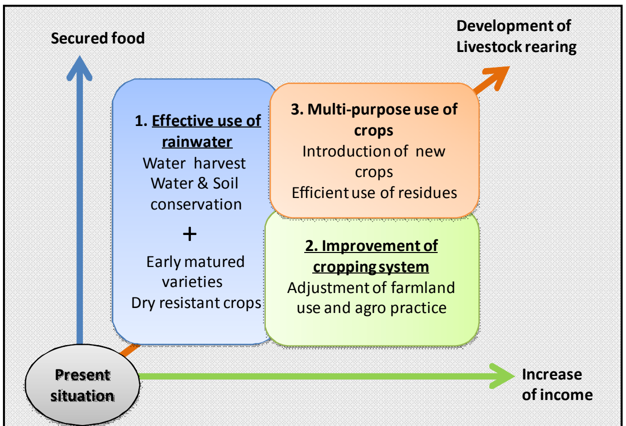


Figure 8.3.2 Measures required by Model
Source：JICA Team

2.1) Effective Use of Rainwater: Water Harvest and Water and Soil Conservation Techniques

The objectives of water harvest and water and soil conservation in the Borena zone are to recover the land and to prevent flood and soil erosion. Those have hardly been directed toward the efficient use of water for crop production or farmland conservation so far. However, certain good results can be observed in crop production in certain areas. For instance there are constant yield through construction of terraces and stone band in Teltele wareda.

Following to the above good practice, the efficient use of water shall be attempted by the introduction of appropriate techniques considering the climate and topography conditions of each model, as well as the requirement of labor force for livestock rearing. However, even if the rainwater can be used efficiently, it is difficult to grow local varieties which are late matured under the present rain condition. Therefore the introduction of early matured varieties and drought tolerant crops is needed for harvesting grains some extent even with small amount of rainfall.

2.2) Improvement of Cropping System: Appropriate Farmland Use and Dissemination of Agricultural Techniques

It is important to clarify the role of crop production for each model, and then to determine the appropriate farmland size and agricultural techniques applied accordingly to the purposes in different place and model. For instance, in the areas with extensive agriculture at large size like model I and model II, productivity should be improved by the implementation of agricultural works on time meeting rainfall pattern and the introduction of effective and appropriate crop field management.

Based on the expected grain production with new techniques, it is necessary to minimize farmland size while the remaining area should be used as pasture or as fallow land for the rotation of crops depending on people’s needs. On the other hand, the areas where crop production has an important role for the livelihood but farmland cannot be expanded, like in model III and model IV, efficient production should be achieved by crop diversification, intercropping and crop rotation through an appropriate cropping system.

2.3) Multi-purpose Use of Crops: Effective Use of Crops and Residues

Currently, crop production is practiced in a traditional and conventional way. The increase of productivity and the stability in the production of food and cash crops should therefore be aimed by the improvement of farmland management through efficient cropping technologies, like the improvement of soil fertility and prevention of pest and diseases, together with the introduction of new crops adaptable to the environment and the demand differed place to place.

Also, the residues and the dried plants usually used have little nutrient value as feed. Therefore the use of residue with high nutritional value by the improvement of storage methods and appropriate timing for the plant cutting is recommended, no matter how much the grain harvest is. The appropriate use of residue is needed to improve livestock rearing for models I and II. In the case of models III and IV, with little number of animals, utilization of residues as feed can be introduced as a new source of income by innovating the processing and storage methods.

3) Measures and Techniques to Improve Farming practice by Model

The position of crop production for livelihood is determined by social conditions and the land use is different by the natural environmental condition such as the shape of land, the geography, the type of soil, availability of streams and also occurrence of floods etc. The above mentioned challenges regarding farming management system and the development potential by point of view of the natural environmental are summarized in the following Table 8.3.2, and further appropriate techniques which should be introduced according to the models are shown in Table 8.3.3:

Table 8.3.2 Challenges on Farm Management and Development Potential by Model

	Objective of crop production	Challenges	Principles of Improvement			Potentials of Development
			(1)	(2)	(3)	
Model I	Self consumption Animal food	- Increase of grain harvest using rainwater	◎	○	○	✓ Good practice of water and soil conservation, and water harvest ✓ Unused land proper for cultivation ✓ High interest in improving techniques and people's strong willingness
		- Adjustment of farmland location and area	○	◎	—	
		- Improvement of productivity by the introduction of appropriate technology	—	◎	○	
Model II	Self -consumption/ Animal feed	- Increase of grain harvest by introduction of appropriate measures to use rainwater	◎	○	○	✓ Appropriate location of farmland ✓ Implementation of recommended techniques including water harvest and soil & water conservation ✓ Large volume of manure being wasted
		- Dissemination of new techniques not requiring much work and time	○	◎	—	
		- Prevention against missing the proper period of crop production	○	◎	△	
		- Appropriate use of vegetal residue to use as animal feed	—	○	◎	
Model=III	Self-consumption Monetization	- Making structures coping with erratic rainfall	◎	○	—	✓ Relatively cool climate ✓ Occasional occurrence of strong rain ✓ Partial introduction of new techniques ✓ Existence of products that can be introduced
		- Increase of soil fertility by proper farming measures	○	◎	—	
		- Crop production in proper period (efficient use of draft animals)	○	◎	△	
		- Lack of diversification of crops for monetization	○	○	◎	
Model-IV	Self-consumption Monetization	- Innovation of crop rotation and intercropping	○	◎	—	✓ Cool climate and abundant rain ✓ Possibility to grow different variety of products ✓ Numerous vegetation
		- Increase income by improvement of prevention method of pest & diseases and weed	—	◎	○	
		- Damage reduction of productivity during severe droughts	◎	○	—	

Source: JICA Team

Table 8.3.3 Technical Measures Applied for Each Model

Particular	Model -I	Model-II	Model-III	Model-IV
Effective use of rain water: water harvest and water and soil conservation measures	- Zai pit, Tied contour ridge. Etc. - Introduction of early matured varieties (Melkassa-1) and dry resistant crops	- Counter ridge, Soil band, etc. - Introduction of early matured varieties (Melkassa-1), products resistant to dry weather	- Gabion, permeable rock dams, stone pilling, tied contour ridge - Humidity resistant crops - Early matured varieties (Melkassa-4, 1)	- Introduction of family pond - Permeable rock dams, construction of dams, stone pilling - Introduction of early matured varieties (Melkassa-4,BH540, etc.)
Adjustment of farming land and dissemination of agricultural techniques	- System of farming works properly timed with the rainy season - Use of manure, line planting, adequate intercropping) - Introduction of crop rotation and intercropping - Introduction of trees for forage, pasture and aromatic trees - Adjustment of cultivation area	- System of farming works properly timed with the rainy season - Use of manure, line planting, adequate intercropping) - Introduction of crop rotation, intercropping and mixed crops to prevent weeds - Introduction of trees for forage and pasture production - Adjustment of cultivation area	- System of farming works properly timed with the rainy season - Methods for the application of manure and chemical fertilizers - Line planting, intercropping - Implementation of proper crop rotation and intercropping to prevent weeds, pest and disease	- Proper crop rotation, intercropping, relay cropping - Introduction of improved agricultural tools - Introduction of repellent plants
Effective use of crops or residue	- Introduction of drought resistant crops - Green cutting, farm pasture - Grain drying and storage - Planting of trees for forage and incense trees and efficient collection	- Introduction of dry resistant crops - Green cutting, farm pasture - Grain drying and storage - Planting of trees for forage and incense trees and efficient collection	- Introduction of crops as measures against flood - Green harvest - Production and sales of silage from existing crops residue - Sales of humidity resistant crops	- Introduction of crops as measures against flood - Green harvest - Production and sales of silage from existing crops residue - Sales of humidity resistant crops

Source: JICA Team

It is better to introduce very early or early matured varieties together with 1) Water harvest and water and soil conservation measures. In the case of maize Melkassa-1, very early matured varieties, is suitable for model I and II areas and Melkassa-4 and BH540, whose matured period is a little long but early matured varieties with high productivity, are more appropriate for model IV areas. For the model III, the appropriate variety should be identified according the climate condition.

Regarding 2) Adjustment of farm land use and dissemination of agricultural techniques, the measures all depend on the challenges, the natural and social environment different by model. The keys should be to meet the timing of agronomical practices to rainfall, appropriate farmland size and cropping pattern. Regarding '3) Effective use of crops and residues', the aim is to introduce the production of forage production and effective use of residues for the model I and model II. On the other hand, for the model III and model IV, it is recommended to introduce crops for prevention of flood and also silage processing in order to contribute not only to their livelihood but also to develop livestock rearing.

3.1) Model I: Minimum Required Farming and Expansion of Livelihood Activities

The environmental conditions of model I are not suitable for crop production by nature but it is possible to grow plants and grains if water-harvesting measures are properly implemented in farmland and its surrounding. Most farmland being currently used is located close to *Olla* (natural village) at higher places with flat or gentle slope. In the areas with inclinations and some water flows, it is recommended to construct small ditches to the fields to collect water. In the case of little water flows or if the field is flat, 'Zai pit' and 'Tied contour ridge' are recommended. Zai pit is a small hollow made for each plant and manure is applied after the digging. The pits can retain water and moisture in the pit. Zai pit making is a time consuming work but it can facilitate the plants to keep growing even under rain shortage, whereby raising the probability of grain harvest.

Example of Tied contour ridge (Kenya)
Source: FAO

Considering the income from animal husbandry, the farmland size should be minimized according demand of the households. A reduction of farmland size is compensated by the introduction of early matured varieties of maize and haricot beans which can grow even in the short rain condition. Also, sorghum and millet that are resistant to dry weather should be introduced as crops to be combined with haricot beans. The remaining area could be used as fallow for the crop rotation, planting of floral trees to improve apiculture, etc.

3.2) Model II: Managing both Crop Production for Self-consumption and Livestock Rearing

For the farming practice of Model II, it is advisable to increase the probability of plants growth and grains harvest by introducing basic agricultural techniques such as soil fertilization and line planting, as well as water and soil conservation structures. For efficient rainwater use, appropriate soil and water conservation measures are 'counter ridge' and 'soil band' that can be constructed by draft animals while plowing. As for fertilization, an application of manure well stored for 2 to 3 years can be recommended, which reduces weed. Besides, soil coverage by pulse crops in an intercropping is also effective for weed

Soil band (Fultole, October 2014)
Source：JICA team

prevention.

Chichata[2] can also be recommended; leaving the animals free in the farmland for a period, and after that, mixing the defecated dungs into the soil. This method requires frequent weeding during plant growing stage, however with the line planting, the traditional *Shilshalo* only at furrows as tillage can prevent certain weeds and facilitate moisture in the soil as well.

Once a certain volume of grains is able to be harvested with above mentioned measures, aiming to reduce labor force and the use of animals for farming, the adjustment of farmland size should be done same as model IV. The land and spaces that are not cultivated can be used as fallow land for crop rotation and the pasture grass and fodder trees for animal feed. The forage production will allow them to practice livestock rearing near living area. As for the use of residues, plants start to dry up to certain wilting stage when the plant cannot recover due to shortage of rainfall; for example, when more than 70% of leaf dries up and changes color due to lack of rainfall, it is advisable to cut promptly and use as animal feed. Or the animals can be set free in this space to feed on the stem and leaves.

3.3) Model III: Crop Diversification for Self-consumption and For Cash Income

In model III, it is necessary to achieve a stable food production and the diversification of crop. For that purpose, the introduction of appropriate soil and water conservation measures should be done according to the excess or otherwise lack of rainfall. In the farmland located on the areas which have the risk of washing over soil or of water logging due to unexpected water flows, protection fences made by humidity resistance crops such as banana trees and sugar cane could be planted. These crops can be easily planted not to require well plowing by draft animals, and also useful as cash crops in the area. Then, at the downstream of the area, early matured varieties can be cultivated and the increase of productivity can be expected even with small amount of water.

Banana to mitigate flood (Fultole, October 2014)
Source : JICA team

In the areas where rainfall has decreased, 'Tied contour ridge' is advisable to keep the water flow during the rainy season together with introduction of dry tolerant crops, e.g. sorghum, besides maize and haricot beans, in order to avoid harvest loss by droughts. Regarding the agricultural production techniques currently recommended, they have already been introduced to some extent. However, like in model II, the cropping patterns are not efficient, and therefore according to the usage and needs of crops, crop rotations in combination with various crops are recommended. Like in Model II, crops that have lost growth when rain stopped, the plants should be promptly cut or be fed directly to animals. In case of no animals in a household, it is possible to sell the cut plants to the markets or to process them into silage as an income source.

3.4) Model-IV: Innovation of Water Harvest Methods and Efficient Cropping System

For this model, crop production is the main livelihood. It is recommended to improve water harvest structures in order to prepare for droughts and to improve cropping system appropriate for different natural conditions. 'Terraces' and 'stone band' are suitable by making use of inclined farmland which is characteristic in the areas observed in this model area. Those structures have been practiced in

[2] Method of using manure as fertilizer traditionally practiced at the highlands of Oromia region. Currently some Guji people started recently implementing it in Malka Soda woreda

Konso inhabited area to use efficiently rain water. Besides, it is advisable that the construction of family ponds of which the bed/pit are concreted or covered with plastic sheets can also be recommended. The ponds can store water from rain and streams and then supply water as irrigation when the rain stops for certain time, which can facilitate certain harvest in case of drought.

For prevention and control of weed, pest and diseases, relay cropping, crop rotation and intercropping should be introduced by dominating various crops which have been grown in the areas. For instance, in the case of high elevation place like Malka Soda woreda, the rotation order such as banana to sugar cane or sunflower to maize and to haricot bean will be able to prevent the expansion of pest and diseases. In the other areas which are relatively low in elevation, rotated maize and haricot bean by cropping season facilitates to decrease the damages of pest and diseases and also degradation of soil fertility. In addition, it is useful to include repellent plants such as Mint and Thyme in the intercropping system, which increases the effectiveness for pest control. The residues of most crops can be used and sold as nutrient forage especially in the lowland areas.

Family pond for irrigation (Did Yabelo, October 2014)
Source：JICA team

CHAPTER 9 CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion

This Project, taking the points below into account, concludes that the RREP approach, tried out through the implementation of pilot activities in Borena zone, can be a very essential approach amongst measures in improving the people's livelihood currently at the mercy of unstable weather, especially droughts, and thereby enhancing the people's resilience against droughts. The Government of Ethiopia should therefore embark, at her own cost or with an assistance from donor country(ies), on implementing and expanding the RREP approach over the drought prone Borena area as well as to other areas where similar natural conditions prevail.

1) The major intervention by RREP approach is to provide only tools and technical assistances, with both of which the people accelerate their own community based development activities. The approach does not provide any cash or subsidy in supporting their activities; namely, cash-for-work is not a part of the RREP approach, nor food-for-work. With this simple approach, it was found that the people have increased their participation in the communal development activities to 187% to 247% for the Phase I PAs (kebeles) undertaken in 2013 and 139% for the Phase II PAs in 2014. With the increased participation, their essential means of life, e.g. *haro* (pond), *kalo* (rangeland), *ella* (well), etc., have been rehabilitated and enlarged in a very sustainable way.

2) RREP approach can and in cases should be implemented supplementing other donors' programs, which usually follow cash-for-works. Cash-for-work, if applied in sound environment, can protect the people from falling into a vicious cycle of the poverty. One thing noted here is that such people in due need of cash-for-work usually reside around township areas, e.g. just surrounding of kebele and woreda centers, because they are the people who have lost their livestock and no longer able to make livelihood in their rural village and accordingly, they have to rely upon daily basis wage labor. Cash-for-work, if any, can work on improving those people's livelihood while RREP approach can uplift the rural population's livelihood.

3) There are a great number of examples which have enhanced the people's resilience through the implementation of RREP approach. For example, after the tools provision, a community worked very hard to reduce the problem of water shortage through *haro* construction and rehabilitation. As a result, three old *haros* were rehabilitated and one was newly constructed, and frequent movement for search of water was reduced. In another community, bush was cleared from their enclosed rangeland, and then pasture started regaining successfully, which enables to save the life of calf which are more vulnerable to pasture shortage. The movement in search of pasture was also decreased. These examples are just a fraction of the stories realized on the ground, leading to enhancing the people's resilience especially against drought.

9.2 Recommendations

Through the implementation of pilot activities in Borena lowland areas, the JICA Team has learned a lot of lessons and also encountered a number of issues that led to the recommendations presented below. These recommendations should be referred to in continuing and expanding RREP approach in drought prone areas of Ethiopia. However, as is the case with continuous processes, these recommendations are by no means exhaustive and may need to be changed or modified, depending upon the prevailing condition.

On Combination of RREP Approach and Project Approach

1) RREP approach considers the people's continuous communal development activities with

community initiatives as theirs. RREP Approach provides tools equally for the communities, and does not alone decide, does not alone design, and does not participate directly in their activities. RREP approach basically plans and evaluates the system and mechanism of how to maintain and to extend the communal development activities continuously. In this sense, RREP approach is expected to work better only for the activities with community initiatives.

2) Then, the people still need good roads and bridges, schools, health posts, veterinary posts, etc. which are public infrastructures. To establish these public infrastructures, the Government and donors should employ conventional project approach including cash-for-work. In fact, projects are expected to solve certain problems of certain target groups in a period of time and disappear after that. “Good” projects are the ones, which can fully solve the specific problems facing the people, so that the benefit of the projects should stay there as long as possible. The roles of the Government are to plan, design, and implement those projects, and maintaining those.

3) As such, those public infrastructures should be established through conventional project approach while thousands of *haros* and *kalos* can hardly be established only by Project approach. Here comes the RREP approach since making several *haros* in a dry season is not enough; villagers need to make thousands of haros in a zone and they have to continue to make, maintain and rehabilitate almost every dry season. To sustain and enhance such communal development activities, the RREP approach works, and therefor combination of RREP approach and Project approach should be explored and considered in enhancing the people’s resilience there in Borena lowland.

4) There are some communities where people want cash-for-work, but they are the ones where people do not have strong traditional social ties at community level. Borena people, for example, who live near Yabelo town, have lost most of the cattle, and are selling firewood or charcoal. They prefer cash-for-work. In addition, farming ethnic groups in Malka Soda woreda and Teltele woreda who do not have strong traditional social ties, and Gabra people who are the minorities in Borena zone also prefer cash-for-work. Therefore, RREP approach seems to work better in the traditional rural areas while cash-for-work is effective and in fact important for those people living near Yabelo Town and also in farming areas.

On Toward Tailor-made Application / Implementation of Programs and Projects

5) Tailor-made intervention should be put in practice since there are wide varieties of environment not only from the highland but also over Borena zone, and even within a woreda. As an example, watershed activities are usually carried out in January and February, when most of the highland farmers have collected their harvest and it is their free time to do any development activities. For the pastoralist of the Borena lowland, however, it is usually when they move out of their PAs to the satellite camps in search of pasture and water. Therefore, it is actually easier for the pastoralist community like Borena to do such development activities, if the schedule is changed to the short dry season of July to August, when they do not have much activity to do.

6) Tailor-made intervention applies to agriculture as well. Farming in Borena zone started from highland parts of Borena, and then hilly parts of Teltele, Yabelo, Mega and Miyo about 60 to 70 years ago mainly by highland people like *Konso*, *Burji*, etc. Borena people have been also engaged in farming since around 20 years ago mainly around those hilly areas. In recent years, however, farms have emerged even in traditionally pastoral Dhas woreda and Dillo woreda. From an assessment by the DAs, transition areas are expected to put more emphasis on farming. Each PA, and sometimes even each *gare / olla* of the transition area, needs full attention to be given for the implementation of farming activities, as their conditions and needs may differ from one to another.

On Filling the Gaps between the Community and DAs

7) Although there is strong social structure and rich local knowledge of natural and range resource management in traditional Borena communities, the Borena people still need scientific training and techniques to conserve their scarce natural and range resources together with the existing indigenous knowledge. Towards this, it should be better to assign community representatives such as Community Development Workers (CDWs) newly, who represent one or several *gares / ollas* and who can train the whole community and also easily exchange information. By that way, DAs can give TOT to the CDWs, and 1) Information or knowledge obtained through training can easily be disseminated thanks to the communication nature in the society, 2) It will be two way communications, the trainer and the community can exchange their knowledge (indigenous vs. scientific), and thus 3) Communication gap will be minimized.

8) DAs should also be equipped with different technical knowledge, which improves their day-to-day development activities. The Government and donors should in this sense arrange a venue where they can develop their capacity, e.g. series of trainings to be administered. On the other hand, it is difficult for the DA to give training to the communities after they have been trained and sent back to the PAs, because 1) The pastoral area is very far apart and it is difficult for them to go and give training at each *zoni* (PA zone) or *rera*, and 2) They don't have all the necessary materials and equipment including transportation mean. To cope with this pitfall, above mentioned CDWs should be established and connected with the DAs.

9) Previously different NGOs and international organizations have tried to establish different local committees / community workers at PA level such as, Community Animal Health Workers (CAHWs), Trained Traditional Birth Attendants (TTBAs), Community Health Promoters (CHPs), Kebele Development Management Committees (KDMC), and etc. The lessons learnt are: 1) There is less coordination among the NGOs, and they just go to the village and establish different committees or they do not utilize existing committees, and 2) Most of the committees were established without informing the community members well enough and/or the community gathered just for incentives so that they are gone once the project is gone. To make the system sustainable and functional, they should be integrated and coordinated with the government system.

On Information Flow for Decision Making and Policy/Program Designing

10) A bottom-up information flow of actual conditions and also evaluation results for any of development projects including lessons learnt from the field offices and officers to woreda, zonal, regional and then to the federal government should be improved for the sake of decision making at higher level, e.g. regional and/or federal level, and policy/program designing. Through a series of survey, the JICA team realized that some of very important and valuable data stay with the officers instead of with the system and organization. Annual patients and diseases data were at the hospitals and health centers, but not at the woreda offices or zonal offices. Likewise, enroll and dropout data are at the schools, but not at the woreda offices or zonal offices. Those data should be availed at each of the government offices and forwarded to the central ones.

11) As for evaluation, it is conducted often at monitoring level. The primary objective of evaluation is to improve the designing and implementation of the programs/projects for future while that of monitoring is to check the differences between planned activities/indicators and actual activities/indicators for supervision. Evaluation focuses more on the project purpose and above whereas monitoring does more on the input, activities and output. It is difficult to improve the programs/projects for future, if the focus of evaluation is on output and below only. Evaluation

should see the achievement of the project purpose, impact, relevance and sustainability rather than just input vs. output. Such evaluation results should be shared at each of the government cadre and finally at the federal level for the better implementation in future.

On Utilization and Strengthening of Traditional Social Ties

12) Development intervention should be aligned in the context of social ties the people have accumulated over long history. The JICA team thought there are poorer people living in the border areas which are chronically stricken by droughts, and they do not work together for participatory projects without cash-for-work or food-for-work. It was completely different from the reality, however, as long as the JICA team has heard from people in the interviews. The social ties and traditional culture and customs are stronger in those areas, so that they prefer to continue communal activities with the community's initiatives. Borena people thus maintain and manage *Ella* at *Gosa*-level, *kalo* (rangeland) at *Rera*-level, *Haros* (ponds) for livestock at either *Rera*- or multi-*Olla*-level, and *Haros* for human beings at one or few *Olla*-level. In this context, there are multi-layered social ties, and development intervention should refer to such traditional norm.

13) From the monitoring and evaluation of the community-based activities, it was acknowledged that there are a wide variety of communal activities being performed after tools were provided. *Olla*-level activities have been increased more than other levels, and people tend to start from *Haro* for human beings (at one or few *Olla*-level), then work together on *Haro* for livestock and *Kalo* (at multi-*Olla*-, *Rera*-level), and finally roads and schools at PA-level. They move from smaller ties, small range of collaborative work, to larger ties or large range of collaborative works as they continue communal activities. They become more communal and public when the social ties are larger. With this, it should be better to deliver tools as communal properties to the *olla / gare* for strengthening the traditional social ties.

14) Also from the analysis of monitoring data of community activities, the JICA team found that people work with their own initiatives more on *Haro* and *Kalo* activities, and the side effects on the social ties by cash-for-work are less significant with public works like infrastructure and construction projects because they are usually implemented at PA zone level and PA level or above. Cash-for-work for public works at PA zone, PA and inter-PA levels is expected not to weaken the existing social ties and not to damage people's initiative so much. However, once cash-for-work is implemented in a small range of society, like at the level of *olla* and *gare* where there is still strong social ties, it could weaken the traditional social ties, thus such approach should be limited to implement.

On Rangeland Improvement and Pasture Development

15) Selection of activities on rangeland development should be carefully done according to the target areas located. There are mainly three activities acknowledged on rangeland management in Borena zone; namely, bush thinning, pasture production and fencing. As a result of the pilot activity, it was found that the pasture production should mainly target agro-pastoral and farmers' communities since the critical issue facing the people there is the expansion of unproductive bare land. Moreover, the areas are blessed with relatively better precipitation and therefore can be well-adapted to introduction of improved varieties of forage. Thus, the activity of pasture production could relatively have good performance in those areas.

16) On the other hand, bush encroachment is the most crucial issue in lowlands of Borena zone where the topography is flat with few hills and mostly pastoralist reside. Bush thinning/clearing is therefore more prioritized issue in such pastoral communities and an evaluation result implies that there are some difficulties in producing improved forages especially at times when rainfall

condition does not allow the pasture to grow. Therefore, actual trial of pasture production on the ground should be started at smaller scale and be conveyed from agro-pastoral areas to pastoral areas step by step. Thus, it is advisable that the Government and donors should first prioritize bush thinning by providing necessary hand tools and skills for the pastoral communities, and then support pasture sowing so as to make the utmost use of budget.

17) At the initial stage of the dissemination, pasture production should be undertaken with the watershed management program run by the Government and should be well-integrated into it. Since the watershed management program has antedated the dissemination of pasture production and initiated water harvesting technologies in Borena zone, each PA often has several watershed management project sites where there are number of soil bands and/or micro basins and sometimes leaves them just unused. Such sites are the best for pasture production since it conserves water and prevents soil erosion. Therefore, wherever there is a site of watershed management program with water and soil conservation structures, pasture production should be tried with high priority.

18) As a pitfall for extending pasture production, only the limited budget is in fact allocated to the local governments to purchase forage seeds sounding expensive. They therefore have hardly experienced the dissemination of pasture production. This should be the field that donors and NGOs need to support the Government. They can provide technical trainings to the frontline officers like DAs and such necessary input supplies as seed and hand tools. Or rather, since some government research institutions produce such forage seeds as Rhodes grass, it is therefore recommended that the Government should provide forage seed when implementing the watershed management program.

On Dryland Agriculture Improvement

19) Dryland agriculture training on basic agriculture technics should continuously be done to the agro-pastoralist especially in the lowland area because the practice of the agro-pastoralist in Borana zone is still primitive. In providing trainings to the agro-pastoralist, much emphasis should be given to the increase of the production but not on the expansion of the farm areas. In a sense, the direction of improvement should be towards intensive agriculture, combined with rain-harvesting technics, rather than expanding their extensive agriculture. Government officers are in fact concerned with the conflict between pure pastoralist and agro-pastoralist by the expansion of agricultural land. Agriculture land should not be expanded, rather productivity should be improved.

20) To achieve the timely sowing, it is important that to make draft ox strong at the end of the dry season. One of the reasons of low crop productivity in the area comes from late sowing. As a matter of fact, agro-pastoralist often misses appropriate sowing time since they have to wait for draft ox coming back to their village from grazing. To improve the situation, agro-pastoralist communities or local government should prepare the feed and water for draft ox at the season. The rangeland and water resource improvement will contribute to improving this issue.

21) In order to ensure and maximize the agricultural production, several varieties of crops that have different maturing period should be cultivated in the same farmland. The characteristic of environment of the area is the meager and erratic rainfall. Dry tolerant and short maturity variety can be contributed to ensure the production in the shortfall rain year. Meanwhile, high productivity variety can produce a lot of crop in the normal rainy year. In addition, with the several varieties of different maturing period in the farmland, the beneficiary agro-pastoralist can eat fresh corn, which is usually grilled, for a longer period of time. It is however noted that in this case cross pollination can easily take place, and to cope with seeds have to be renewed

almost every year.

22) The shortage of the improved variety seed is also one of the reasons of unstable and low agricultural productivity in the area. With this situation, the zone and woreda PDO and/or NGOs should support seed multiplication groups by providing technical and financial support for a period of 2 – 3 years. The JICA team established 2 seed multiplication groups in Malka Soda woreda through the pilot implementation of seed multiplication, and the woreda PDO distributed the improved seed to the needy farmers. The seed multiplication groups consist of small number of members with limited experiences. It is therefore recommended that the government organizations and/or NGOs should support the group to produce improved seeds within Borena locality.

PART III

COMPONENT II

(GODE ZONE, SOMALI)

CHAPTER 1 PROJECT TARGET AREA

This chapter discusses the present situation of Gode woreda, Shebele Zone, Somali region from different angles such as spatial settings, demography, administration, natural environment (including topography, land use, climate, hydrology), major development sectors of livestock, agriculture, infrastructure, etc., and also development actors, e.g. donors and local NGOs operating in Gode woreda.

1.1 Spatial Settings, Demography, and Administration

1.1.1 Location

The project area is located in Gode woreda, Shebele zone in Somali region. Shebele zone is one of 9 zones of the Somali region, which includes Gode town, and is located on longitude and latitude coordinates ranging from 5°45’N to 6°00′N and from 43°30’E to 43°45′E respectively. Gode town is located on coordinates of 5°57’N 43°40’E. Shebele zone is bordered on the south by Afder zone, on the west by the Oromia region, on the north by Fiq and Degehabur, on the northeast by Korahe, and on the east by the provisional administrative line with Somalia land. Likewise, the Shebele river defines its southern and western boundaries (See Figure 1.1.1).

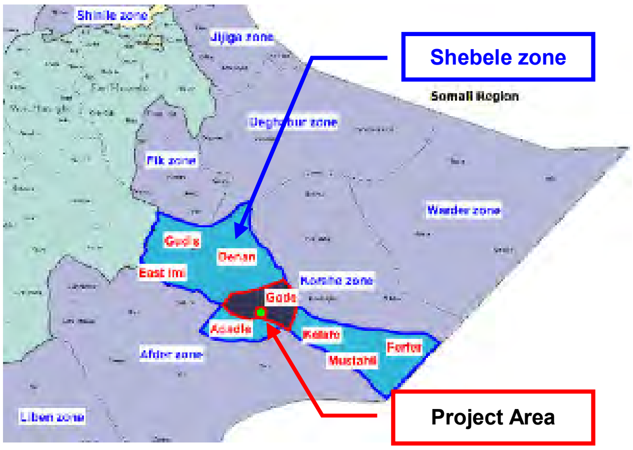


Figure 1.1.1 Project Target Area
Source: ATLAS OF THE Ethiopian Rural Economy

1.1.2 Demography

According to the Central Statistical Agency (CSA) 2007 Census survey, the Somali region accounts for 6 % of the overall population which takes account of 4.4 million as surveyed in 2007. When we further zoom in to Shebele zone and then Gode woreda, the 2007 census survey population data shows that Shebele zone is a home to 463,000 people, which is estimated to attain 527,000 population by the end of 2012. Likewise, Gode woreda has registered population size of 109,5000 in 2007, and it is estimated to be a home for populations of 124,6000 by the end of 2012.

When we investigate urban-rural distribution of the Somali region, the 2007 census survey indicated that the majority of the region’s populations are rural dwellers. While the urban population accounts for 14 % of the region’s population, the rural population takes the rest of 86 % of the population. At the zonal level, the urban population accounts for 19 %, and the rural population accounts for 81 %. And then, at the level of Gode woreda, the urban population accounts for 39.3 %, while the rural population takes only 60.9 % share of the woreda’s population.

In terms of household numbers, the CSA 2007 census survey indicated that 665,397 households reside in Somali region. The survey also indicated an average household size of 6.6 persons; 6.3 persons in urban area and 6.7 persons in rural area. Note that household data at zone and woreda levels are not available. On gender distribution, it is found that at the regional level the size of male population takes up 55.6 % share, while female population takes up 44.4 % share. Likewise, the zonal and woreda level distributions also indicate the same shares in the distribution.

On Ethnic group distribution, the CSA 2007 survey indicated that the Somali region predominantly is an area where Somali ethnic groups have resided in by taking up 97 % of the population of the region. Next to Somali are Amhara and Oromo ethnic groups that take only 0.66 and 0.46 % share respectively. Particularly in urban parts of the Somali region, the share of Somali ethnic group goes down to 91 %, while in rural areas its share increase to 98 %. Religiously, Somali region is predominantly Muslims taking up 98 % of the region's population.

Table 1.1.1 Shebele Zone Population by Urban-Rural Residence and Sex (2012)

region / zone / woreda	Urban + Rural (x1,000)			Urban(x1,000)			Rural(x1,000)		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Somali region	5,047.0	2,807	2,240	706.3	385.8	320.5	4,340.8	2,421	1,919.7
Shebele zone	527.3	293.6	233.7	101.6	55.9	45.7	425.6	237.6	188.0
Imiberi-woreda	92.9	51.8	41.1	13.0	7.3	5.6	79.9	44.4	35.5
Adadilo-woreda	94.6	54.7	39.9	6.3	3.5	2.9	88.3	51.3	37.0
Danan-woreda	27.0	15.1	11.9	6.9	3.8	3.2	20.0	11.3	8.7
Gode-woreda	124.6	70.5	54.1	49.0	27.5	21.6	75.5	43.0	32.5
Kelafo-woreda	87.9	47.1	40.8	12.8	6.7	6.1	75.0	40.4	34.6
Mustahil-woreda	56.0	30.3	25.7	7.0	3.7	3.3	49.0	26.6	22.4
Ferfer-woreda	44.3	24.1	20.2	6.5	3.5	3.0	37.8	20.6	17.2

Source: CSA 2007 Population Census Survey

1.1.3 Administration

The Somali region is divided into 9 administrative zones, and Shebele zone has 8 woredas, one of which is Gode woreda where there are total 27 kebeles. The JICA team is to operate in and around Gode town, probably within 20km radius distance, taking into account logistics arrangement. Within this 20 km radius distance, there are 7 kebeles located along Wabe Shebele river. The project sites are therefore to be selected out of these 7 kebeles. Name of the zones, woredas and potential target kebeles are shown in Table 1.1.2 below.

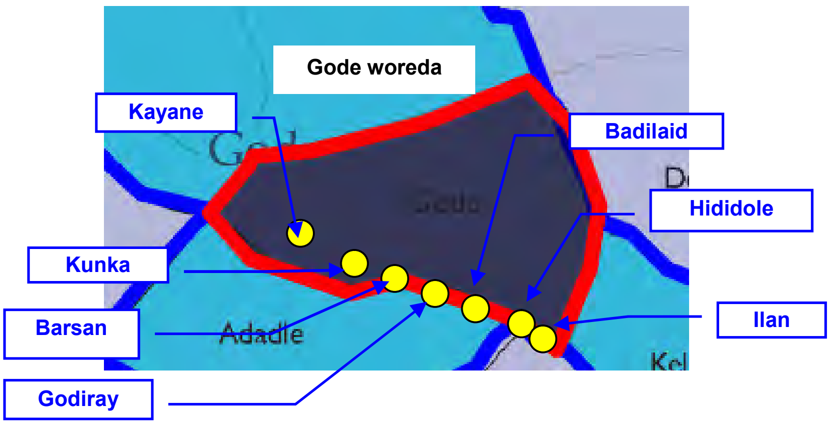


Figure 1.1.2 7 Kebeles in Gode woreda
Source: ATLAS OF THE Ethiopian Rural Economy

Table 1.1.2 Project Site Administration

Somali region	Shebele zone	Kebeles around Gode town with in 20km radius
Shinile zone	Gudis woreda	Kayane
Jijiga zone	East Imi woreda	Kunka
Deghabur zone	Gode woreda	Barsan
Fik zone	Adadle woreda	Godiray
Warder zone	Kelafo woreda	Badilaid
Korahe zone	Mustahil woreda	Hididole
Shebele zone	Ferfer woreda	Ilan
Afder zone	Alwayn woreda	....
Liben zone		....
9 zone	8 woreda	7

Source: RREP Team Field Survey

1.2 Natural Environment

1.2.1 Topography

The project target area is located in Wabe Shebele basin. The Wabe Shebele basin is located in the south-east of Ethiopia (see Figure 1.2.1). Its total surface to the frontier of Somalia is about 202,220 km^2, and it is in fact the largest drainage basin in Ethiopia. Through the basin, Wabe Shebele River flows, being a permanent river, mainly supplied by the tributaries flowing down from the highland plateau. The Gode area is situated at a lower part of Somali region. The topography is mainly characterized by a flat land, where the altitude ranges from 250 to 300 meters above sea level).

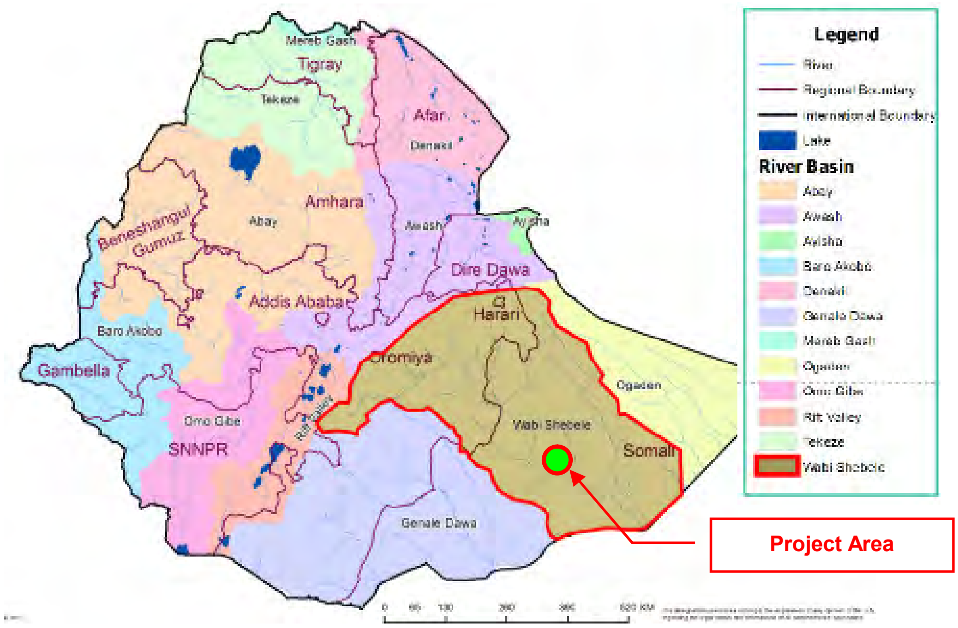


Figure 1.2.1 Major River Basins in Ethiopia and the Location of the Target Area

Source: OCHA

1.2.2 Land Use

Land use data is available only at the regional level. The data indicate that most of the land in the region is allocated for crop production. As can be observed from Table 1.2.1 below, crop production constitutes 67% (76,668 ha) of land use. On the other hand, fallow land, grazing land and other land use constitute the difference 33%. Specifically stating, fallow land takes up 11.8% (13,542 ha), grazing land takes up 10.7% (12,231 ha) and other land use takes up the rest 10.4% (11,897 ha).

Table 1.2.1 Land Use Area, No. of HHs and Holders by Size of Holding in Somali Region (2009/2010)

Items	Holding Size (ha)						
	Under 0.1	0.1 to 0.5	0.5 to1.0	1.0 to2.0	2.0 to 5.0	5.0 to10.0	Total
1.Temporary crop area	122	5,570	13,461	26,091	21,222	5,305	71,770
No. of HHs	2,948	23,225	24,230	25,374	10,549	1,570	87,896
Average area/holder	0.04	0.24	0.56	1.03	2.01	3.38	0.82
2.Permanent crop area	*	438	970	2,318	984	*	4,898
No. of HHs	*	3,276	4,935	7,814	2,569	*	19,205
Average area/holder	*	0.13	0.2	0.3	0.38	*	0.26
3.All crop area	130	6,007	14,431	28,410	22,206	5,485	76,668
No. of HHs	3,074	23,814	24,402	25,582	10,549	1,570	88,991
Average area/holder	0.04	0.25	0.59	1.11	2.11	3.49	0.86
4.Fallow land	*	686	1,470	3,814	3,220	*	13,542
5.Grazing land	32	507	1,810	4,264	4,135	*	12,231
6.Other land use	1,044	2,361	2,546	3,064	2,600	*	11,897
7.All land use	1,221	9,561	20,258	39,552	32,162	11,584	114,338
No. of HHs	39,059	34,166	28,089	27,631	11,463	1,570	141,976
Aver. ha/HHs	0.03	0.28	0.72	1.43	2.81	7.38	0.81

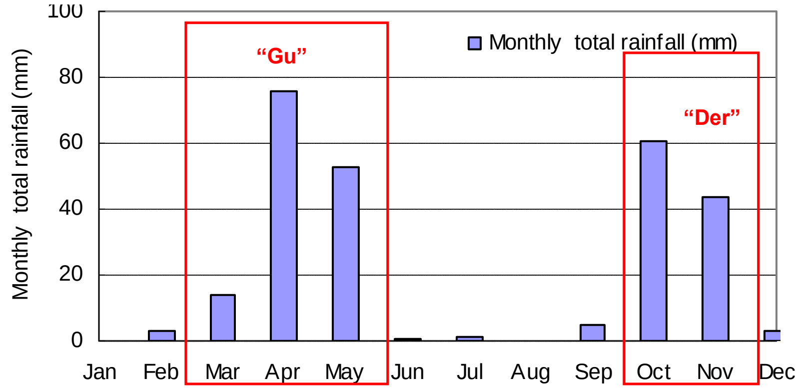
Source: CSA, Land use survey, 2009/2010, Note: *means no data

1.2.3 Climate

The nearest meteorological station for the project site is Gode Meteorological Station installed in July 1968, which coordinates are N 5°58', E 43°30' with an altitude of 260 m. Data such as rainfall, temperature, sunshine, relative humidity, and wind available to the end of 2010 were collected and evaluated as follows:

1) Rainfall

The local climate belongs to the equatorial semi-arid type. It is characterized by mean annual rainfall of about 260 mm distributed in two rainy seasons, high temperatures and whereby consequently high evaporation. Inter-annual irregularity of rainfall is considerable. The average monthly rainfall for the Gode station is given in Figure 1.2.2. From the figure, it is obvious that there are two rainy seasons; the first, the longer one, is called "*Gu*" between March to May and the second is "*Der*" between October to November. This is considered due to an effect of "inter tropical convergence zone".



Month	Monthly Rainfall (mm)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Average	0.3	2.8	13.7	76.1	52.9	0.7	0.9	0.1	4.6	60.6	43.8	3.2	260

Figure 1.2.2 Monthly Total Rainfall recorded at Gode Station
Source: Gode Meteorological Station Data(1966-2010)

2) Temperature

The temperature in Gode area does not vary much throughout year. The hottest temperature appears in March, which corresponds to the end of the dry season. The mean annual temperature is estimated at 28.9 °C with maximum and minimum of 34.8 °C and 22.8 °C respectively. The mean monthly temperature ranges between 27 °C and 31 °C. The mean monthly maximum temperature varies between 32 °C and 37 °C while the minimum temperature varies between 21 °C and 24 °C (see Figure 1.2.3).

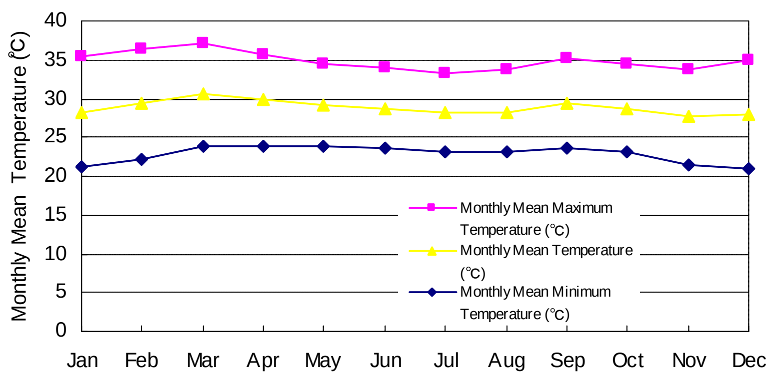


Figure 1.2.3 Monthly Mean Max and Min Temperature at Gode Station
Source: Gode Meteorological Station Data (1966-2010)

3) Sunshine Hours

Average sunshine hour is given in Figure 1.2.4 at a monthly scale. It has 6.6 hours in July, which is the month with the minimum insolation, and has 10.2 hours in February with the maximum. July is a month between the 2 rainy seasons and there are coudy days, leading to less sunshine hours. On the other hand, Feburary is just before the onset of rainy season, which is very hot and characterized by long sunshine hours. It can be said that throughout the year, the isolation in Gode area is long and strong, and the annual average keeps about 8.5 hours per day.

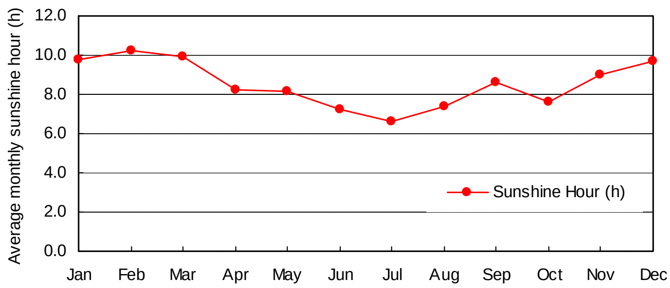


Figure 1.2.4 Monthly Average Sunshine Hour at Gode Station
Source: Gode Meteorological Station Data (1974-2007)

4) Relative Humidity

The yearly average relative humidity is calculated at 54% without great daily and monthly variations throughout the year. It has 46 % in February, which is the month with the minimum humidity, and has 62 % in May with the maximum. The monthly relative humidity data is given in Figure 1.2.5, and as shown it is characterized by arid climate.

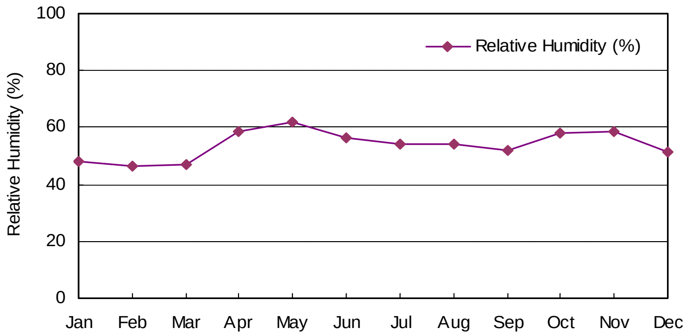


Figure 1.2.5 Monthly Relative Humidity at Gode Station
Source: Gode Meteorological Station Data (1974-2007)

5) Winds

In Somali region, south-east wind blows during a period of six months from May to October, whereas from November to April, north-east winds are dominant. The mean velocity of the south-east winds is considerably higher than that of the north-west winds. Mean annual velocity exceeds 2 m/s and even reaches as high as 4 m/s speed during the dry months (refer to Figure 1.2.6). The wind conditions are determined mainly by the breeze effect from the Indian ocean. Night winds originate in gales which start blowing during the previous afternoon on the Somalian Coast.

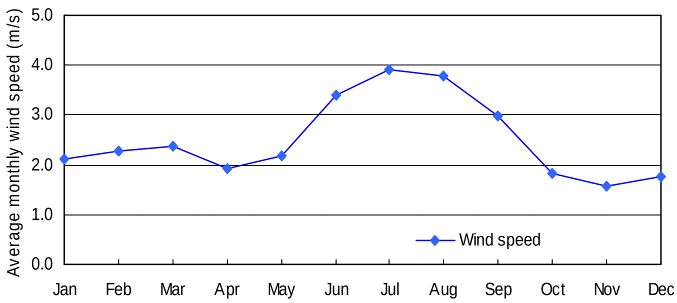


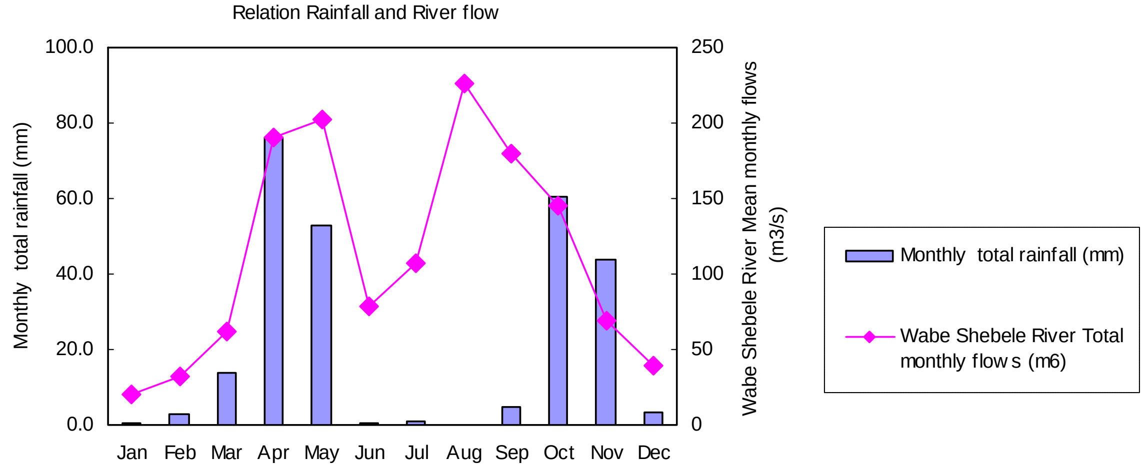
Figure 1.2.6 Monthly Wind Speed at Gode Station
Source: Gode Meteorological Station Data (1974-2007)

1.2.4 Hydrology

The flow of Wabe Shebele river shows bimodal peaks; one in April and the other in October corresponding to the rainfall pattern over the catchment area as shown in Figure 1.2.7. In fact, latter peak of the river flow shows up early than that of rainfall recorded in Gode station. This is because the rainfall for the latter season, called *Der* in Somali and called *Berg* in highland areas, start falling earlier in the upstream catchment areas than in Gode area.

The flow ratio changes very significantly throughout year. For example, the lowest flow shows up in January with only 20.3 cum/s while the maximum takes place in August with 226.7 cum/s, showing more than 10 times different by month. The mean annual flow of Wabe Shebele river near Gode town is estimated at 113 cum/s, and available volume of water therefore comes to about 3.5 billion cum per year. Wabe Shebele basin has a very vast area of potential irrigable lands spreading over the basin;

however the annual specific yield of surface run off is only 0.49 l/s/km^2, suggesting difficulty of bringing about much of the land under irrigation.



Month	Monthly total rainfall (mm)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Average	0.3	2.8	13.7	76.1	52.9	0.7	0.9	0.1	4.6	60.6	43.8	3.2	260
Month	Wabe Shebele River Total Monthly flows (m^6)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total	52.7	82.7	159.6	493.9	525.6	203.1	276.4	587.5	465.7	375.8	177.8	100.3	3,501
Month	Wabe Shebele River Mean monthly flows (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Average	20.3	31.9	61.6	190.6	202.8	78.4	106.6	226.7	179.7	145.0	68.6	38.7	113

Figure 1.2.7 Relation between Rainfall and River Flow at Gode
Source: Gode Meteorological Station Data (1966-2010)

1.3 Major Livelihood and Employment

A field survey carried out in September 2012 for the 7 kebeles located within 20 km radius from Gode town found that the majority of the settlers around Gode area are agro-pastoralist that takes about 46% share, followed by pure farmers (about 40 %) and pure pastoralists (14 %) as shown in Figure 1.3.1. Likewise, on employment side shown in Figure 1.3.2, the field survey has indicated that these employments are mainly geared towards agricultural laborer (45 %), followed by pastoral laborer (24 %) and construction laborer (19 %). The survey has also identified an unemployment size of 3,855 (19 %) in the settlement areas (see Table 1.3.1).

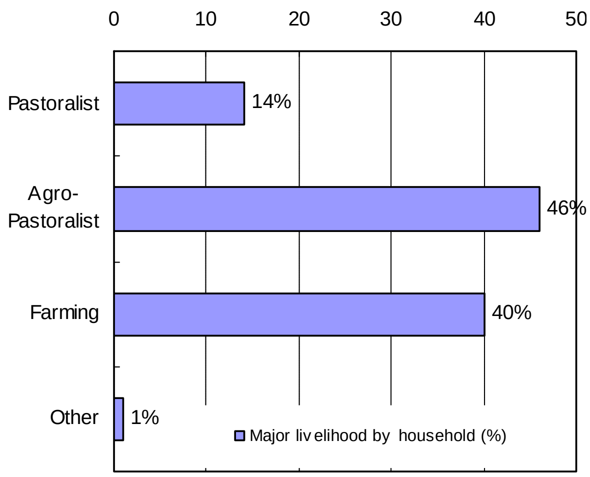


Figure 1.3.1 Major Livelihood in 7 Settlement Areas (Kebeles)

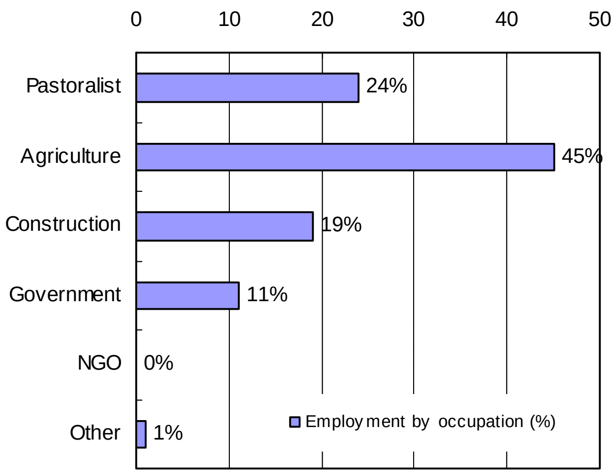


Figure 1.3.2 Major Employment Type in 7 Settlement Areas (Kebeles)

Table 1.3.1 Employment status in Gode Area (in 7 Survey Kebeles)

Description		Average	Sum
No. of Population	Male	1,191	9,528
	Female	1,409	11,274
	Total	2,600	20,802
No. of unemployed	Male	244	1,950
	Female	242	1,935
	Total	486	3,885 (19%)

Source: RREP Team Field Survey

1.4 Agriculture in Gode Area

The agriculture in Gode woreda is characterized as tropical dry type, with relatively high temperatures and aridity throughout the year. Thus crops like maize, sorghum, sesame seed, haricot beans, tomato, watermelon and some varieties of onion adapted to tropical conditions are mostly produced. The cultivations are generally practiced twice a year during the long rain season from March to May and during the short rain season from October to November. If irrigation is not available, cereal crops and sesame are usually grown only during the long rainy season called *Gu*.

In and around Gode area, natural conditions such as temperature, soil and topography are the relatively appropriate for crop cultivation. During the cultivation period in the rainy season especially, the temperature hardly reaches 40 degrees Celsius and varies at the day and night, which is favorable for plant growth. The soil contains available phosphorous and potassium blessed with sediments flown from the upstream river basin. It can therefore be said that certain crops can be produced without much chemical and organic fertilizer.

1.4.1 Crop Production and Cultivation Techniques

1) Main Agricultural Products

Such crops as maize, sorghum, sesame, haricot beans and tomato are produced both for human self-consumption and for livestock feed, and then the surplus is sold for cash earning. The Gode Pastoral and Agro-Pastoralist Research Center (GoPARI) together with the Farmers' Research Groups (FRGs) cultivate Sudan grass as a fodder crop and some investors and individual farmers grow vegetables like onion and watermelon using irrigation for commercial purposes.

Maize (back) and Sesame (front) after 30 days of planting (March 30, 2013 Hididole)

According to the interviews with the Livestock, Crop and Rural Development Office of Gode woreda (LCRDO), the cultivation area and agricultural production have a tendency to increase; cultivated area has been expanded for both rainfed and irrigated farms from 1,000ha to 2,000ha and from 4,500ha to 7,000ha over the last decade respectively. The average yield (t/ha) of each product at Gode woreda and at the FRGs under both rain-fed and irrigation are reported as in the following Table 1.4.1:

Table 1.4.1 Average Productivity by Main Products in Gode in 2012（kg/ha）

Crop	Average in Gode	Yield by FRG
Maize	1.8 t/ha	3.5 t/ha
Sorghum	0.85 t/ha	2.5 t/ha
Sesame	1-1.2 t/ha	2.0 t/ha

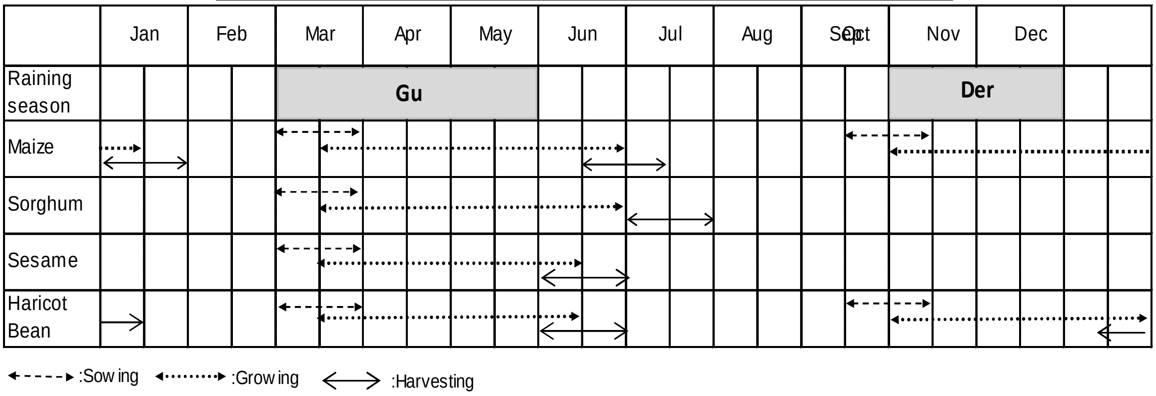
Source: Interview from LCRDO and GoPARI

As in the above table, yields achieved by ordinary farmers in Gode woreda are low in fact. According to the interviews, it was also found that there is a difference, e.g., in the maize productivity ranging from as low as 0.4 t/ha to as high as 5.0 t/ha due to the precipitation and the watering condition from the river different by place to place even within the same woreda. However, with a stable water supply and proper agronomical practices, ordinary farmers also could achieve high yields as almost same as those yields of FRGs.

2) Present Cropping Calendar

Cropping calendar for the main crops are shown below, which is based on the interviews to farmers at the target kebeles. Maize and haricot beans are usually grown twice a year while other crops such as sorghum and sesame are sown during early rainy season '*Gu*' according to the climate characteristics. In addition, tomato, water melon and onions can be sometimes seen in the fields as cash crop. Onion, which is generally adapted to the *Der*'s condition, can be cultivated throughout year because early matured varieties with 4-6 months growing period are already distributed in Gode woreda.

Table 1.4.2 Crop Calendar at the Subject Areas in Gode Woreda



Source: JICA Project Team

3) Agronomical Practices and Cultivation Techniques

The LCRDO has a tractor for rent; however farmers have to buy fuel by themselves, leading to difficulty of using the farm machine. At present, therefore, only a part of individual wealthy farmers and cooperatives are able to use the tractor. Common farmers seldom rent the tractor and do not use animal draft power either. Agronomical practices are carried out only by using hand tools like plows and scoops shown in the picture on the right. It is observed that farm works such as pre-sowing plowing and harvesting which require a lot of manpower and times are often done by community mutual work called "*Gob*" in order to finish the required works in time.

Small hoe used to weeding and a weed (*Solanum Incanum L.)* frequently found in Gode (March 30, 2013 Hididole)

According to interviews at the target areas, although the technical understanding on agriculture differs by place, farmers already know and practice basic cultivation techniques such as fertilization, row planting, weeding and tillage, etc. Intercropping is supposed to reduce efficiency of farm works, whereby it is rarely practiced. On the contrary, crop rotation is known and in fact practiced by many farmers as a measure against pest, disease and soil sickness. At present, without fallow land, double cropping with maize and sorghum and crop rotation with a combination with tomato, haricot beans and sesame are generally observed.

Thus, it can be said that the farmers already have certain level of agricultural farming techniques.

However, on the other hand, most of them do not have techniques and experiences inherited and accumulated in long history within families. Their agriculture can be said still to be a new livelihood for them. Therefore it is said that though they have basic agricultural techniques, still vulnerability lies on their agriculture unable to take a sound measure against unexpected pest, disease and also climate change according to GoPARI.

4) Characteristics of the Target Kebeles

Interviews had been conducted to the villagers of 4 kebeles such as Godiray, Badilaid, Hididole and Ilan. The interviewed 4 kebeles do not show significant differences by site in terms of agricultural environment, crops and production situation although there are some characteristics pertinent to each site. Those features by kebele are summarized in the following table:

Table 1.4.3 Agricultural Environment and Production Situation at 4 Target Kebeles

Features	Godiray	Badilaid	Hididole	Ilan
Soil*	pH6.5-7.0, Black soil, particularly the soil canal alongside contents N (75kg/ha), P (150 kg/ha) K (500kg/ha).	pH6.5-7.0, Brown clayish soil, few N but P (170kg/ha) and K (500kg/ha), highly contented.	Not available because of flood (March, 30 2013).	pH7.0-7.5, Brown clayish soil. Content of P and K is observed but less than other Kebeles (70-150 kg/ha in both).
Irrigation pump	Repaired and operated in 2013 but submerged by flood at the end of March.	Seems to be operative occasionally.	Broken (impossible to use).	Broken (impossible to use).
Cultivation situation in 2013	Sown maize and sesame from February-March by using water provided by rain and irrigation pomp.	Sown maize and sesame from March by using water provided by rain and irrigation pomp.	Rain-fed cultivation of maize (not confirmed).	Rain-fed cultivation of sorghum as forage due to impossible irrigation.
Cropping pattern (sample)	Impossible to rotate crops due to 90% of farmland grown maize.	Crop rotation is practiced at random: mainly maize and sesame in Gu. Half of farmland for maize and the other for beans and tomato in Der.	Crop rotation is practiced at random: Mainly maize in Gu combined with sesame, tomato and onion in Der.	Sorghum alternated with maize at rainfed land. With irrigation, maize in Gu and cultivate tomato and beans, etc. according to the market demand.
Cropping Season	Once a year for maize production. Cultivated occasionally vegetables and sesame.	Cropping twice a year in Gu and Der.	Cropping twice a year in Gu and Der. Occasionally possible to three times cropping a year with irrigation.	Once a year in Gu at rainfed field and twice a year two crops in both Gu and Der at irrigated field.
Agricultural input	Supported improved seeds, chemical fertilizers and agro chemicals by LCRDO.	Supported improved seeds, chemical fertilizers and agro chemicals by LCRDO.	Supported improved seeds and agro chemicals by LCRDO. No use of chemical fertilizer.	Supported improved seeds and agro chemicals by LCRDO. No use of chemical fertilizer.
Agronomical practices	Applied compost and chemical fertilizer. Practiced row planting for maize. Regularly carried out weeding, irrigation and tilling.	Applied compost and chemical fertilizer. Practiced row planting for maize. Regularly carried out weeding, irrigation and tilling. Worked for plowing and harvesting with Gob in a short period.	Applied compost and chemical fertilizer. Practiced row planting for maize. Regularly carried out weeding, irrigation and tilling. Worked for tilling and harvesting with Gob in a short period.	After collecting residues and leveling, practiced row planting for maize. Regularly carried out weeding, irrigation and tilling.
No. of Primary cooperative**	10 Primary cooperatives	12 Primary cooperatives	10 Primary cooperatives	22 Primary cooperatives
Farmers' Training Center(FTC)**	Existence with demonstration field	Nonexistence Possible to use in Godiray.	No-existence Possible to use in Ilan.	Existence with demonstration field
Other characteristics	Carried out soil conservation measures by reforestation.	Existence of many insects in Der (white fly, aphid), caused to reduce volume of production.	Lack of seeds and agrochemicals is a problem.	A cooperative cultivates Sudan grass seed for sale to the research center.
Requirements for agricultural production	Irrigation pump to increase maize production.	Installation of irrigation pump and support for measures against insect pest.	Machinery like tractors to reduce farm works.	Techniques for the stable production of maize and sorghum. Added value of sesame by introducing oil press equipment.

* Standard fertilizer application for maize cultivation recommended by Somali Region Rural Research Center is 41kg/ha of Nitrogen, 47 kg/ha of phosphoric acid. Calcium is originally present in the soil so that there is no need of application.

** Based on the results of interviews at the GoPARI

Source: JICA Project Team based on interviews to the farmers in target kebeles

In general, cultivation is similar between the right bank (Godiray and Badilaid) and left bank (Hididole and Ilan) of the Wabe Shebele river. Some significant differences between both sites may be an appearance of pest and disease and cropping patterns. Occurrence of pest and disease in the right bank seems more frequent than the other one. This could be attributed to continuous cropping of maize, as crop rotation is hardly practiced in the right bank side. On the other hand, at the left bank, in Hididole and Ilan, sorghum and Sudan grass are cultivated using rainfall every year and crop rotation with a variety of vegetables is practiced.

A common recognition of farmers at the target kebeles is that they can get certain production only with irrigation but no fertilizer application since the soil is still new and is originally fertile. For this reason, the continuous cropping of maize has been done for years at the right bank. In addition, compost or agrochemicals are seldom applied to the farmland at both bank sides. However, such exploitive agriculture production by continuous cropping without fertilization obviously leads to worsening the soil condition, and thereby reduces agricultural productivity. Therefore, it is necessary to introduce measures which encourage farmers to practice an efficient land use method such as crop rotation and cultural control in order to keep the current privileged conditions of soil fertility.

1.4.2 Distribution of Agricultural Products

1) Farm Gate Price and Market Price

Market in Gode town is in fact small and has few warehouses and processing facilities, so that the adjustment of shipment or sales is hardly observed. For that reason, product prices are highly fluctuated caused by local agro-products shipment all at once soon after harvest, as well by the arrival of grains from external assistance. Among the agricultural products sold at the market in Gode town, sesame seeds and its oil, onions, some fresh vegetables like tomato and cabbage and fruit e.g. papaya are locally produced. The agro-product prices at farm gate and at market are indicated in following table provided by LCRDO of Gode woreda:

Table 1.4.4 Prices of Farm Gate and Market for Main Agro-products

Product		Farm Gate Price		Market Price (March 29, 2013)
		Local price per unit	Kg Price	
Maize		500B/ Quintal (=100kg)	5 B/kg	-
Sorghum		1,300B/ Quintal (=100kg)	13 B/kg	-
Sesame	Seed	1,100B/ Quintal (=100kg)	11 B/kg	-
	Oil	2,000B/ Quintal (=100kg=50l)	40 B/kg/l	80 B/l
Onion		250-300B/ Kishe (＝50kg)	5-6 B/kg	7-8 B/kg
Tomato		18-20B/ Container (＝20kg)	0.9-1 B/kg	4 B/kg
Watermelon		15-25B/ Piece (3-4kg)	5-6 B/kg	10 B/kg
Papaya		10-15B/ Piece (500g)	20-30 B/kg	30-40 B/kg

Source: LCRDO of Gode Woreda

Among the commodities above, sesame is shipped from not only nearby Gode town area but also from Kelafo woreda, a famous agriculture production woreda located about 90 km downstream from Gode town. Raw seeds and products processed as oil, materials of sweet cakes, and animal feed are sold in the market of Gode town. According to an agricultural expert at the LCRDO, the price of sesame can be double higher if it is processed as oil rather than seeds.

2) National Markets and Future Distribution Trends

Onion and sesame locally produced are distributed to big national markets out of Gode town, such as Addis Ababa, Jijiga and Dire Dawa. Small volumes are directly taken to the market in Gode by the farmers but in case that a certain volume of products is shipped, a number of local traders, counted 15 to 20 traders within Gode, go to the production site and purchase by lot. They bring the purchased products to the Gode town market and to other urban markets including Addis Ababa. In case of shipping to Addis Ababa, the traders often use a diversion unpaved road since security condition of the road connecting Gode town with Jijiga city is not good.


Good quality onion produced in Gode and potato from Addis Ababa (Gode market March 29, 2013)

1.4.3 Agricultural Support System

1) Agricultural Research Institutions

Somali Region Pastoral and Agro-pastoral Research Institute (SoRPARI) located at the capital of the region and the branch office in Gode (GoRPARI) are in charge of research and study in agricultural production in the region and Gode woreda respectively. Both institutes have conducted an agricultural research considering the local environment with the aim of securing access to food and increasing agricultural income. Collection of relevant technical information is also its important activity. Focusing on researches in adapted varieties and cultivation techniques, GoPARI has accumulated the technical information which has verified adaptability in the area through practical crop growing experiments.

2) Livestock, Crop and Rural Development Office (LCRDO)

Under an objective of promoting livestock husbandry and crop production in the area, the LCRDO is responsible for 1) supporting the acquisition of agricultural machinery and input, and 2) providing technical extension towards local natural resources management for the population. The LCRDO has 4 expertise departments; namely, livestock, crop production, natural resources management, and cooperative associations. 2-4 kebeles are grouped together in one according to the location, and each group is assigned 1 to 2 experts who take the responsibility of disseminating information and new techniques for the assigned development agents (DA) and the population.

3) Support of Agricultural Machinery and Input

Since 1995, the LCRDO has been distributing improved seeds of the main crop (e.g. 30kg＝1ha of maize) and chemical fertilizer (50kg of Urea, 100kg of DAP) to individual farmers for free. DAs are in charge of preparation for the distribution list while hearing the requests from farmers who are ready enough in his/her farmland to start cultivation. Regarding agrochemicals, the DAs who have been requested to supply it go and check the farmlands and distribute appropriated agrochemicals for free in case that the pest and disease is considered serious.

The free input distribution is planned to continue up to year 2015. Actually, farmers are being organized and formed in a primary cooperative, so that the cooperatives are supposed to procure and supply the agricultural input by themselves after year 2015. Up to March 2013, 130 primary cooperatives have been established in Gore woreda under the facilitation of Livestock, Crop and Rural Development Office of Gode woreda, and all of them are to form a Union together in future.

4) Technical Extension System

Technical extension is conducted in a cascaded system; namely, advanced farmers are given new agricultural technical information at the Farmers Training Center (FTC) in order to improve the production, and then those advanced farmers are supposed to extend the techniques to the other farmers. FTC has been established at 3 kebeles; Ilan, Godiray, and Konka within Gode woreda. There are demonstration fields of total 2 ha in each of the FTCs. However, demonstrations are carried out only in one field or in a plot per year due to budged constraint of LCRDO.

5) Capacity of the Livestock, Crop and Rural Development Office

According to the interviews to farmers in target kebeles, they have had few opportunities of receiving technical trainings from agricultural experts and DAs at FTC. The main reason is that the government officers such as experts and DAs do not have means of transportation to go round to farmers' fields. In addition, the DAs may have a limited knowledge and experience on the agricultural practices. Thus their technical level may not be commensurate to what is required. In future, since the agricultural input is to be procured by the farmers, the DAs should be in charge of not only agriculture extension but also organizing the farmers. Therefore, capacity development of DAs on agricultural techniques and organizational supporting is an urgent issue.

CHAPTER 2 IRRIGATION SCHEME DESIGN

This chapter discusses project designing for the Gode irrigation scheme such as; 1) examination of gravity irrigation feasibility, 2) design of pump irrigation system as an alternative to gravity irrigation system, 3) agriculture development with irrigation, 4) water management, 5) project cost, 6) project economic and financial analysis, and 6) implementation arrangement, etc.

2.1 Examination of Gravity Irrigation System on the Wabe Shebele River

There are mainly 2 irrigation systems such as gravity irrigation and pumping irrigation. In general, gravity irrigation provides better sustainability from the view point of low cost operation and maintenance. Therefore, as far as topographic condition allows and also project cost can be limited to a reasonable investment level, gravity irrigation should be selected. Then, if the water diversion and delivery by gravity to the target farmlands is not feasible, pump irrigation comes as the second option.

2.1.1 Topographic Survey

Topographic surveys were carried out in June 2012 to examine the feasibility of gravity irrigation system for Gode area. The site for the topographic survey is along the Wabe Shebele river (see Figure 2.1.1). A permanent benchmark was established at the site of Gode bridge, from which 14 km toward upstream and also 6 km toward downstream were covered by longitudinal and cross sectional surveys. Cross sectional survey was conducted at 11 sections of the Wabe Shebele river as indicated by double circle in Figure 2.1.1. Leveling survey had covered a potential irrigation area by gravity located on the right bank of the river.

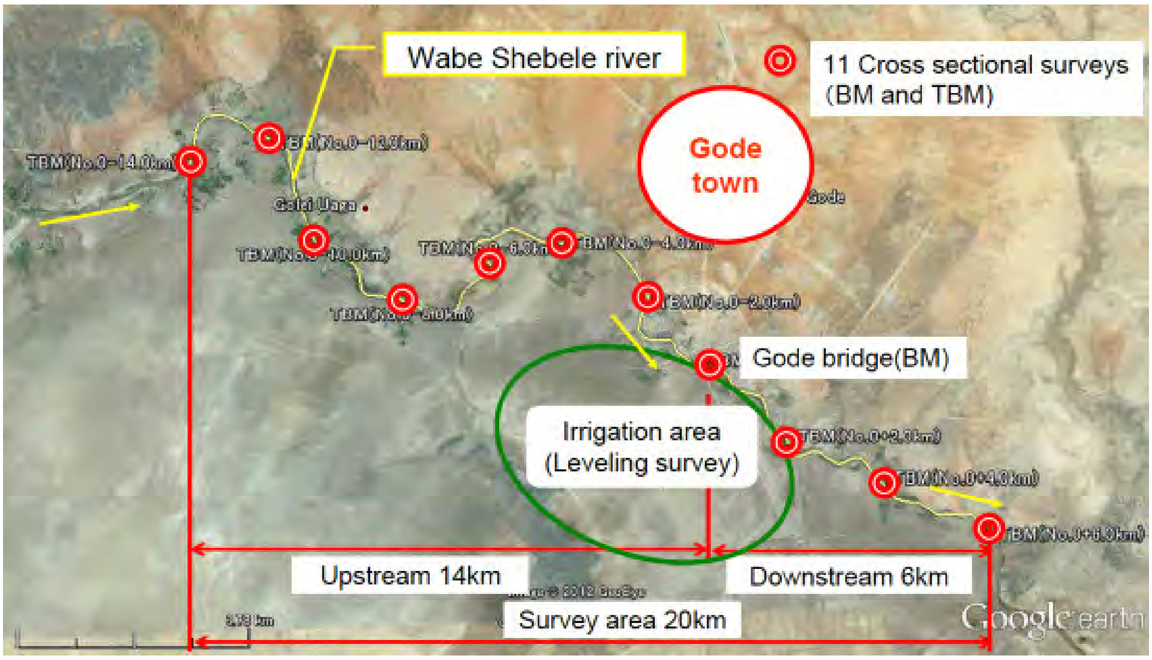


Figure 2.1.1 Topographic Survey Area; Total 20 km for Longitudinal Survey

Longitudinal survey found that the longitudinal gradient of Shebele river over the surveyed 20 km reach is about 1:2,500, meaning 1 meter drop over 2.5 km distance. Gradient 1:2,500 is in fact gentle, and conveyance canal to be constructed from the diversion point to the irrigable area should be so gentler that can absorb the elevation difference arising between the diversion point and the farmland, say probably 1:5,000 to even 1:10,000.

Cross sectional survey was conducted with reference to the elevation given by the temporary benchmarks. Eleven cross sections of the river were measured. According to the result of the cross section survey, Wabe Shebele river was found to has more than 10m depth and more than 80m width in most of the reaches surveyed. The depth at Gode bridge point reaches as deep as 14m, and the width reaches about 120m. Wabe Shebele river is in fact very wide and deep, and especially the depth provides a difficulty on the establishment of gravity irrigation system.

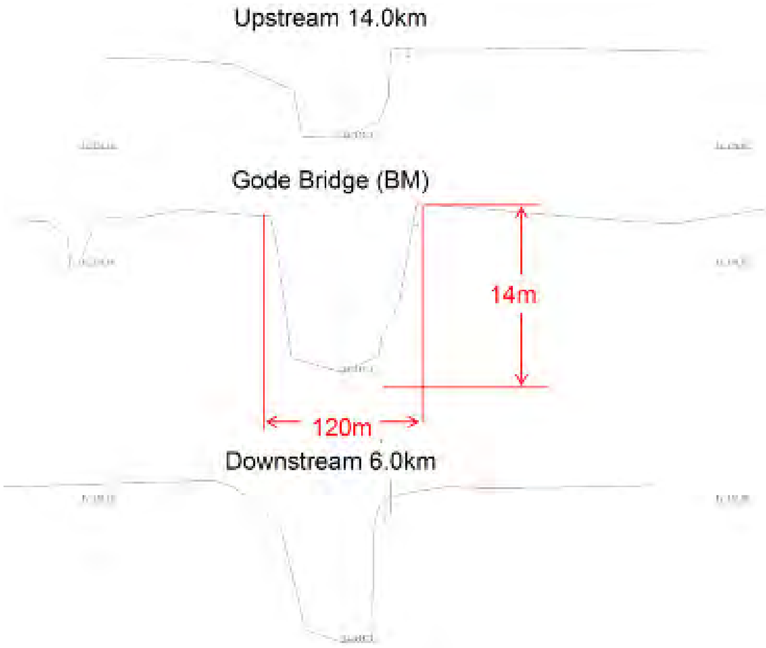


Figure 2.1.2 Result of the Cross Sectional Survey at 3 Points

As afore-mentioned, potential gravity irrigation area is located on the right bank of the river opposite to the Gode town. Leveling survey in this potential area found that the land lies on a very flat plain with an elevation ranging from EL.271m to EL.276m. Within the area, undulation is very little so that the land slopes very gently from upstream to downstream gradually. Gradient of the land was computed at about 1: 2,500, which is in fact more or less same as that gradient of the Wabe Shebele river.

2.1.2 Feasibility of Gravity Irrigation on the Wabe Shebele River

Wabe Shebele river bed slope around the project area was found at 1:2,500, meaning very gentle slope. The depth and width were also found ranging from 8m to 14m and 80m to as wide as 150m respectively. The irrigable land is also very flat and its gradient is only 1:2,500 same as that of the river. With this condition, canal having different longitudinal gradients was planned with diversion weir having also different heights in order to examine the feasibility of gravity irrigation system for Gode area. It was found that;

Case 1 Given 1/5,000 longitudinal gradient to the conveyance canal with 3m height diversion weir, 26.14 km conveyance canal is required from the intake point to the potential irrigable area in order to realize gravity irrigation (water conveyance and distribution by gravity),

Case 2 Given 1/10,000 longitudinal gradient to the conveyance canal with 3m height weir, there should be 20.78 km length of conveyance canal from the intake point to the potential irrigable area for realizing gravity irrigation, and

Case 3 Preliminary proposed site, 7-8 km upstream from the potential irrigable area along the river, cannot be a gravity diversion site even with 5 m height diversion weir (it needs approximately 10 m height weir, almost equal to the full depth of the river).

Above Case 3, preliminary proposed site located around 7-8km upstream from the irrigable area, is clearly found not feasible from technical point of view. A weir even with 5 m highest cannot divert the river water to the irrigable area by gravity. To realize gravity delivery, in fact 10m height weir is necessary, which is not possible to construct taking into account the foundation condition of the site where no hard foundation exists.

Case 1 and Case 2 imply that from technical point of view, gravity irrigation system is feasible on condition that we construct very long conveyance canal reaching 21 – 26 km length with gradient of 1:10,000 to 1:5,000. However, the conveyance canal has to run over such long distance without any use, and in this case maintenance becomes very hard. The river water is turbid by origin, and also soil erosion by wind would provide additional sedimentation in the conveyance canal.

Construction cost is very high as well, reaching nearly US$ 10 million for the weir and the conveyance canal only. Foundation treatment for the weir establishment and flood protection work along the both banks of the river are also required, further increasing the construction cost. Therefore, it is concluded that gravity irrigation system cannot be feasible in this Gode area from maintenance and financial points of view as summarized in Table 2.1.1:

Table 2.1.1 Comparison on the Feasibility of Gravity Irrigation System from Wabe Shebele River

Case	Assumption	Examination	Cost	Feasibility	Selection
1	Weir H=3.0 m Canal i=1:5,000	Gravity irrigation system needs 26 km length canal, and also flood protection earth bank on the both sides of the river as well as foundation work for the weir will be required, raising the construction cost.	Weir: US$ 5 million Canal: US$ 4 million Foundation: ++ Flood protection: ++ Over US$ 9 million	Technically feasible but Financially **NOT**	**X**
2	Weir H=3.0 m Canal i=1:10,000	Gravity irrigation system needs 21 km length canal, and also flood protection earth bank on the both sides of the river as well as foundation work for the weir will be required, raising the construction cost.	Weir: US$ 5 million Canal: US$ 5 million Foundation: ++ Flood protection: ++ Over US$ 10 million	Technically feasible but Financially **NOT**	**X**
3	Weir H=5.0m Canal i=10,000 (Preliminary proposed site)	Even with 5 m height weir (appox. half of the river depth), gravity irrigation system can not be installed.	-	Technically **impossible**	**X**

Source: JICA RREP Team

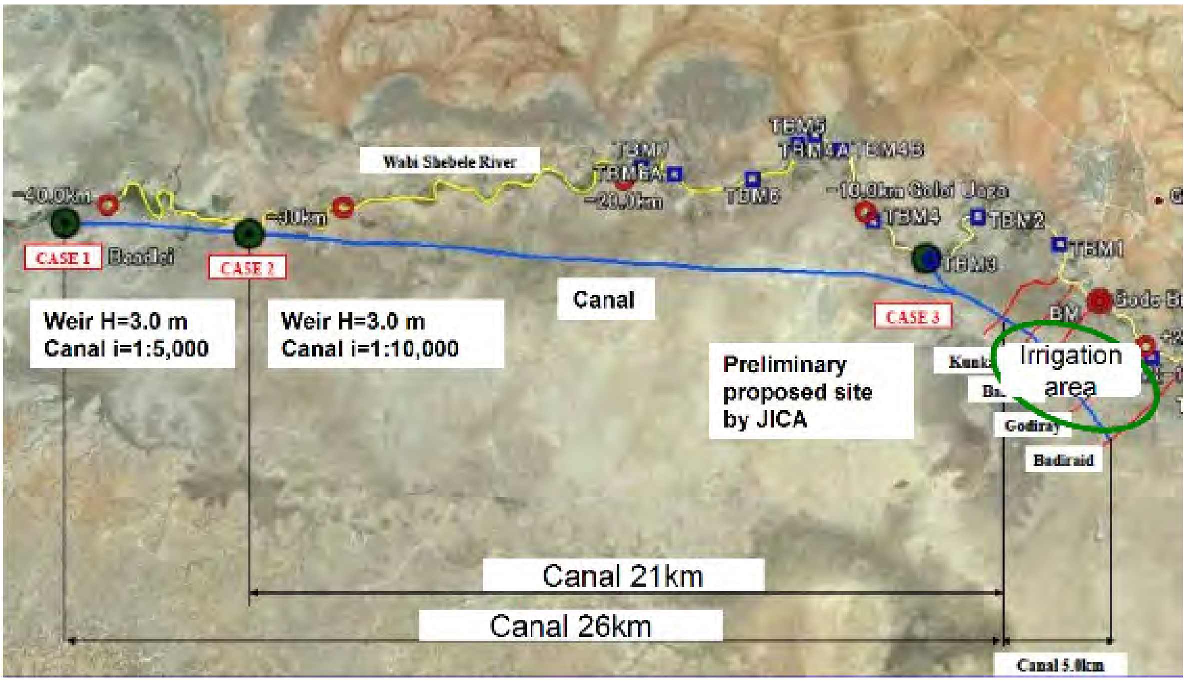


Figure 2.1.3 Ground Plan on the Feasibility of Gravity Irrigation

Source: JICA Project Team

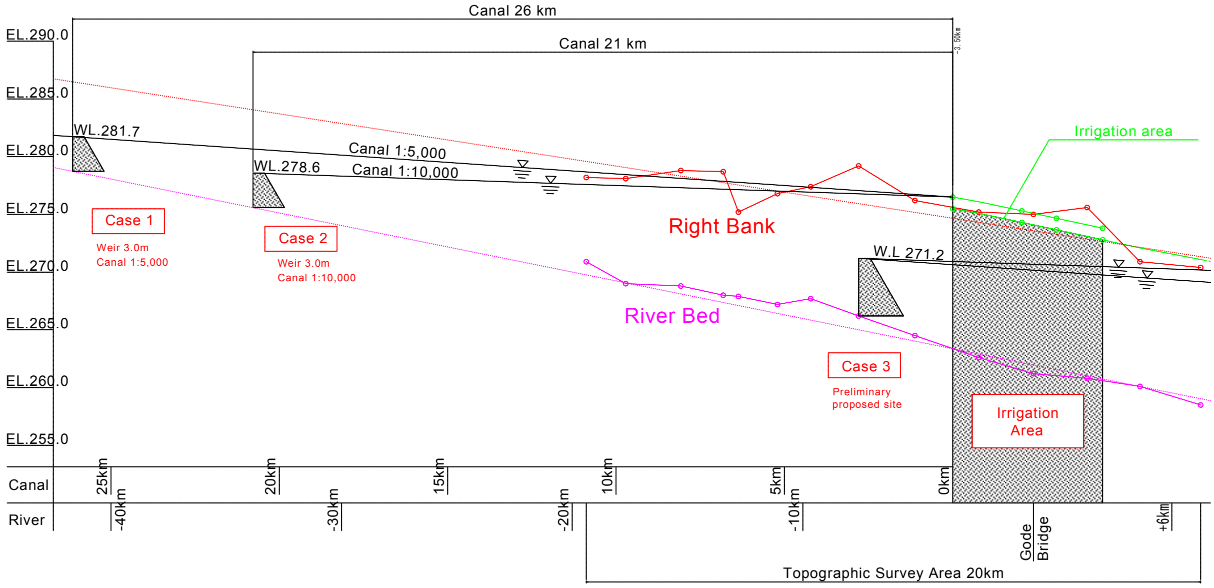


Figure 2.1.4 Longitudinal Plan on the Feasibility of Gravity Irrigation

Source: JICA Project Team

2.1.3 Alternative Options to Gravity Irrigation System

It has become clear that the installation of gravity irrigation scheme by constructing a diversion weir in the target area is not feasible from the view points of maintenance and the construction cost. Therefore, it is necessary to select other irrigation method which can be adaptable to the area. There are 4 alternatives, instead of gravity irrigation, and based on the following examination, Option 2 ‘pump irrigation from the Wabe Shebele river’ is selected:

Option 1) Extension from the West Gode Irrigation System via siphon on the Wabe Shebele River

The man canal of the irrigation scheme has been suffering from huge amount of sedimentation since its inception, leading to difficulty of ferrying the water to the end of the man canal. In fact, downstream portion of the main canal rarely receives irrigation water. Given this present situation, the existing scheme has little potential to convey irrigation water up to the target potential irrigation area over such long distance reaching almost 60km

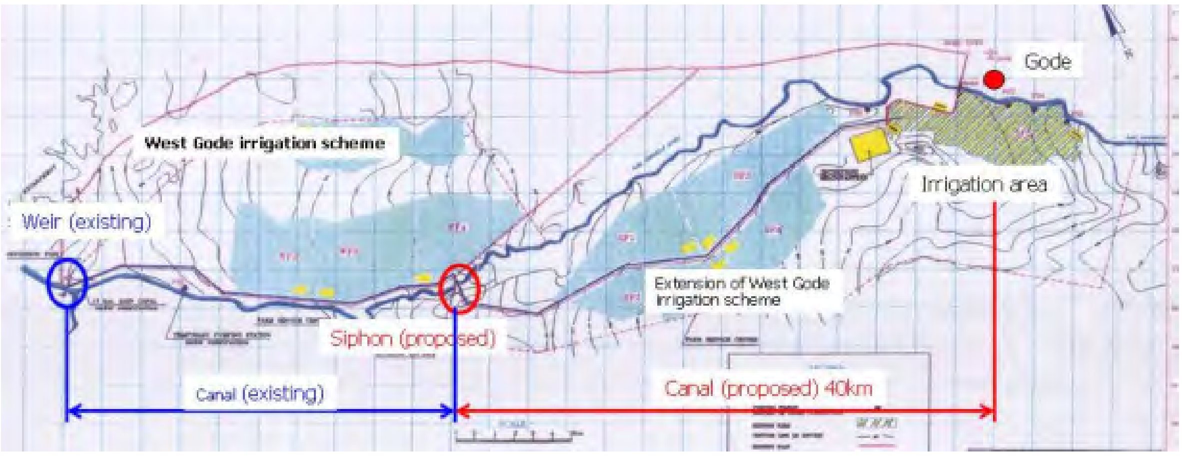


Figure 2.1.5 Option 1) West Gode Irrigation System and its Extension Plan

Source: Original map from Gode Irrigation and Agro-Industrial Project, Vol.1 June 1995

Option 2) Pump irrigation from the River

The farmers in the area have an experience on this pump irrigation to some extent, and it is also feasible to extend the existing pump irrigation area. It is mostly realistic option based on the site condition and budget available under this Project. The pumping power can be provided by different means, such as diesel generator, engine direct driven, solar (see option 3), etc.

Option 3) Pump irrigation with solar electricity generation system

Solar system works only 6 – 8 hours a day and can hardly be operational during rainy season. Therefore stand-by generator should always be provided, and also to secure priming power in any case under solar system, generator power is required. Therefore, solar system raises the construction cost, and financially it becomes difficult.

Option 4) Water-saving irrigation system by drip irrigation utilizing groundwater

It is necessary to sink a borehole and carry out pumping test in order to confirm the groundwater yield. It is necessary for sustainable system to reduce water volume with saving-water method and to increase profit by producing valuable products in this groundwater irrigation. Drip irrigation can be an option; however it is a sophisticated system which is difficult to introduce under present situation.

2.2 Selection of Pump Irrigation Beneficially Areas (Kebeles)

2.2.1 Candidates Sites for the Pump Irrigation

Irrigation scheme to be established in Gode area is to apply pump irrigation system as afore-mentioned. The JICA team is to select potential irrigation sites mostly from kebeles located in and around Gode town area taking into account logistics arrangement. There are, according to Gode Woreda Administration office, 7 kebeles which are basically resettlement villages (see Table 2.2.1 and Figure 2.2.1). Note that number of households shown in Table 2.2.1 differs by year due to the effect of drought whereby different numbers are often reported by source.

Table 2.2.1 Irrigated Agriculture Experience of the 7 Candidates Kebeles

Kebele	Max. area irrigated in the past (ha)	Irrigated area in 2011/12 (ha)	No. of villagers (HHs)*
1) Kunka	400 ha	NA	120 HH
2) Barsan	400 ha	About 30 ha	115 HH
3) Godiray	400 ha	About 30 ha	180 HH
4) Badilaid	400 ha	About 30 ha	222 HH
5) Hididole	118 ha	About 50 ha	307 HH
6) Ilan	110 ha	About 40 ha	260 HH
7) Kayane	78 ha	22 ha	240 HH

Source: Gode Kelafo Irrigation Development Office

*: no. of households differs by year, being affected mainly by drought.

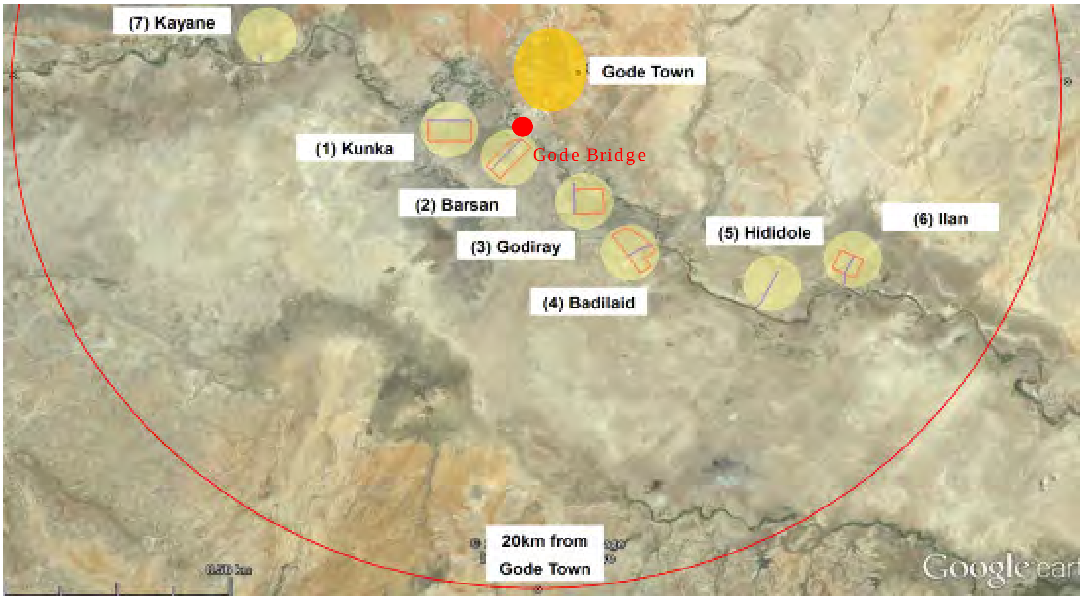


Figure 2.2.1 Location of the 7 Candidate Sites along the Wabe Shebele River

2.2.2 Salient Feature of 7 Candidate Sites

The candidate sites have in fact a long history in irrigated farming. In 1970s, following the 1972-74 drought, pastoralists were settled on around 1,000 ha of irrigable land. However, during the Ethio-Somalia war in 1977, the Somali crop farmers migrated to Somalia and their land was taken over by the Derg government. In 1979, the Derg government brought settlers from Wollo and Tigray to the south Gode area. The settlers started producing food crops through a pump-based irrigation scheme at selected sites including Barsan.

In 1980, the Derg government established the south Gode state farm at Barsan, Godiray, Badilaid, Welwel, and Gelewage, all of which are located in south Gode area stretching from Gode town to the downstream with Somalia border. This can be said in fact to be the beginning of the large scale pumping irrigation in the area. During this time, 6 piston pumps were provided and some of them are still functional. According to information from Gode Kelafo Irrigation Development Office, total 18 pumps were procured in 1982 by the government and as of 2013 still 3 pumps are functional.

Derg regime fell in 1991, and in the following year 1991/2 returnees from Somalia started claiming their land that had been converted into the state farm, now occupied by the settlers from highlands. In the following year of 1992/3, the Ethiopian People's Revolutionary Democratic Front (EPRDF) transitional government established a committee under the prime minister’s office to handle this issue. The settlers were finally returned home, and the lands were returned to the returnees from Somalia within the following year.

Following the above background overall history around the candidate sites, Tables 2.2.2 and 2.2.3 depicts the situation in 3 periods as during the Derg regime, after the Derg regime (after year 1992) and as of year 2012 by candidate kebele. Excerpts are as follows;

- ✓ Out of the 7 kebeles, 5 of the original farms were started as state farm in 1980 by the Derg regime while 2 kebeles of Ilan and Kayane as community settlement in 1992 and 1986 respectively. These state farms produced cotton as the primary commodity and fruit such as banana and papaya in the irrigated land of approximately 400 – 600 ha except for Hididole having only 118ha.
- ✓ During the state farm period, 4 nos of pumps with 6 pistons were provided to each of the 4 kebeles of Kunka, Barsan, Godiray, Badilaid and 2 numbers of same pump to Hididole. Therefore, total 18 pumps were provided in total at that time, and as of March 2013, 3 pumps are still functional being used in Barsan, Godiray, and Badilaid.
- ✓ All the state farms were transferred to the current villagers in 1992 upon the fall of the Derg regime. For such 4 kebeles of Kunka, Barsan, Godiray and Badilaid, 6 piston pumps were also transferred to the respective kebeles, so that the community members were able to start irrigated farming. In these 4 kebeles, 400 ha of farmland each was allocated for irrigated agriculture with the pumps, whereby total 400 households were settled based on a policy that each settler household should be given 1ha farmland. On the other hand, pumps in Hididole went out of order, so that they had to depend on relief and also rainfed agriculture.
- ✓ During the years between 1991 and the present, new pumps were also provided by different organizations, e.g. donor (FAO), government and NGOs. For example, FAO provided 3 sets of new motor driven pumps each to Kunka and Barsan in 2009, which are designed to irrigate maximum 100 ha per site. The Government has also provided small 1-piston pumps and/or medium – big pumps to Hididole, Ilan and Kayane. Furthermore, some farmers in Hididole, Ilan and Kayane started purchasing small 1-piston private pumps to cultivate cash crops such as onion.
- ✓ For the situation as of 2012, Kunka and Barsan irrigate around 100 ha area each with the FAO

provided pumps in 2009 while the other 5 kebeles have some difficulties in order to secure their livelihood from agriculture. For example, Godiray and Badilaid narrowly irrigate some areas only, 20-30 ha, with old 6-piston pumps frequently broken. Hididole, Ilan and Kayane kebeles can use only 1-piston small pumps which can irrigate 2 to maximum 50ha only, still not enough to feed all the villagers in the kebeles. For Kayane, however, Ad Horn (a national NGO), has constructed an irrigation system in 2012. With the system operational, the villagers can start irrigated farming.

Table 2.2.2 Salient Feature of 7 Candidate Sites (1/2)

Name	Kunka	Barsan	Godiray	Badilaid
(1) Situation in the Former Government from 1980 to 1991 (Derg regime)				
Established year	1980	1980	1980	1980
Origin of farm	Estate farm	Estate farm	Estate farm	Estate farm
Purpose of Establishment	Produce cotton and fruit such as banana and papaya	Produce cotton and fruit such as banana and papaya	Produce cotton and fruit such as banana and papaya	Produce cotton and fruit such as banana and papaya
Number of HHs	-	-	-	-
No, of pumps	4 big pumps (6 piston) installed by government	4 big pumps (6 piston) installed by government	4 big pumps (6 piston) installed by government	4 big pumps (6 piston) installed by government
Actual land irrigated by those pumps (ha)	421 ha	400 ha	596 ha	428 ha
(2) Situation after the fell down of the Derg regime 1992- (existing Government)				
Types of farm	In 1992, the state farm was transferred to the local community	In 1992, the state farm was transferred to the local community	In 1992, the state farm was transferred to the local community	In 1992, the state farm was transferred to the local community
No. of HHs (returnees and settlers in 1992)	400 HHs	400 HHs	400 HHs	400 HHs
Available pumps in1992	4	4	4	4
Planned land to be irrigated (ha)	400 ha	400 ha	400 ha	400 ha
Actual cultivated land (ha)	400 ha	400 ha	400 ha	400 ha
New pumps provided by Gov't & NGOs in different years.	In 2009 FAO replaced the old pumps by 3 new ones, ≈ 100 ha capacity altogether	In 2009 FAO replaced the old pumps by 3 new ones,≈ 100 ha capacity altogether	-	-
Private Pumps (purchased individually)	-	-	-	-
Lands cultivated by both gov't provided & private pumps (ha) at maximum	400 ha	400 ha	400 ha	400 ha
(3) Present Situation				
Total Number of HHs in the kebele	120 HHs	115 HHs	180 HHs	222 HHs
Irrigated area (2011)	100 ha	100 ha	100 ha	100 ha
Irrigated area (plan)	100 ha	100 ha	100 ha	100 ha
Irrigated area (possible)	100 ha (Electric motor and pump×3)	100 ha (Electric motor and pump×3)	0 ha (Pump is not functional)	0 ha (Pump is not functional)
Existing pumps	Electric motor and pump×3 (Functional) (Replaced by FAO in 2009)	Electric motor and pump×3 (Functional) (Replaced by FAO in 2009)	Big diesel engine pump×1 (6 cylinders) (Not functional)	Big diesel engine pump×1 (6 cylinders) (Not functional)
Future plan for pump provision	No plan	No plan	No plan	No plan
Irrigation structure	• The main canal, 2nd canal, discharge sump and control structure are heavily damaged. • Possible to rehabilitate by Gode Kelafo Irrigation Office.	• The main canal and discharge sump are functional. • The 2nd canal, and control structure are damaged.	• The main canal and discharge sump are functional. But main canal is slightly damaged. • The 2nd canal and control structures are damaged.	• The main canal and discharge sump are functional. But main canal is slightly damaged. • The 2nd canal, and control structures are damaged.
Discharge sump	Heavily damaged	Functional	Functional	Functional
Main Canal	Heavily damaged	Functional	Functional (slightly damaged)	Functional (slightly damaged)
2nd Canal	Damaged	Damaged	Damaged	Damaged

Source: Gode Kelafo Irrigation Development Office, Gode Woreda Agriculture and Rural Development Office, Woreda Administration Office and JICA project team's field observation.

Table 2.2.3 Salient Features of 7 Candidate Sites (2/2)

Name	Hididole	Ilan	Kayane
(1) Situation in the Former Government from 1980 to 1991 (Derg regime)			
Established year	1980	1992	1986
Origin of farm	Estate farm	Not established in the former Gov't	Community settlement
Purpose of Establishment	Produces cotton and fruit such as banana and papaya	-	To make the community permanent resident in the place
Number of HHs	-	-	15 HHs
No, of pumps	2 big pumps (6 piston) installed by government	-	Don't have pump
Actual land irrigated by those pumps (ha)	118 ha	-	-
(2) Situation after the fell down of the Derg regime 1992- (existing Government)			
Types of farm	In 1992, the state farm was transferred to the local community	To make the community permanent resident in the place	The same to the establishment
No. of HHs (returnees and settlers in 1992)	22(start)→650HHs	10(start)→469HHs	437 HHs
Available pumps in1992	No pump	No pump	No pump
Planned land to be irrigated (ha)	-	-	-
Actual cultivated land (ha)	10 ha (Rain-fed)	No data	No data
New pumps provided by Gov't & NGOs in different years.	In 2009, the Gov't gave them 12 small pumps (1 piston pump) & they are organized in 22 cooperatives.	In 2003, the Gov't gave them 1big pump (4 piston pump).	• In 2003 CCM gave them 1 medium pump. • In 2009, the Gov't gave them 7 small pumps (1 piston pump) & they were organized in 7 cooperatives.
Private Pumps (purchased individually	2 small pumps (1 piston pumps)	17 small pumps (1 piston pumps)	9 small pumps (1 piston pumps). Small commercial private farm organized in 6 cooperatives.
Lands cultivated by both gov't provided & private pumps (ha) at maximum	100 ha	130 ha (pump was new) 72 ha (2009) 40 ha (2011)	78 ha
(3) Present Situation			
Total Number of HHs in the kebele	307 HHs	260 HHs	240 HHs
Irrigated area (2011)	50 ha	40 ha	22 ha
Irrigated area (plan)	50 ha	2 ha	22 ha +120 ha (Ad Horn)
Irrigated area (possible)	50 ha (12 small pumps)	2 ha (1 small pumps)	22 ha (7 small pumps)
Existing pumps	Small diesel engine pump (10 Functional) (2 Functional, Private) (2 Not functional)	Big diesel engine pump×1 (Not functional) Small diesel engine pump (1 Functional)	Small diesel engine pump (3 Functional) (4 Functional, Private) (4 Not functional) (5 Not functional, Private)
Future plan for pump provision	No plan	No plan	Ad Horn (NGO) is constructing 1 big pump (4-piston) irrigation system.
Irrigation structure	• All irrigation structures are heavily damaged. It needs rehabilitation. • The farmers are using another small canals constructed by themselves.	• All Irrigation structures are damaged. It seems that initially they were not well constructed. • The farmers are using another small canals constructed by themselves	• Ad Horn (NGO) is constructing all the irrigation structures such as canals, gates, pump station etc. as of 2012.
Discharge sump	Heavily damaged	Heavily damaged	Under construction by Ad Horn
Main Canal	Heavily damaged	Heavily damaged	Under construction by Ad Horn
2nd Canal	Heavily damaged	Heavily damaged	Under construction by Ad Horn

Source: Gode Kelafo Irrigation Development Office, Gode Woreda Agriculture and Rural Development Office, Woreda Administration Office and JICA project team's field observation.

2.2.3 Selection of the Beneficiary Sites

Based on the above discussions, Tables 2.2.4 and 2.2.5 summarize some key parameters to be applied in selecting the beneficiary sites. Godiray, Badilaid, Hididole, Ilan are selected as the beneficiary sites taking into account the facts that; 1) Kunka and Barsan were provided with new motor driven pumps by FAO in 2009, which is functional able to irrigate 100 ha each, 2) Kayane is to receive irrigation facilities being constructed as at 2012-2013 by Ad Horn, a national NGO, which is also to irrigated over 100ha, 3) the remaining 4 sites of Godiray, Badilaid, Hididole, Ilan do not have enough pumping facilities for irrigation and no plan to have such facilities as of 2012.

Table 2.2.4 Selection of the Beneficiaries (1/2)

Particular	Kunka	Barsan	Godiray	Badilaid
1. Irrigated area (2011)	100 ha	100 ha	100 ha	100 ha
(plan)	100 ha	100 ha	100 ha	100 ha
(possible)	100 ha (Electric motor+pump×3)	100 ha (Electric motor+pump×3)	0 ha (Pump is not functional)	0 ha (Pump is not functional)
2. Beneficiary	120 HHs	115 HHs	180 HHs	222 HHs
3. Pump	Electric motor+ pump×3 (Functional) (Replaced by FAO)	Electric motor+ pump×3 (Functional) (Replaced by FAO)	Big diesel engine pump ×1 (Not functional)	Big diesel engine pump ×1 (Not functional)
4. Discharge sump	Heavily damaged	Functional	Functional	Functional
5. Main canal	Heavily damaged	Functional	Functional (slightly damaged)	Functional (slightly damaged)
6. 2nd canal	Damaged	Damaged	Damaged	Damaged
7. Control structure	Damaged	Damaged	Damaged	Damaged
Supply and rehabilitation	-	-	100ha Pump (4 motor pumps) Main canal 2nd canal Control structure	100ha Pump (4 motor pumps) Main canal 2nd canal Control structure
Reason	Pump was replaced by FAO in 2009.	Pump was replaced by FAO in 2009.	Pump conveyance system are not functional.	Pump conveyance system are not functional.

Source: JICA Project Team

Table 2.2.5 Selection of the Beneficiaries (2/2)

Particular	Hididole	Ilan	Kayane
1. Irrigated area (2011)	50 ha	40 ha	22 ha
(plan)	50 ha	2 ha	22 ha +120 ha (Ad Horn(NGO))
(possible)	50 ha (12 small pumps)	2 ha (1 small pump)	22 ha (7 small pumps)
2. Beneficiary	307 HHs	260 HHs	240 HHs
3. Pump	Small diesel engine pump (10 Functional) (2 Functional) Private (2 Not functional)	Big diesel engine pump×1 (Not functional) Small diesel engine pump (1 Functional)	Small diesel engine pump (3 Functional, 4 Not functional) (4 Functional, 5 Not) Private
4. Discharge sump	Heavily damaged	Heavily damaged	Under construction by Ad Horn
5. Main canal	Heavily damaged	Heavily damaged	Under construction by Ad Horn
6. 2nd canal	Damaged	Damaged	Under construction by Ad Horn
7. Control structure	Damaged	Damaged	Under construction by Ad Horn
Supply and rehabilitation	100ha Pump (4 motor pumps) Discharge sump Main canal 2nd canal Control structure	100ha Pump (4 motor pumps) Discharge sump Main canal 2nd canal Control structure	-
Reason	Pump conveyance system are not functional.	Pump conveyance system are not functional.	Ad Horn (NGO) is under construction of the pump systems.

Source: JICA Project Team

2.3 Design of Pump Irrigation System

2.3.1 Water Requirement

1) Evapo-transpiration (ETo)

Monthly values of potential evapo-transpiration (ETo) can be estimated using Penman-Monteith method. Data used in estimating the potential evapo-transpiration with Penman-Monteith method are the mean monthly values of temperature, relative humidity, ratio of actual sunshine duration to the maximum possible one, and wind velocity. Together with the climate data recorded at Gode meteorological station and employed in estimating the ETo, the monthly ETo values are given in Table 2.3.1, which ranges from 5 mm to about 7 mm per day:

Table 2.3.1 Evapo-transpiration (ETo) in Gode Estimated by Penman-Monteith Method

Particulars		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min Temperature	(°C)	21.2	22.1	23.9	23.9	23.9	23.5	23.1	23.0	23.5	23.0	21.5	21.0
Max Temperature	(°C)	35.3	36.4	37.1	35.8	34.5	33.9	33.2	33.6	35.2	34.4	33.8	34.9
Relative Humidity	(%)	48	46	47	59	62	56	54	54	52	58	58	51
Wind speed	(km/day)	184	196	205	165	187	294	339	327	258	159	135	151
Sunshine	(hours)	9.7	10.2	9.9	8.2	8.1	7.2	6.6	7.4	8.6	7.6	9.0	9.7
Radiation	(MJ/m2/day)	22.6	24.5	24.8	22	21.1	19.3	18.6	20.4	22.6	20.6	21.7	22.1
ETo	(mm/day)	6.08	6.75	7.12	5.89	5.64	6.28	6.53	6.73	6.86	5.44	5.12	5.54

Source: JICA Team based on meteorological data recorded at Gode station.

2) Crop coefficient (Kc)

In Gode area, crop is cultivated with irrigation 2 times in a year in general. One crop season takes about 3 months, and the first one is from April to June, and the other is from October to December. Crop coefficient is estimated for the case of maize (grain) because it requires the largest amount of water amongst crops cultivated in and around the area. Estimation of crop coefficient (Kc) refers to the recommended figures in the "Crop Water Requirements No.24 FAO Irrigation and Drainage paper". The crop coefficient (Kc) estimated is as follows, which varies from 0.35 at the initial stage to 1.1.5 as the peak stage:

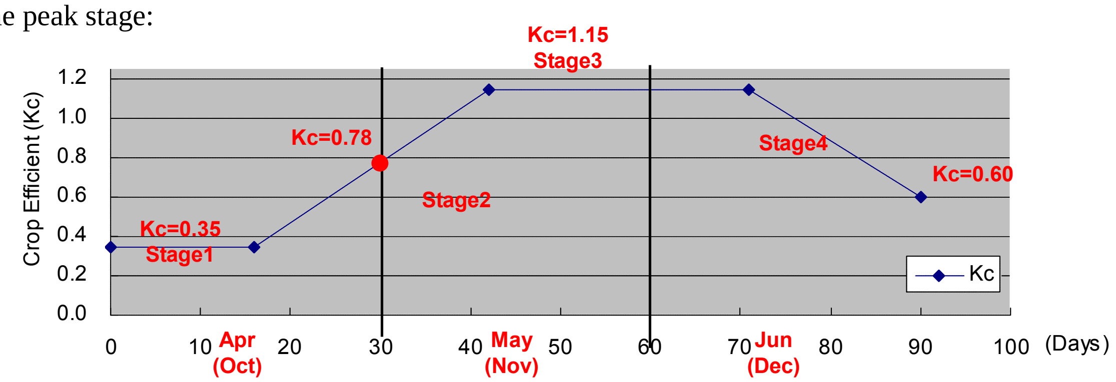


Figure 2.3.1 Crop Efficient Carve (Maize, Grain)

Source: Crop water requirements No.24 FAO irrigation and drainage paper

Table 2.3.2 Crop Development Stage (Maize, Grain)

Crop	Crop stage	1	2	3	4	Total
Maize(grain)	Warm desert climate (day)	25	40	45	30	140
	Gode (day)	16	26	29	19	90

Crop	Crop stage	Wind (m/sec)	
		0-5m	5-8m
Maize(grain)	Stage 1	0.35	0.35
	Stage 2	0.35-1.15	0.35-1.2
	Stage 3	1.15	1.2
	Stage 4	1.15-0.6	1.2-0.6

Source: Crop water requirements No.24 FAO irrigation and drainage paper

3) Irrigation Efficiency

Overall irrigation efficiency, so-called project irrigation efficacy, is composed of 1) conveyance efficiency (Ec), 2) field canal efficiency (Eb) or distribution efficiency, and 3) field application efficiency (Ea). The project irrigation efficiency is estimated by multiplying these 3 efficiencies. Table 2.3.3 presents the efficiencies applied in the target project with reference to the recommended efficiencies in the ‘Crop Water Requirements No.24 FAO Irrigation and Drainage Paper’ as; 0.90 for the conveyance efficiency, 0.80 for the field canal efficiency, 0.6 for the field application efficiency, whereby the project irrigation efficiency comes to 0.432:

Table 2.3.3 Irrigation Efficiencies

Efficiency	E	Remarks
Conveyance Efficiency (Ec)	0.90	Continuous supply
Field Cancel Efficiency (Eb)	0.80	Blocks larger than 20 ha
Field Application Efficiency (Ea)	0.60	Referred to the case of basin irrigation
Project Irrigation Efficiency	0.432	Overall irrigation efficiency

Source: JICA Project Team based on Crop water requirements No.24 FAO irrigation and drainage paper

4) Design Irrigation Hour per Day

According to the field interviews to the current irrigator farmers in and around Gode area, they practice in most cases maximum 20-hour irrigation per day during peak irrigation period. Table 2.3.4 summarizes the irrigation practices during the peak period in the 7 kebeles afore-mentioned. Therefore, maximum irrigation hour for the target project is also designed at 20 hours.

Table 2.3.4 Irrigation Hour in Gode Area

Site	Kunka	Barsan	Godiray	Badilaid	Hididole	Ilan	Kayane
Pumping hours	20hours/day	20 hours/day	20 hours/ day	21.5hours/day	19hours / day	20hours/day	15hours/day
	6am-4pm (10hours) 6pm-4am (10hours)	6am-4pm (10hours) 6pm-4am (10hours)	6am-4pm (10hours) 6pm-4am (10hours)	6am-4pm (8.5hours) 5pm-6am (13hours)	6am-11pm (5hours) 3pm-5am (14hours)	6am-4pm (10hours 6pm-4am (10hours)	6am-11pm (5hours) 3pm-1am (10hours)

Source: Field interviews to the current irrigator farmers in 7 kebeles

5) Calculated Water Requirement (l/s/ha)

Table 2.3.5 shows the calculation of water requirement by month. As shown in the table, the peak water requirement is in June within the crop cultivation period from April to June for the first cultivation and from October to December for the second cultivation. Given the maximum ETo of 6.28 mm/day with the crop coefficient of 1.15 in June, the design water requirement per second per hector unit is given below:

6.28 mm / day (ETo) x 1.15(Kc) x (10^5 x 10^5 /10^6) / (60 x 60 x 24) / 0.9 (Ec) / 0.80 (Eb) / 0.6 (Ea)
= 1.93 l/s/ha (24-hour irrigation) in June
= 2.32 l/s/ha (20-hour irrigation) in June
= 2.4 l/s/ha (designed unit water requirement)

Table 2.3.5 Calculated Water Requirement (l/s/ha)

Particular		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min Temperature	(°C)	21.2	22.1	23.9	23.9	23.9	23.5	23.1	23.0	23.5	23.0	21.5	21.0
Max Temperature	(°C)	35.3	36.4	37.1	35.8	34.5	33.9	33.2	33.6	35.2	34.4	33.8	34.9
Relative Humidity	(%)	48	46	47	59	62	56	54	54	52	58	58	51
Wind speed	(km/day)	184	196	205	165	187	294	339	327	258	159	135	151
Sunshine	(hours)	9.7	10.2	9.9	8.2	8.1	7.2	6.6	7.4	8.6	7.6	9.0	9.7
Radiation	(MJ/m2/day)	22.6	24.5	24.8	22	21.1	19.3	18.6	20.4	22.6	20.6	21.7	22.1
ETo	(mm/day)	6.08	6.75	7.12	5.89	5.64	6.28	6.53	6.73	6.86	5.44	5.12	5.54
Crop coefficient	Kc				0.78	1.15	1.15				0.78	1.15	1.15
ET x Kc	(mm/day)				4.59	6.49	7.22				4.24	5.89	6.37
Conveyance Efficiency	Ec				0.9	0.9	0.9				0.9	0.9	0.9

Particular		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Canal Efficiency	Eb				0.8	0.8	0.8				0.8	0.8	0.8
Field Application Efficiency	Ea				0.6	0.6	0.6				0.6	0.6	0.6
Irrigation hour	(hour)				20	20	20				20	20	20
Water requirement 24 hours	(l/s/ha)				1.23	1.74	1.93				1.14	1.58	1.71
Water requirement 20 hours	(l/s/ha)				1.48	2.09	2.32				1.37	1.9	2.05

Source: JICA Team, referring to Crop water requirements No.24 FAO irrigation and drainage paper

2.3.2 Design Irrigation Unit and the Scheme Water Requirement

In the previous days under state farm arrangement, the unit irrigation area per scheme was set to be 400 ha. Such big irrigation unit was managed by state, however this time the Project is for community members. Upon completion of the scheme construction, all the operation and maintenance shall be carried out by the beneficiary members organized in a water users association. In this regard, such big irrigation unit, say 400ha, seems to be quite difficult to manage by beneficiary farmers.

From the site observation, the current irrigation system supported by FAO in 2009, in a form of pump provision, is designed to irrigate maximum 100ha. This 100 ha irrigation unit area can be said to be almost maximum feasible extent of area to irrigate from field observations. According to the observations, with pre-arranged enough amount fuel and input such as seed and fertilizer, they can irrigate up to 100ha with great efforts. Otherwise the irrigated area is easily reduced to less than 100ha.

From the view point of management, 100 ha irrigation unit area can be manageable since there should be 100 farmer households provided that each farmer is given 1 ha farmland according to a government policy. 100 farmer households are not too big number to be organized in an association in charge of scheme management. Even if one farmer is given half hector of farmland, in that 2-cropping per year provides total 1 ha to each farmer, there will be total 200 beneficiaries which can still be considered able to manage the irrigation system if they are well organized as association/cooperative.

Based on the above discussions, therefore, this Project applies 100 ha of irrigated farmland as the design irrigation unit per scheme. In case of 100 ha irrigation unit, total water requirement per scheme is therefore computed as: WR = 2.4 x 100 = 240 l/s (60 l/s pump x 4) as indicated in Table 2.3.6. It is further designed that each 100 ha irrigation unit will be divided into 4 sub-irrigation units, and if 4 pumps are to be provided for an irrigation scheme, each group can be responsible for emergency evacuation for each of the 4 pumps when hit by flood. Note that the pumps are to be installed on the slope of the Wabe Shebele river where there is possibility of inundation by flood.

Table 2.3.6 Design of Irrigation Unit per Scheme

Particulars	Dimension/Specification	Remarks
Area Irrigated per scheme	100 ha	
Water Requirement	240 l/s	
Pump Capacity	60 l/s x 4	4 pumps/scheme planned
Power	20 kw x 4	
Total Pump Head	20 m	
Actual Pump Head	12 m	
Beneficiaries (1.0 ha/person)	100 farmers	
	25 farmers x 4 sub-groups	

Source: JICA Project Team

2.3.3 Standard Design of Pump System per Unit

1) Selection of Pump System Type

The suction head is the distance between pump setting height and intake height at the river. It should be limited to less than 7.0m while Wabe Shebele river presents 10-14m depth from the bottom to the top of the river. Accordingly, the pumps should be set on a slope of the river. Otherwise driving channel type or under-ground type shall be employed, both of which require huge investment than the first option. Therefore, type of pump system should be the one where the pumps are to be placed on the slope of the river.

2) Number of Pumps

Discharge volume per pump is dependent on the number of the pumps as summarized in Table 2.3.7. In order to drive the pumps efficiency and economically, 4 numbers of pump-sets per scheme is proposed from the view point of:

- ✓ The pump set shall be such size that the pump can be moved by man-power from the installation place to the upper ground in order to evacuate during flood time. A pump set with 60 l/s discharge can be moved by manual.
- ✓ The pump number should be at least more than 2 taking into account risk hedge in order to prepare for the event of broken down. On the other hand, as the number increases more, total cost for the pumps will also increase, giving disadvantage from economic point of view.
- ✓ Irrigated farmland, 100 ha each per irrigation scheme, is to be divided into 4 blocks, each of which is to be managed by a farmer sub-group. Since there will be 4 sub-groups in each of the irrigation scheme, there should also be 4 number of pumps per scheme. This arrangement facilitates to allocate the responsibility of evacuating the pumps from flood to each of the 4 sub-groups respectively.

Table 2.3.7 Comparison of the Pump Number

Particular	Apr	May	Jun	Oct	Nov	Dec	Per-discharge	Farmers/pump (HH/pump)
Total discharge volume (l/s/100ha)	148	209	232	137	190	205		
Unit discharge by 5 pumps (l/s/100ha)	30	42	46	27	38	41	50l/s	20
Unit discharge by 4 pumps (l/s/100ha)	37	52	58	34	48	51	60l/s	25
Unit discharge by 3 pumps (l/s/100ha)	49	70	77	46	63	68	80l/s	33
Unit discharge by 2 pumps (l/s/100ha)	74	105	116	69	95	103	120l/s	50

Source: JICA Project Team

3) Power Supply and Alternatives

Ppumping irrigation system can already be seen along the Wabe Shebele river. Though operation cost of pumping irrigation system is rather high as compared to gravity system, the system is only the feasible plan to establish with due consideration of minimizing the operation cost. There are means in terms of operating the pumps such as; 1) conventional generator powered motor driven pump, 2) direct connection of the diesel engine to the pump, 3) utilization of national grid for the power, and 4) introduction of solar panel. For the comparison, see Table 2.3.8:

Table 2.3.8 Comparison on the Pump Driven System

CASE	CASE A	CASE B	CASE C	CASE D
Type	Diesel Generator Motor	Diesel Engine (direct connection)	National Grid Motor	Solar Motor
Remarks	Conventional type. If there is a plan/ possibility for national (commercial) grid power in near future, this case can be applied.	If there is no plan for the commercial power even in future, this case can be selected. Energy efficiency is about 10% or more better than Case A, reducing the fuel cost by about 10%.	In case that there is national (commercial) grid, this case is the most suitable, able to minimize the operation cost.	Operation cost can be minimal; however initial cost is the highest and also priming power shall be provided by generator. Operation hour is limited, probably only 6 hours per day.
Cost	Middle +	Middle	Lowest	Highest
Priority	2	2	1	3

Source: JICA RREP Team

Where there is national power grid is available, the grid power shall be employed with the highest priority since this power entails the lowest operation cost. In case there is a plan that national grid is to be provided in near future, usually motor-pump system powered by generator can be the selection, intending the replacement of the generator to the national grid power in the near future. The national grid to Gode town is already under construction as of 2013. Expecting the national power available in a couple of years to come, this Project selects the motor-pump system powered by generator, as in case A in the above table.

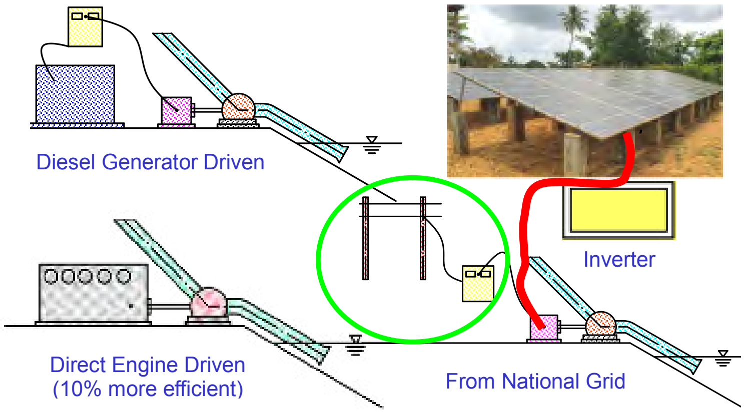


Figure 2.3.2 Power Source of Irrigation
Source: JICA RREP Team

Note that such places where there is no plan for sometime to bring about national grid, diesel engine direct driven pump may be the option, being economical than the generator powered system in terms of both initial investment and operation cost. Operation efficiency is usually about 10% higher for the direct driven system, able to save the fuel by about 10%. Solar power entails the least operation cost, however there are 2 issues with this system; 1) initial cost is the highest and also 2) generator power is required for the priming up. Therefore, the solar system usually needs a full top-up cost for the panel on the motor-pump system powered by generator.

4) Flood Protection

In case that the pump station is established on the slope of the river, the pumps and motors shall be evacuated when hit by flood. In fact, 3-year probability of flood accompanies 9.2 meter depth of flow which is already over the pumping station, likewise 5-year probability of flood does 10.6 meter depth of flow which is also very much over the expected location of the pumping station. The evacuation here proposed is the simplest one; i.e., each pump-set shall be moved out by manual from the pumping station to upper ground free from flood (see Figure 2.3.3). Therefore, 4 sets of the pumps are proposed as aforementioned, weight of each set being approximately 350 kg (pump+ motor = 150+200).

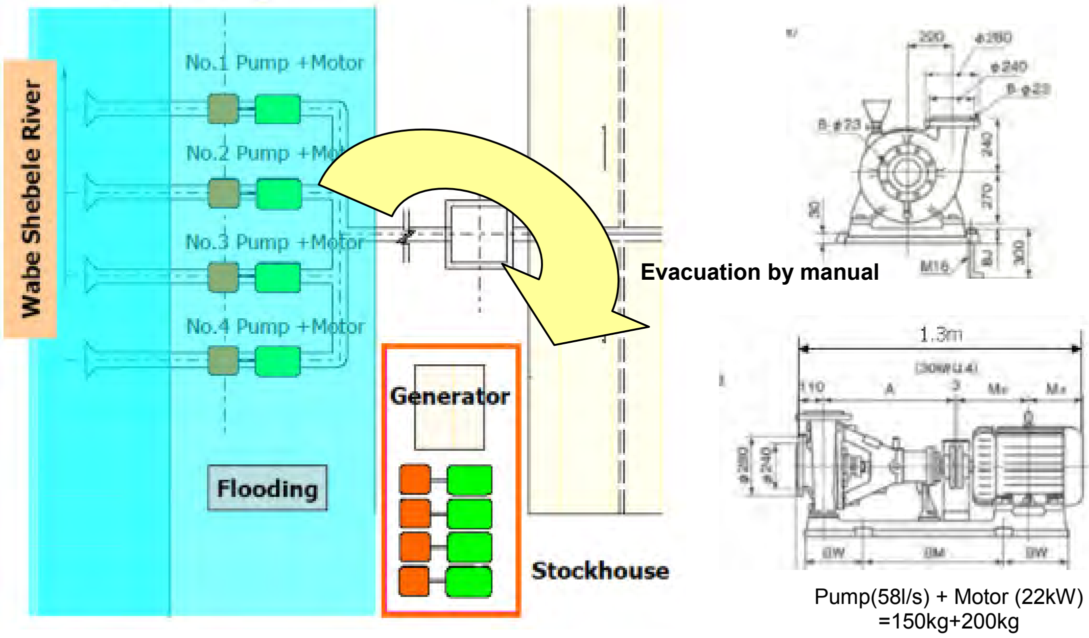


Figure 2.3.3 Standard Design of Flood Protection

5) Pump Operation Hour and Fuel Consumption

Table 2.3.9 shows the total water requirement, pump operation hour and fuel consumption by season, composed of early cropping season from April to June and late cropping season from October to December. Total water requirement per scheme with 100ha of irrigation area comes to 1,033,110 cum for the early season and 929,860 cum for the late season. To pump up these amounts of river water, the total fuel consumption arrives at 26,529 litter and 23,887 litter respectively. Note that fuel consumption was estimated based upon unit fuel consumption of 22.2 liter/hour under normal operation according to a manufacture's specification.

Table 2.3.9 Water Requirement and Fuel Consumption by season

Month		April			May			June		
Day		10days	20days	30days	10days	20days	30days	10days	20days	30days
ETo (Average)	(mm/day)	5.89	5.89	5.89	5.64	5.64	5.64	6.28	6.28	6.28
Crop Coefficient (Average)	Kc	0.35	0.38	0.64	0.95	1.15	1.15	1.15	1.02	0.73
ETo x Kc (Average)	(mm/day)	2.06	2.24	3.79	5.38	6.47	6.49	7.22	6.40	4.58
Conveyance Efficiency	Ec	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Field Canal Efficiency	Eb	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Field Application Efficiency	Ea	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Water Requirement (Average)	(m^3/100ha/day)	4,769	5,185	8,773	12,454	14,977	15,023	16,713	14,815	10,602
	(m^3/100ha/3months)	1,033,110								
Irrigation Hour (Average)	(hour/day)	5.5	6.0	10.2	14.4	17.3	17.4	19.3	17.1	12.3
Fuel Consumption (Average)	(L/day)	122.1	133.2	226.4	319.7	384.1	386.3	428.5	379.6	273.1
	(L/3months)	26,529								
Month		**October**			**November**			**December**		
Day		10days	20days	30days	10days	20days	30days	10days	20days	30days
ETo (Average)	(mm/day)	5.44	5.44	5.44	5.12	5.12	5.12	5.54	5.54	5.54
Crop coefficient (Average)	Kc	0.35	0.38	0.64	0.95	1.15	1.15	1.15	1.02	0.73
ETo x Kc (Average)	(mm/day)	1.90	2.07	3.50	4.88	5.87	5.89	6.37	5.65	4.04
Conveyance Efficiency	Ec	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Field Canal Efficiency	Eb	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Field Application Efficiency	Ea	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Water Requirement (Average)	(m^3/100ha/day)	4,398	4,792	8,102	11,296	13,588	13,634	14,745	13,079	9,352
	(m^3/100ha/3months)	929,860								
Irrigation Hour (Average)	(hour/day)	5.1	5.5	9.4	13.1	15.7	15.8	17.1	15.1	10.8
Fuel Consumption (Average)	(L/day)	113.2	122.1	208.7	290.8	348.5	350.8	379.6	335.2	239.8
	(L/3months)	23,887								

Source: JICA Project Team, FAO Crop water requirements No.24 FAO irrigation and drainage paper

2.3.4 Overall Scheme Design

1) System Layout

The irrigation scheme constitutes of; 1) suction pipe, 2) pump station where 4 sets of motor driven pumps are provided, 3) generator and warehouse which can also be utilized as evacuation place for the pumps during flood time, 4) delivery pipeline, 5) discharge sump, 6) main canal, 7) field canal, and then lastly 8) on-farm channels. Facilities of 1) to 7) are constructed by the Project engaging civil contractor and also Gode Kelafo Irrigation Development Office. On-farm channels are constructed by beneficiary farmers. Summary of the irrigation schemes designed is briefed below and shown in Table 2.3.10, and a typical plan is shown as an example in Figure 2.3.5.

- ✓ Pump station is set on the slope of Wabe Shebele river as aforementioned. This station does not have super structure but is just made of concrete base with a size of 2.5 m x 6.5 m on which 4 sets of motor-pumps are fixed with anchors. The base is composed of 3 layers of total 70 cm; 30 cm concrete, 20 cm hard core, and 20 cm selected materials.
- ✓ Warehouse is constructed on the bank top of the river free from flood. Warehouse's plan consists of 6.5 m x 7.5 m where generator is installed and the motor-pumps are to be temporary placed during flood time. To carry the motor-pumps, a cart is also provided and stored in this warehouse.
- ✓ Galvanized φ200mm pipe is used for the delivery pipelines from the pumps to the discharge sump

which is the beginning of the main canal. The discharge sump is of a concrete structure to which the irrigation water is discharged through the delivery pipelines. Discharge sump is connected to the main canal, and then field canals via diversion boxes. A main canal branches into 6 – 8 field canals, from further which on-farm channels start running.

Table 2.3.10 Design Briefing of Gode irrigation Scheme

Site	Godiray	Badilaid	Hididole	Ilan
1. Design condition				
Irrigation area	100ha	100ha	100ha	100ha
Irrigation area per household*	(0.5)-1.0ha / HH	(0.5)-1.0ha / HH	(0.5)-1.0ha / HH	(0.5)-1.0ha / HH
Discharge for irrigation	0.24 m^3/s	0.24 m^3/s	0.24 m^3/s	0.24 m^3/s
Irrigation method	River- Pump- Pipeline- Sump- Main canal- Field canal- Basin/Furrow irrigation	River- Pump- Pipeline- Sump- Main canal- Field canal-Basin/Furrow irrigation	River- Pump- Pipeline- Sump- Main canal- Field canal- Basin/Furrow irrigation	River- Pump- Pipeline- Sump- Main canal- Field canal- Basin/Furrow irrigation
Power supply	Motor driven by the diesel generator	Motor driven by the diesel generator	Motor driven by the diesel generator	Motor driven by the diesel generator
2. Design scheme				
Pump facilities	Volute pump 4 nos. Q=0.06m^3/s/pump Total head H=19.0m Actual head H=15.1m Motor :20kW x 4nos Valve : Foot valve、Check valve、Sluice valve	Volute pump 4 nos. Q=0.06m^3/s/pump Total head H=19.0m Actual head H=14.7m Motor :20kW x 4nos Valve : Foot valve、Check valve、Sluice valve	Volute pump 4 nos. Q=0.06m^3/s/pump Total head H=19.0m Actual head H=15.9m Motor :20kW x 4nos Valve : Foot valve、Check valve、Sluice valve	Volute pump 4 nos. Q=0.06m^3/s/pump Total head H=16.0m Actual head H=13.7m Motor :20kW x 4nos Valve : Foot valve、Check valve、Sluice valve
Pipeline (galvanized)	Suction pipe :φ200 L=15.0m Delivery pipe :φ200 L=60.0m	Suction pipe :φ200 L=18.0m Delivery pipe :φ200 L=60.0m	Suction pipe :φ200 L=18.0m Delivery pipe :φ200 L=24.0m	Suction pipe :φ200 L=18.0m Delivery pipe :φ200 L=21.0m
Canal	Discharge sump （Existing use） Main canal:1693m Field canal:6180m Division box:7 nos.	Discharge sump （Existing use） Main canal:1634m Field canal:5120m Division box:9 nos.	Discharge sump Main canal:2704m Field canal:5200m Division box:9 nos.	Discharge sump Main canal:2668m Field canal:5200m Division box:9 nos.
Others	Retaining wall H=2.0m L=10.0m H=2.0m L=2.0m H=2.5m L=2.5m Drainage Generator house Wind break	Retaining wall H=2.0m L=7.5m H=2.0m L=4.0m H=2.5m L=15.0m Drainage Generator house Wind break	Retaining wall H=2.0m L=15.5m Drainage Generator house Wind break	Retaining wall H=2.0m L=15.5m Drainage Generator house Wind break

Note: * Irrigation can realize 2 crops cultivation per year. Therefore allocation of 0.5ha of irrigated land is equivalent to 1ha land under 2 crops cultivation per year, though the government policy is that each settler household should be allocated 1.0ha of land.
Source: JICA Project Team

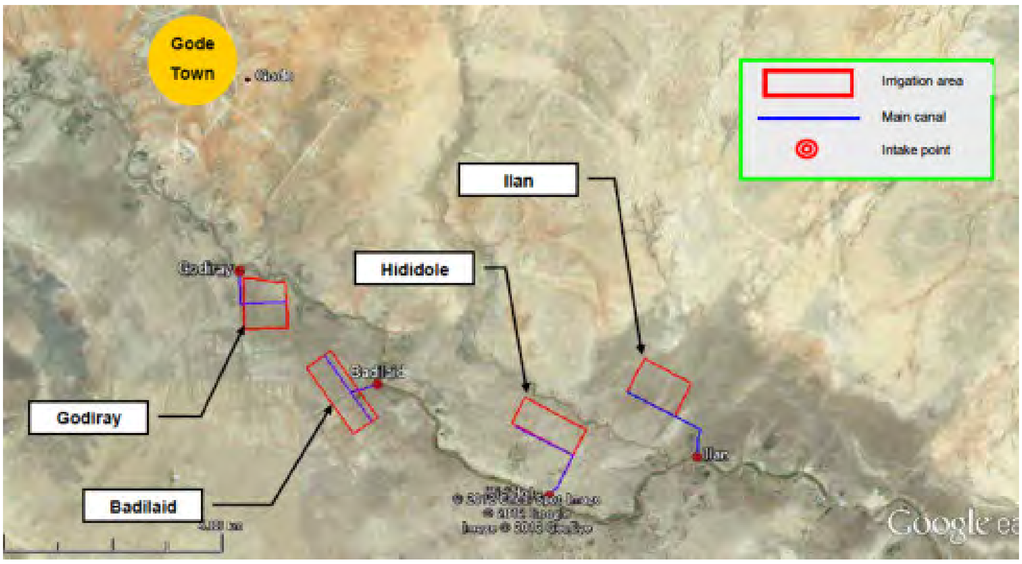


Figure 2.3.4 Project Sites of Godiray, Badilaid, Hididole and Ilan
Source: JICA Project Team

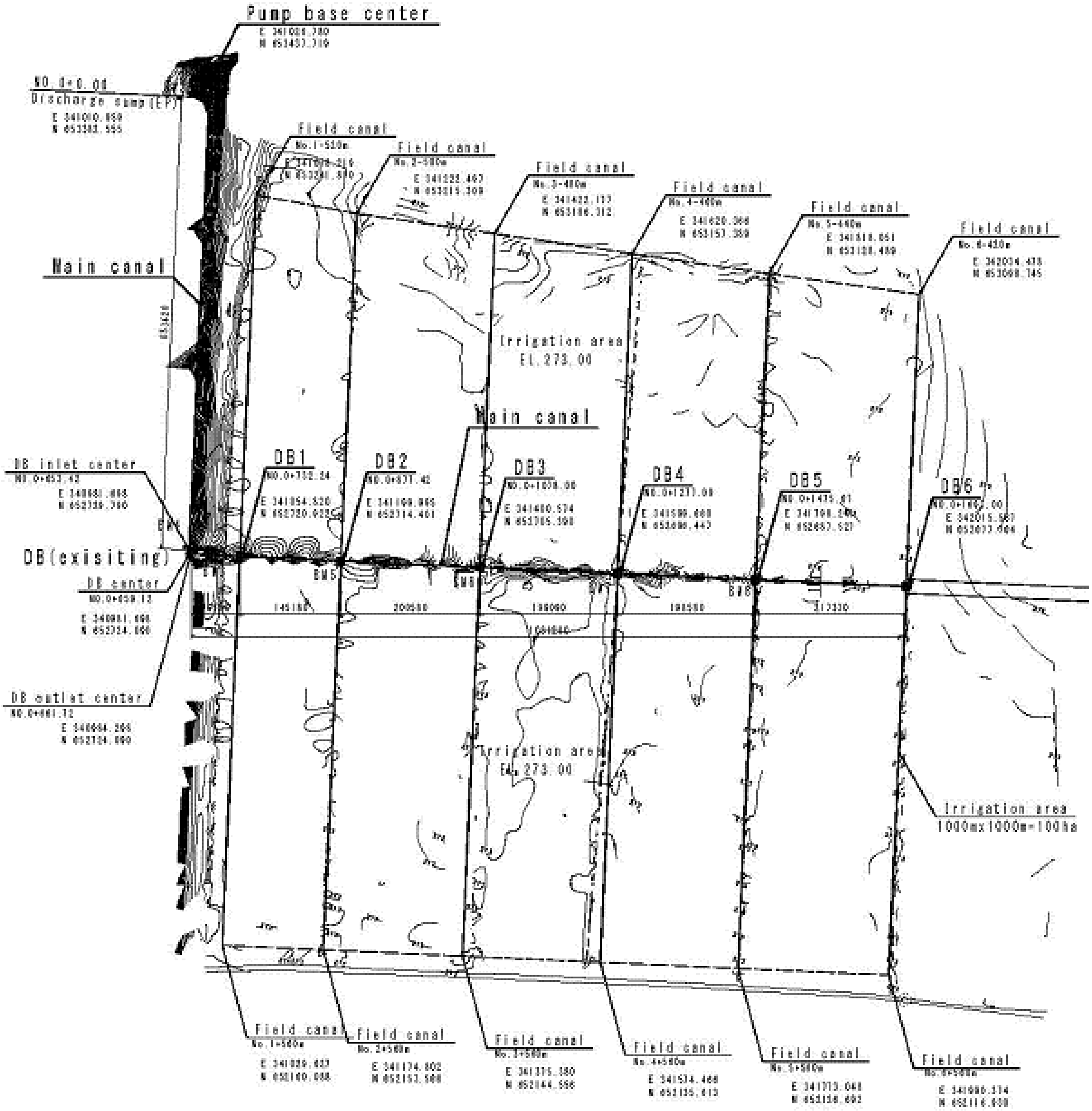


Figure 2.3.5 An Example of Plan (Godiray Irrigation Scheme): 100ha Irrigation Area
Source: JICA Project Team

2) On-farm Arrangement and On-farm Irrigation Method

Irrigation unit proposed here is 100 ha, composed of 4 sub-groups. Each sub-group is therefore composed of 25 ha in gross. Each farmer is supposed to have 1.0 ha gross irrigable area whereby total 25 members per sub-group or 100 members for the whole unit will be arranged as the irrigation unit sub or mother group. The on-farm arrangement accommodating 100 members are shown in Figures 2.3.6 – 2.3.9, where each irrigation sub-group will be provided 2 – 3 field canals branching from the main canal. After the field canal, the beneficiary farmers have to construct on-farm channels. The on-farm channels can be constructed by farm tool like plough.

For the on-farm irrigation, a mix of basin and furrow surface irrigation is proposed for the project area. Basin irrigation is the simplest method for smallholders with little or no irrigation experience and is suitable to all crop types, including row crops, vegetables and orchards, except those crops that cannot stand a very wet soil for more than 12-24 hours. Besides the farmers in and around Gode area are more familiar with this methods. Furrows pose some advantages for row crops providing furrow shape (depth) and for those crops that cannot stand a very wet soil or water logging.

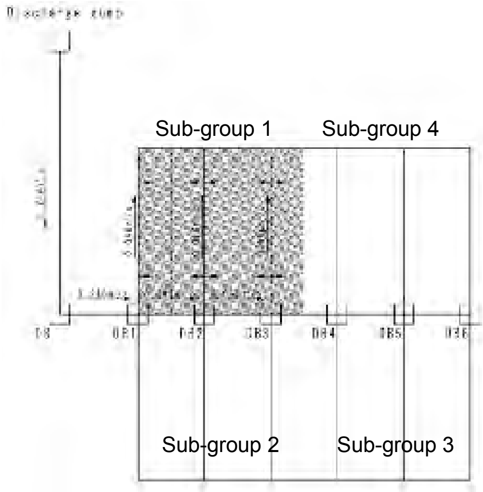


Figure 2.3.6 Irrigation Unit (Godiray)

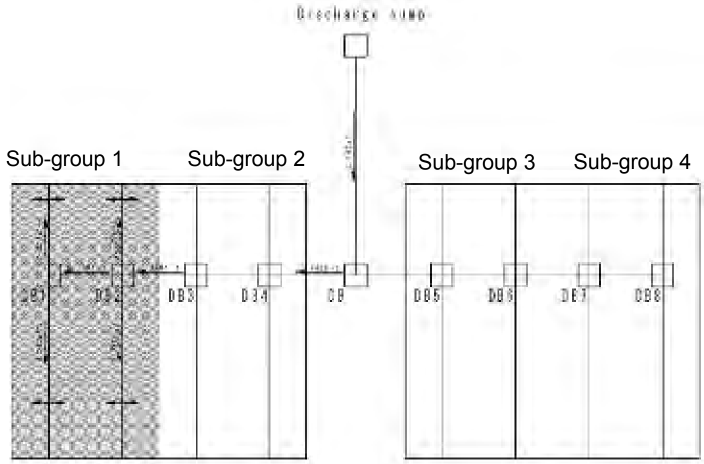


Figure 2.3.7 Irrigation Unit (Badilaid)

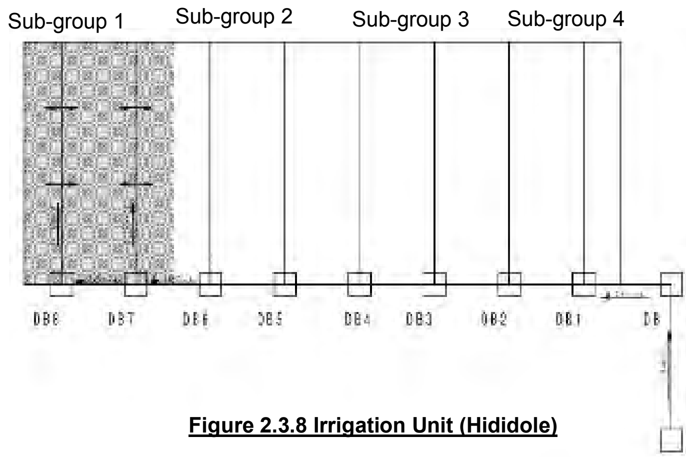


Figure 2.3.8 Irrigation Unit (Hididole)

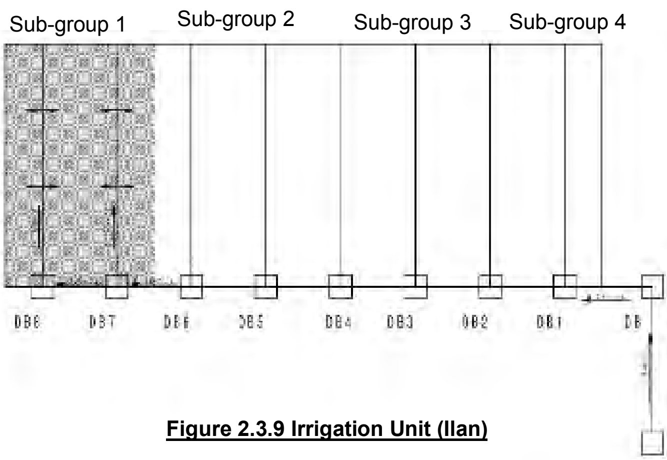


Figure 2.3.9 Irrigation Unit (Ilan)

CHAPTER 3 IRRIGATED AGRICULTURE DEVELOPMENT PLAN

3.1 Potentials and Issues for Agricultural Production in Gode Area

Present conditions of agricultural production in the target area can be confirmed as tabulated below, from which it is realized that there are a variety of problematic issues in the subject area. However, the area is favored with the potential agricultural environments in terms of climate, soil condition and the topographic condition and it is considered that improvement in agricultural productivity in the area could be achieved comparatively at an early date if the issues on insufficient irrigation water supply be solved.

Table 3.1.1 Potentials and Problem Issues for Agricultural Production in Gode Area

Area	Potentials	Problem issues
Farming environment	- Rich river water resource available throughout a year - Climate suited for crop production - Comparatively fertile soil condition - Flat topography easy for cultivation activities	- Insufficient facilities for river water pumping-Rain-fed agriculture being difficult for producing grains and pods (Possible for stems and leaves production only) - Damages by wind erosion and crop fall down by strong winds
Crop production/ cultivation techniques	- Basic technologies for cultivating several crops have been existing - Environment allowing farmers to concentrate in agricultural production (Minimum effect by other activities) - Habit of collaboration works by mutual aid group	- Tendency of continuous cropping of maize, the staple foods (Fertility reduction and possible hindrance by continuous cropping) - Ineffective agricultural land use - Hard farming works without draft animals and machines - Damages by weeds and occurrence of insect diseases - Poor adaptability by farmers due to insufficient experiences
Marketing of farm produces	- Possibility of maize sales through brokerage by government agencies - Possibility of sesame marketing by government agencies - Existence of demands for onion in external market and available brokerage business	- Small internal local market - Prices of farm produces are not stabilized - Shortage of warehouses and processing facilities (Difficulty in preservation) - Problems on peace and order in marketing channel and road conditions
Agricultural supporting system	- Available agricultural research activities and technical manual - Free supply of input materials (Up to 2015) - Availability of FTC (Farmers' Training Center)and demonstration farms - Available government staff in research and technical extension who have enough capability and experience	- Number of farmers who can receive technical training are quite limited - Free supply is to be terminated in the year 2015 - Lack of agricultural supporting capacity by DA

Source: JICA Project Team

From above table, agricultural supporting system being undertaken by the government for the beneficiary farmers still sees some shortages in transporting means and extension capability by DAs. However, this situation may be improved through further activation of services by local agricultural researchers/ experts in the research institutes e.g. Somali Region Pastoral and Agro-pastoralist Research Centre (Jijiga), Gode Pastoral and Agro-pastoralist Research Centre (Gode) and various government agencies, especially Gode Woreda Livestock, Crop and Rural Development Office where DAs are allocated.

A difficult issue is the problem on the marketing of the agricultural products which are beyond the countermeasures possible to be handled at the farmer's level. In order to ensure the cash income by farming activities, it seems necessary to involve brokers from outside, and also intervention and intermediation by the government agencies shall be done taking into account the small market scale in Gode. This, however, will take time in securing a certain quantity of produces with a specific quality. Further, such issues as peace and order and poor road conditions cannot be solved by the efforts at the level of the beneficiary farmers alone. As is the case, the problem issues would be the restrictive factors for the agricultural development in the area.

3.2 Strategies for Irrigated Agriculture Development and Required Measures

3.2.1 Strategies for Agricultural Development

Varieties of crops being cultivated and farming techniques practiced at present conform mostly to the agricultural environment, background of farmers' living, as well as dietary habits, though there remain considerable parts to be improved. For those crops ever planted and continued to date, there have been accumulated technologies in the government agencies concerned and the farmers themselves understand about the basic cultivation techniques and practices. Under the circumstances, it is considered reasonable to initiate the further development through improving the presently practiced farming activities.

Under the subject project, pumping facilities for irrigation purpose are to be provided, and in order to realize the stabilized agricultural production, it is necessary to secure budget for procuring pump fuel and cost for maintenance needs. Therefore, strategies here shall be fixed at further strengthening of cash crop farming through expanding the cultivation area of cash crops and more intensive farm management than before. The beneficiary farmers are supposed to manage by themselves to bear the pump operation and maintenance (O&M) cost.

3.2.2 SWOT Analysis for Irrigated Agriculture Development

Assuming the provision of pumping facilities under the project and also in line with the strategies mentioned above, possible measures for development of irrigated agriculture shall be examined. SWOT analysis is applied in this examination. Those items to be encountered in the course of irrigated agriculture development and those concerned closely with the development strategies derived from the present conditions of agricultural production can be classified in order as follows:

Table 3.2.1 SWOT showing the Measures for Development of Irrigated Agriculture

	Advantages	Disadvantages
Internal	**<Strengths>** - _Possible to plant more than 2 crops a year_* - Infiltration of basic technologies for planting several crops - Availability of agricultural research and technical manual - Existence of FTC (Farmers' Training Center)and demonstration farm - Available government staff in research and technical extension who have enough capability and experience	**<Weaknesses>** - _Lack of capacity for O&M and repair of pump facilities_* - Tendency of continuous cropping of maize, the staple foods - Ineffective agricultural land use - Hard farming works without draft animals and machines - Damages by weeds and occurrence of insect diseases - Poor adaptability by farmers due to insufficient experiences - Insufficiency of agricultural supporting capacity by DA
External	**<Opportunities>** - _Possible to introduce new crops and varieties in need of more irrigation water_* - Possibility of maize sales through brokerage by government agencies - Possibility of sesame marketing by government agencies - Existence of demands for onion in external market and available brokerage business	**<Threats>** - _Reduction of pumped water_* - _Price escalation of fuel for pump operation_* - Free supply of input materials be terminated in the year 2015 - Small internal local market - Prices of farm produces not stable - Lack of warehouses and processing facilities(Difficulty in shipping adjustment) - Problems on peace and order in marketing channel and road conditions

*The underlined represents those new items derived from introducing of irrigation facilities. Sauce; JICA Project Team

As above-discussed, marketing of agro-produces is the *threat* for development being the restrictive factor. Accordingly, the threats pointed out in the above table shall be first analyzed for possible formulation of countermeasures towards agricultural development. After that, the detailed contents of measures are further consolidated through due considerations on the opportunities, weaknesses and strengths as pointed out.

1) Threats

Concerning the "Threats", following 3 countermeasures can be pointed out. These include;

- ✓ Introducing food crops and varieties with higher drought-tolerance which assure certain level of harvest even when irrigation water be decreased due to less river water available and/or higher fuel cost.
- ✓ Introduction of cash crops with a certain level of demands not only in the external market but also in the internal market, taking into account the unstable external market condition, and
- ✓ Establishment of farmers' primary cooperative, which can be water users association, for handling procurement of agricultural input materials and sale of farm produces.

For the first measure, it is considered reasonable to introduce food crops such as early-matured maize which can be grown with less irrigation water and sorghum varieties with high drought-tolerance nature coupled with improved manner of cultivation. For the second measure, tomato and fodder crops are considered as cash crops with potential demands both in external and internal markets. For the third item, establishment of primary cooperatives, guidance have to be given, so that farmers themselves can manage systematically purchasing of inputs through organizing farmer members and implementation of training programs.

2) Opportunities

Among the crops selected above, from the viewpoint of "Opportunities", the most positive ones are maize and sesame. For maize, the Ethiopia Grain Trading Enterprise (EGTE) acts as purchaser for the stockpiling by the government and a mediator role for the purchasing by WFP. For sesame, the government is to intervene directly in the marketing of the same. However, single and continuous cropping of maize cause impoverishing of farm land, and therefore rotational cropping with others shall also be tried. For cash crops, encouragement shall be centered on sesame cultivation.

Further, the irrigation facilities will enable introduction of promising food/cash crops and tree crops for future marketing which have never been cultivated in large scale due to the lack of needed irrigation water. Promising crops to be introduced can be upland rice, groundnuts and papaya, etc. At present, however, the introduction shall be limited only in such marginal lands as the boundary ridges of farm land and the areas along irrigation canals so as to monitor the environmental adaptability and marketing potential.

3) Weaknesses

Among the weaknesses, lack of capability for O&M of irrigation pumps is the fatal one for agricultural production itself. It is, therefore, recommended to establish a working group for O&M of pumps and irrigation within the water users association to be organized. When the said association can manage in a unified manner those activities as procurement of agricultural inputs, O&M of irrigation facilities and irrigation water supply, and sales of farm produces, the association can bear the fuel cost for irrigation pump operation as well as other maintenance costs so that the agricultural production activities in the area could be sustainable.

Concerning the crop cultivation problems attributed to mono-cropping and pest/diseases, measures have to be adopted aiming at lessening the damages through attaining cropping patterns with higher efficiency. The cropping patterns have to be worked out in a way to materialize farming practices involving increase of soil fertility and prevention of insect diseases with minimum labor input and lower cost, taking into consideration the presently prevailing agricultural environment and specific characteristics of crops selected.

Introducing and supporting of the said cropping patterns shall be conducted by DAs. There are differences of technical capabilities among them and their supporting capacities are also not sufficient so far. To cope with this, technical trainings have to be given to the government staff concerned. On top of this, supporting services by government staff are needed for the establishment of farmers' water users association and its management. In addition, trainings shall cover not only farming-related technical matters but also institutional matters such as establishment of water users association.

4) Strengths

After the irrigation facilities have been completely provided, double cropping per year becomes possible. In the cropping pattern, therefore, double cropping per year is basically adopted with the idea to apply the cultivation techniques already acquired and practiced by the farmers in a way to follow the existing sound agricultural practices as well as to follow recommendations made in available extension manuals as much as possible.

Further, "Strengths" includes assignment/stationing of government staff as the research professional and agricultural extension technician. Differences in terms of knowledge and experiences are considerable among the extension workers, and therefore training courses for those staff will have to be undertaken at the beginning stage of the project implementation. Then, they are to implement later supporting works for beneficiary farmers, e.g. through farmer training centre (FTC), so that the capability of DA could be built up to undertake their duties effectively.

3.2.3 Measures and Irrigated Agriculture Development Plan

Proposed strategic measures and details of actions are stipulated in Table 3.2.2. These 6 measures are to contribute for attaining food security and increase of farmers' income in the subject area as the final target through effectuating in an inter-related manner improvement of current agricultural production to be sustainable (see Figure 3.2.1).

Table 3.2.2 Six Strategic Measures and Details of Actions

Strategic measures	Details of actions
i) Introduction of high drought-tolerant food crops	Introduction of early-matured maize and sorghum
ii) Introduction of cash crops with high demands both in external and internal markets	Introduction of high-demand cash crops as sesame as main crop, onion and fodder crop
iii) Establishment of farmers' organization (primary cooperative)	Organizing and strengthening of water users association (cooperatives) through trainings who can manage procurement of input materials, O&M of irrigation facilities and irrigation supply and farm produces marketing in future
iv) Introducing of crops with positive future prospective	Partial introduction of future prospective crops as cash crops including (upland) rice, ground nuts and papaya
v) Improvement in cropping pattern efficiency	Introduction of cropping patterns combined with soil fertility improvement, prevention of insect disease, cash crop introduction, and less labor input and lower cost.
vi) Capacity building for government staff (Agricultural experts and DAs) and supporting services for farmers	Implementation of technical and organizational training aiming at capacity build-up and conducting of agricultural supporting services for farmers by using the existing technical manual and FTC.

Source：JICA Survey Team

Of the 6 strategic measures, what to be done first is to determine the crops to be introduced and the selection of varieties. Cropping patterns shall be prepared based on these characteristics in a way to lead to materializing sustainable agricultural production towards the direction to attain less labor input, improvement in soil fertility and prevention of damages by weeds and insect diseases. This flow represents the basic strategy of establishing the irrigated agriculture under the subject project.

Under the development project, capacity building for agricultural technical extension work and farmer supporting services will be implemented for the agricultural technical staff of Gode LCRDO including DAs. Capacity building for agricultural techniques is to be initiated from workshops to be held aiming at examination of the irrigated agriculture development plan. In parallel with the technical training as required, supporting services for farmers are to be carried out for achieving agricultural production based on the irrigated agriculture development plan.

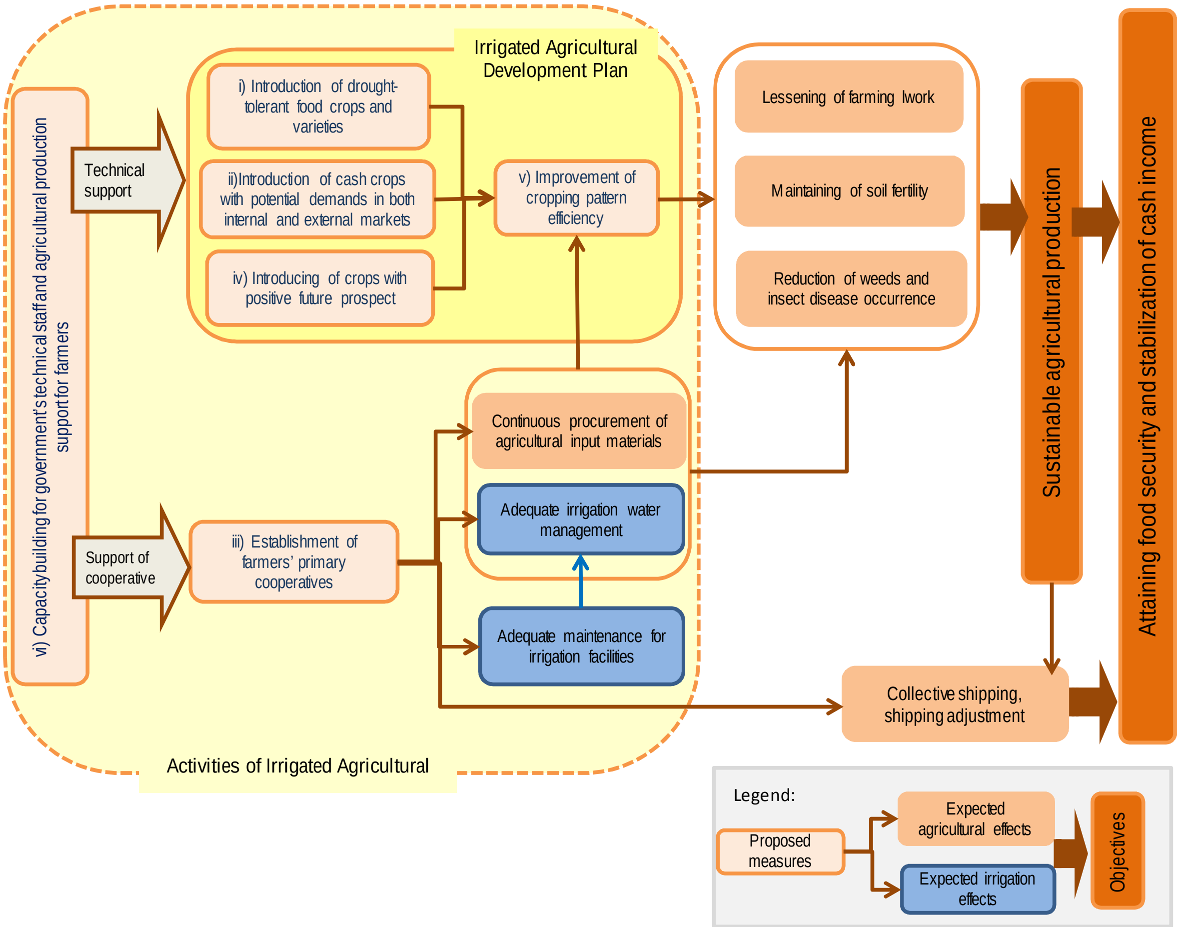


Figure 3.2.1 Relationship amongst 6 Measures towards Attaining the Targets

Regarding the support for farmers' organization, training course for the local government technical staff has to be implemented concerning the methods for organizing farmers and the manner for supporting the farmer activities and engage actually in establishment of farmers' association (cooperatives). The subject water users association (or primary cooperative) is to handle procurement of agricultural input materials in addition to the O&M activities for irrigation water supply and irrigation facilities provided.

Through procurement of good seeds in a sustainable manner by the associations, improvement of cropping pattern could be achieved efficiency. In addition, procurement of fertilizer and insecticides by association/cooperative is to contribute to sustainable agricultural production through lessening the required transaction cost. In case if the association/cooperative may manage collective product shipping and adjustment of shipping quantities, it will contribute for stabilization of cash income from farm produces.

3.3 Irrigated Agriculture Development Plan

Based on the analysis results on the current agricultural production and interviews to the beneficiary farmers, staffs from LCRDO and agriculture related institutes; proposed crops/varieties, cropping patterns and technologies to be newly introduced are noted as follows. As discussed in the foregoing, the development plan is to be utilized as a material for technical trainings in capacity building of the government officers concerned, and therefore shall be finalized based on the specific conditions in each of the irrigation schemes.

3.3.1 Crops and Varieties to be Introduced

Taking into consideration the choices by the farmers, adaptability to agricultural environment, current extension of cultivation techniques, marketability and the future prospect as food and cash crop, following crops and varieties are to be introduced (see Table 3.3.1). Note that as fodder crops carry dual purposes for own consumption and cash crop, it is noted separately;

Table 3.3.1 Proposed Crops and Varieties

Uses	Crops (Scientific name)	Varieties	Growing period	Characteristics
Food crops	Maize (*Zea mays* L.)	Melkasa-1	90-120days	OPV*Early matured(Ripen in 90 days)Cultivable under rain-fed condition to some extent
		Melkasa-2 Melkasa-4	120-140days	OPV Mid-late matured(Ripen in 120-140 days) Melkasa-4 is of high yield nature (Max. 6.5t/ha**)。
		ACV-3 AVC-6	90-130days	Hybrid with early-mid matured (Ripen in 90-100 days)Superior in insect disease tolerance
	Sorghum(*Sorghum bicolor*)	Seredo Meko-1	90-120days	Early matured(Ripen in 70-90 days) High yielding(4t/ha)Superior in preventing damages by birds and tolerance for insect diseases
	Haricot bean (*Phasoelus vulgarus*)	Ayenew	90-120days	Early matured (Ripen in 80-90 days)High yielding (3.64t/ha)
Cash crop	Sesame (*Sesamum indicum*)	Sarkamo	90-105days	Early-mid matured(Ripen in 90-100 days) Seed in black color and high yielding (1.8t/ha)
		Mahado-80	90-105days	Early-mid matured(Ripen in 90-100 days) Seed in black color
		Kelafo-74	90-105days	Mid matured(Ripen in 110-120 says) Cultivated commonly in Gode area Seed in dark brown color
		E-Variety	85-100days	Early matured(Ripen in 85-90 days) Seed in brown –white color
	Onion (*Allium cepa*)	Adama red	4-5 months, including 45 days in nursery	Early-mid matured (Ripen in 130-150 days), scaly bulb is rather small at 6-8 cm. Widely cultivated throughout the country.
	Tomato (*Solanum lycopersicum*)	Heinz-1350	4-5 months, including 45 days in nursery	Extremely early matured(Bearing fruit in 75-90 days). Height is rather limited with 6-7.5cm size fruit and widely cultivated throughout the country.
Fodder crop	Sudan grass (*Sorghum sudanense*)	—	Perennial (2-3 harvesting /year ×2~3 years)	Belonging to Gramineae family with standing natured, similar to sorghum but the stem more slender, superior in drought tolerance and strong as weeds in general
	Guinea grass (*Panicum maximum*)	—	Perennial (2-3 harvesting/ year x 2~3 years)	Gramineae family with standing nature, possible to cultivate even with the rainfall less than 400mm, Effective if inter-cropping or rotated with tomatoes due to the high repellent effects in nematode evasion
	Rhodes grass (*Chliris gayana*)	—	Perennial (2-3 harvesting/ year x 2~3 years)	Gramineae family with standing nature, perennial and tolerant for drought, humidity and saline, but not healthy in shade condition and requires fertilization for cultivation
	Cowpea (*Vigina uniguclata*)	Cowpea large (long shell)	60-80days	Extremely early matured (Ripen in 60 days) Belonging to Fabaceae family with flat-growing nature and suitable for inter-cropping with Gramineae family plants, superior in drought tolerance but vulnerable to insect diseases.
Future potential crops	Rice (*Oryza sativa glaberrima*. L)	Nerica-1 Nerica-2	90-12days	Early matured dry land rice with growing period of 4 months, adaptable to the climate in Gode. Can be grown with scant rain but requires irrigation supply once in 3 days. Difficulties exist in post-harvest processing.
	Ground nuts (*Arachis hypogaea*)	Batisedi	100-110days	Early-mid matured (Ripen in 100 days) High drought tolerance and useful oil crop with high oil content
	Haricot bean (*Phasoelus vulgarus*)	Awash-1	90-110days	Early matured (Ripen in 80-90 days) beans are in white color. Comparatively tolerant to insect diseases but preventive measures are indispensable.
	Papaya (*Carica papaya*)	Solo (Hermaphro dite type)	Bearing fruits all-year-round Life span: 5-10 year	Under rain-fed condition, requires 1000-1500mm rainfall. Tall but no branches and leaves possible to plant in farm land. Attention to dioecious varieties.

*OPV (Open Pollinated Variety： Variety seeds picked through natural pollination without artificial crossbreeding varieties.
** Maximum yields at the experimental plots.
Source： Extracted based on the interviews at the field and referring to Comprehensive Registry of Research Technologies for Somali Region and Other Same Agro-Ecological Areas in Ethiopia (SoPRARI)
Directory of Released Crop Varieties & Their Recommended Cultural Practices 2004(EARO)

3.3.2 Recommended Cropping Patterns

Cropping patterns proposed under the subject development plan aims at production of maize to surpass the own consumption per household (averaged number of family member 7 x 200 kg/year=1.4 t/year, annual consumption of grain per household), taking consideration on the fact that self-sufficiency of grain is yet to be attained. Regarding the yield of maize per unit area under irrigation, it is estimated to attain 4.0 t/ha with reference to the interview results at relevant institutes. However, at the beginning of the project performance, it is estimated at 2.4 t/ha, equivalent to 60% of the target yield, and over a 5-year period it is planned to reach the 4.0 t/ha as the unit yield of maize.

For cash crops, the major is centered on sesame which has the highest reliability in marketing aspect at present in and around Gode town, but consideration shall be given to the other crops which will have positive prospect for future depending on changing situations. Besides, the idea is that papaya and etc. can be planted along the farm land plot boundaries in 5-10 m pitch to receive irrigation water at the same time when farm land is placed under irrigation, implying that such tree crops can be grown with minimum labor input. However, the crops to be planted are limited only to those cultivable with the designated water requirement within the irrigation water supply for maize in the farm land.

Through practicing the above mentioned cropping patterns, efficiency in farming work has to be improved, soil fertility be sustained and damages by weeds, insects and diseases shall be restrained. As is the case, the proposed cropping patterns are fixed as centered by maize and sesame supplemented by other crops in the form of rotational cropping and inter-cropping where growing periods and particular characteristics of other crops be fully used, and the farming as a whole could be practiced with lower labor input and cost.

Under the subject project, as large as 1.0 ha each of irrigable farm land plot is to be distributed to a beneficiary household in accordance with a government policy. In the subject area, however, all the farming works are done by manual labor, and depending on the availability of labor force of each household, some parts of farm land may remain not cultivated. As such, the idea is that the 1.0 ha farm land given shall be divided into 4 sub-plots and farmers be guided to plant at least for 2 sub-plots (0.5 ha). Cropping patterns shall be set, therefore, for cases of different numbers (2-4) of sub-plots cultivable and in a way that farmers can select their choices depending on the household conditions.

1) Cropping Pattern for 2 Sub-plots Case (using mainly 0.5ha)

Crop cultivation is practiced in 2 sub-plots (0.5ha in total) among 1ha of farmland divided into 4 plots. One is for maize cultivation of early maturing variety in consideration of unexpected drought situation. By double cropping of this, 1.2-2.0 t/year can be secured per household (2.4-4.0 t/ha x 0.25 ha= 0.6-1.0 t/ha). Another sub-plot is planted with cash crops adaptable to those different climate conditions where increase of cash income is sought with high yield varieties being different for Gu (Long rainy season from March to May) and Der (Short rainy season from October to November).

As an example for the cash crops, sesame and haricot beans are introduced in the 2 sub-plots. Te target yield is set at 1.5 t/ha and 3.5 t/ha respectively according to interviews at relevant research institutes. These target yields are to be attained over 5-year period starting with 60% of those. Lastly, of the sub-plots uncultivated, one basically remains as fallow and rotational cropping shall be practiced for 2 years with the former 2 sub-plots. For the remaining sub-plot, perennial fodder crop can be introduced and expected to secure animal feed with the minimum labor input for farm management.

Table 3.3.2 Example of Cropping Pattern for 2 Sub-plots Case

	Cropping pattern	Details on cultivation
1st cropping season	**1st year's Gu (Long rainy season)** Plot-1: Fallow (or Gardening in small scale) Plot-2: Sesame (E-variety) Plot-3: 1st yr: Fodder grass (Soudan grass /Panicum etc.) Plot-4: Maize (Melkasa-1)	Plot-1 : Basically remain as fallow but possible to plant vegetables for home consumption. Plot-2 : Sesame cropping for cash income, early matured and high yield variety like E-variety is the most applicable. Plot-3 : Fodder crop of Sudan grass and Guinea grass which are of drought tolerant and high yielding. Plot-4 : Maize for home consumption. To lessen irrigation risks, early matured Melkasa-1 is recommended. However, Melkasa-4 is possible if irrigation supply is secured.
2nd crop cropping season	**1st year's Der (Short rainy season)** Plot-1: Haricot bean (Ayenew) Plot-2: Maize (Melkasa-1) Plot-3: 1st yr: Fodder grass (Soudan Grass /Panicum etc.) Plot-4: Fallow (or Gardening in small scale)	Plot-1 : Early matured Haricot bean for home consumption Plot-2 : Der is a short rainy season and early matured maize variety be planted. Plot-3 : To harvest stems and leaves from the fodder crop planted. Plot-4 : Leave as fallow area. For small scale cropping, beans and leaf vegetables with short growing period be introduced.
3rd cropping season	**2nd year's Gu (Long rainy season)** Plot-1: Maize (Melkasa-1) Plot-2: Fallow (or Gardening in small scale) Plot-3: 2nd yr: Fodder grass (Soudan Grass /Panicum etc.) Plot-4: Sesame (E-variety)	Plot-1 : Utilizing the nitrogen content fixed by the former cropping, maize shall be planted. Varieties shall be selected depending on the irrigation situation. Plot-2 : Remain basically as fallow, but possible to plant small scale vegetable for home consumption purpose. Plot-3 : Harvest stems and leaves from the fodder crop planted previously. Plot-4 : Sesame cropping for cash income purpose. Early matured and high yielding variety like E-variety is most applicable.
4th cropping season	**2nd year's Der(Short rainy season)** Plot-1: Fallow (or Gardening in small scale) Plot-2: Haricot bean (Ayenew) Plot-3: 2nd yr: Fodder grass (Soudan Grass /Panicum etc.) Plot-4: Maize (Melkasa-1)	Plot-1 : Remain basically as fallow, but possible to cultivate vegetables for home consumption. Plot-2 : Introduce early matured Haricot bean for self-consumption. Plot-3 : Harvest od stems and leaves from the standing fodder crop. Plot-4 : Plant early matured maize variety

Source : JICA Project Team

After four cropping seasons, namely two years, fodder crop shall be shifted to the sub-plot 4 and the others have to be rotated plot by plot so as to practice the rotational cropping by 3 sub-plots as shown by the arrows as indicated in the figure for the 4th cropping season. The figure of the cropping pattern combined with calendar is shown as below;

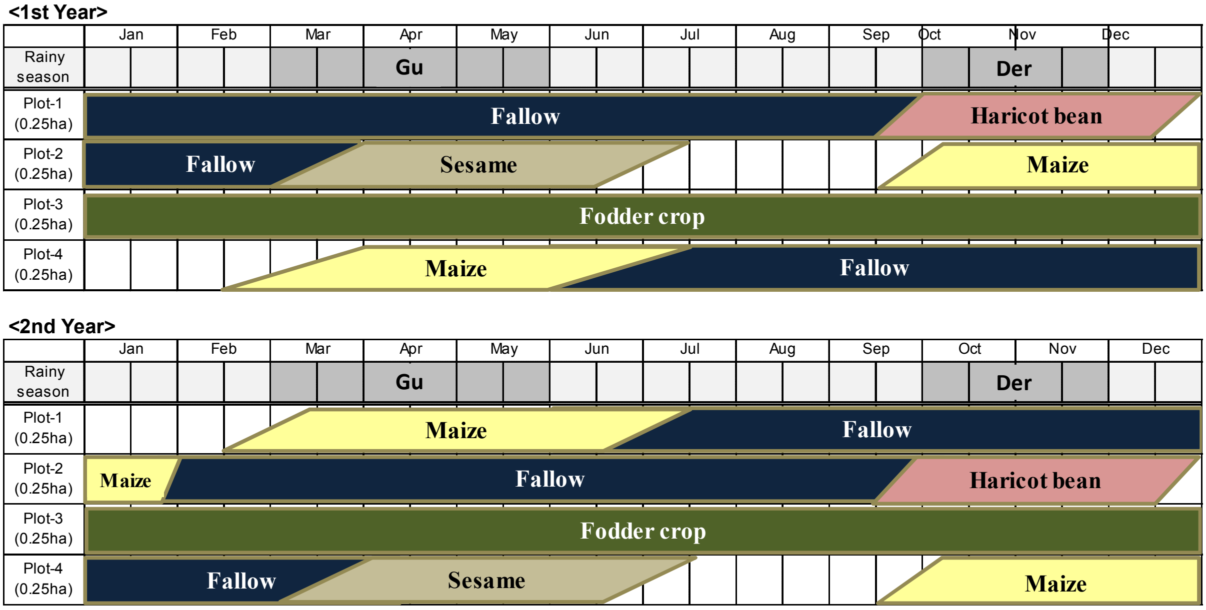


Figure 3.3.1 Cropping Pattern and Calendar for 2 Sub-plots Case

Source: JICA Project Team

2) Cropping Pattern for 3 Sub-plots Case (using mainly 0.75 ha)

Under this pattern, different crops for each sub-plot are planted for every cropping with 1 sub-plot planted for 2-year period perennial fodder crop. Among 3 sub-plots, cereal for self-consumption and the cash crop are introduced by one sub-plot respectively. The remaining one should be of mixed cropping or inter-cropping by maize or sorghum and beans (haricot bean, cowpea and groundnuts, etc.) for home consumption purpose. For the purpose of self-sufficiency of food, expected harvests are 0.6-1.0 t/ha (2.4-4.0 t/ha x 0.25 ha) for maize planting plot and 0.3-0.5 t/ha for the mixed farming plot so as to secure more than 1.4 t/year of self-consumption by 2 cropping per year.

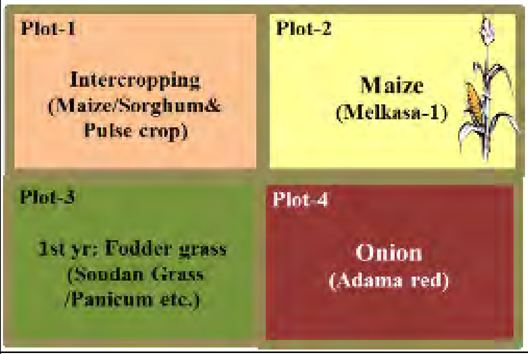
In the mixed cropping plot, by combining the Gramineae family plants typed as upright stem and deep root system and Fabaceae family typed as prostrate stem and shallow root system together, reducing of weeds and improvement in soil condition can be expected. In addition, favorable effect of fixing nitrogen content can also be expected, implying the lessening of the farm work.

Table 3.3.3 Example of Cropping Pattern for 3 Sub-plots Case

	Cropping pattern		Details on cultivation
1st cropping season	1st year's Gu (Long rainy season)		
	Plot-1 Sesame (Sarkamo)	Plot-2 Intercropping (Maize/Sorghum& Pulse crop)	Plot-1 : Sesame as cash crop. Sarkamo variety is recommended for its high yielding advantage. Plot-2 : Mixed farming (Inter-cropping) of self-consumption food grain and beans. Introduce sorghum with tolerance to birds damage or early matured maize variety. Plot-3 : Fodder crops of drought tolerant and high yielding like Sudan grass or Guinea grass Plot-4 : Cultivation of maize for home consumption. With having countermeasures for irrigation risk in other sub-plots, introduce high yielding variety(Example: Melkasa-4)
	Plot-3 1st yr: Fodder grass (Soudan grass /Panicum etc.)	Plot-4 Maize (Melkasa-4)	

2nd crop cropping season

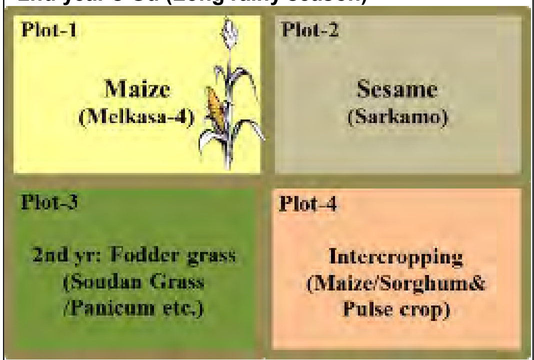
1st year's Der (Short rainy season)



Plot-1 : Mixed farming of self-consumption food grain and beans. Der is short period rainy season and early matured maize is recommended.
Plot-2 : Increase in maize harvest shall be sought with the uses of nitrogen fixed by previous crop and high yielding variety.
Plot-3 : Harvesting stems and leavesfrom the standing fodder crop.
Plot-4 : In view of good marketability, onion is recommended but any other cash crops can be planted except Gramineae and Fabaceae.

3rd cropping season

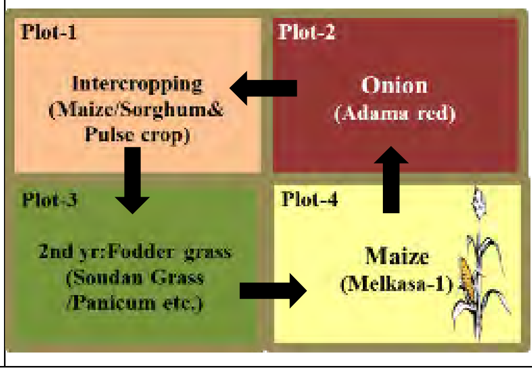
2nd year's Gu (Long rainy season)



Plot-1 : Increase in maize harvest shall be sought with the uses of nitrogen fixed by previous crop and high yielding variety.
Plot-2 : Sesame as cash crop with applying Sarkamo variety with high yielding nature.
Plot-3 : Harvest of stems and leaves from the standing fodder crop.
Plot-4 : Mixed farming of self-consumption grain and beans. Either sorghum tolerant to damage by birds or early matured, maize shall be introduced.

4th cropping season

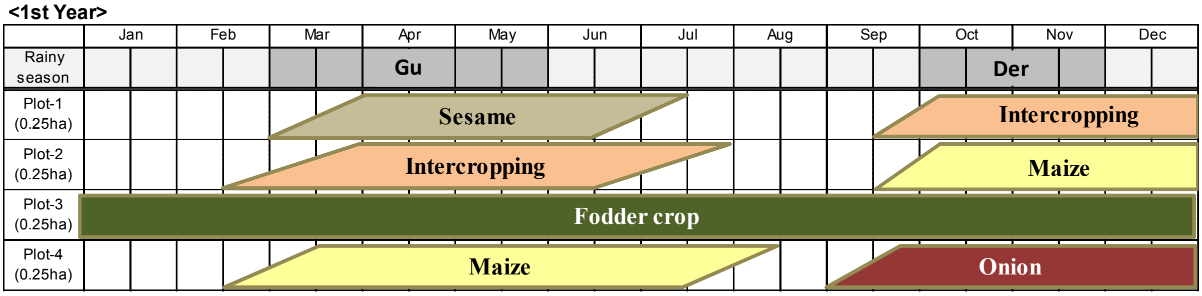
2nd year's Der(Short rainy season)



Plot-1 : Mixed farming or inter-cropping of food grain and beans. Der is a short rainy season and preference is given to early matured maize than sorghum.
Plot-2 : By utilizing the nitrogen fixed by the previous crop, maize cultivation is introduced.
Plot-3 : Harvesting of stems and leaves from standing fodder crop.
Plot-4 : From the higher marketability, onion is recommended. However, any other cash crops with shorter growing period can be planted except the Gramineae family and Fabaceae family.

Source : JICA Project Team

<1st Year>



<2nd Year>

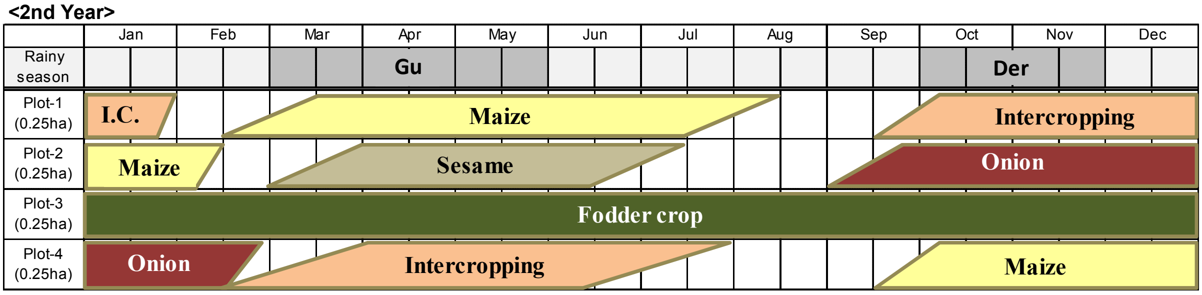


Figure 3.3.2 Cropping Pattern and Calendar for 3 Sub-plots Case

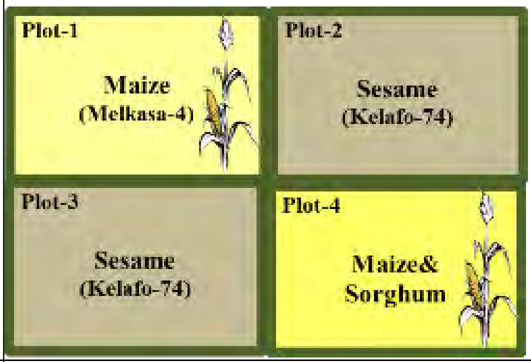
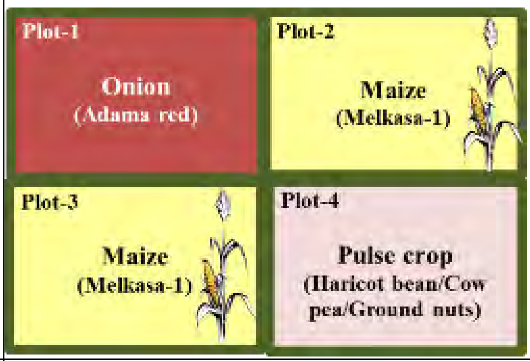
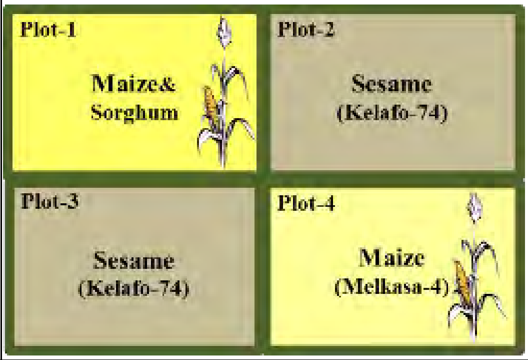
Source: JICA Project Team

3) Cropping Pattern for 4 Sub-plots Case (using mainly 1.0 ha)

In case all 4 sub-plots can be cultivated, it is more efficient if rotational cropping is practiced introducing as many crops as possible. In this case, however, the combination of crops becomes rather complicated and an easier/simpler system similar to the present practice has to be tried where maize for food and sesame for cash income are centered. Under the cropping pattern using the full 4 sub-plots, as much as 2.4 t/ha for the first year to maximum 4 t/ha of maize is to be produced per annum under 2-cropping system including the harvest of sorghum. There are in fact potential demands in and around the area for both grains and stalk/leaf and the surplus excluding the self-consumption is supposed to be shipped for sales.

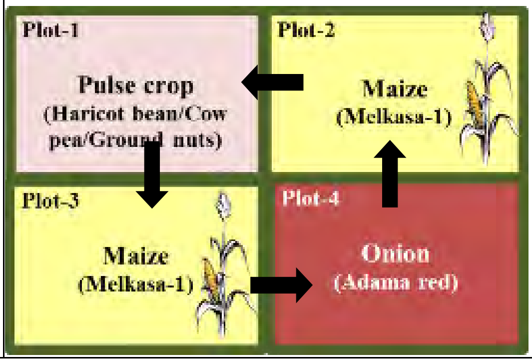
On top of above, onion can be tried as another cash crop aside from sesame. Onion can be tried in Der season instead of sesame as cash crop. The yield of onion is estimated as 12 t/ha with reference to examples around the target area. In addition, sorghum in small scale with maize in a sub-plot for avoiding low water irrigation risk in *Gu* period and beans for maintaining the soil fertility in Der period must be introduced.

Table 3.3.4 Example of Cropping Pattern for 4 Sub-plots Case

	Cropping pattern	Details on cultivation
1st cropping season	1st year's Gu (Long rainy season) 	Plot-1 : Cultivation of maize for self-consumption. With having countermeasure for irrigation risk, introduce high yielding variety (Example: Melkasa-4) Plot-2、Plot-3 : Cultivation of sesame as cash crop. As requiring seeds for 2 sub-plot area, locally available Kelafo-74 is most recommended. Plot-4 : To prepare for possible irrigation risk, 50:50 cultivation by maize and sorghum is planned. For sorghum, variety with tolerance to damage by birds is necessary.
2nd crop cropping season	1st year's Der (Short rainy season) 	Plot-1 : From the marketability potential, onion is recommended. But any kind of cash crops with shorter growing period except Gramineae and Fabaceae family are possible. Plot-2、Plot-3 : Cultivate early matured maize Plot-4 : Introduce Fabaceae family crops to maintain soil fertility. If requiring feed for livestock, introduce cowpea.
3rd cropping season	2nd year's Gu (Long rainy season) 	Plot-1 : To prepare for possible irrigation risk, 50:50 cultivation by maize and sorghum is planned. Sorghum variety shall be tolerant to damage by birds. Plot-2、Plot-3 : Sesame as cash crop. To secure seeds for 2 sub-plot area, locally available Kelafo-74 is most recommended. Plot-4 : Maize cultivation for self-consumption. With countermeasure taken for irrigation risk, high yielding variety (Example: Melkasa-4) shall be applied.

4th cropping season

2nd year's Der(Short rainy season)



Plot-1 : From positive marketability, onion is recommended. However, any kind of cash crops with shorter growing period can be applied except Gramineae and Fabaceae family.
Plot-2&Plot-3 : Early matured maize be cultivated.
Plot-4 : To maintain soil fertility, Fabaceae family crops shall be introduced. In case of need for feed for livestock, cowpea is to be cultivated.

Return to the 1st crop from the following year

Source : JICA Project Team

As same as the other cropping patterns, the cultivating crops and rotation pattern are to be changed every 2 years as shown by the arrows as indicated in the 4th cropping season. In this pattern, especially, two sub-plots such as plot-2 and 3 are to be only planted maize and sesame for 2 years and cannot receive the benefit from rotation with pulse crop and onion which can improve soil condition. The plot-2, therefore, shall be replaced from maize to onion in the third year, and then maize/sorghum-pulse crops-maize can be followed. Additionally, this cropping pattern does not involve fodder crop, however a humidity tolerant Rhodes grass can be planted as it can be introduced along the canals and plot boundaries to secure feed for livestock.

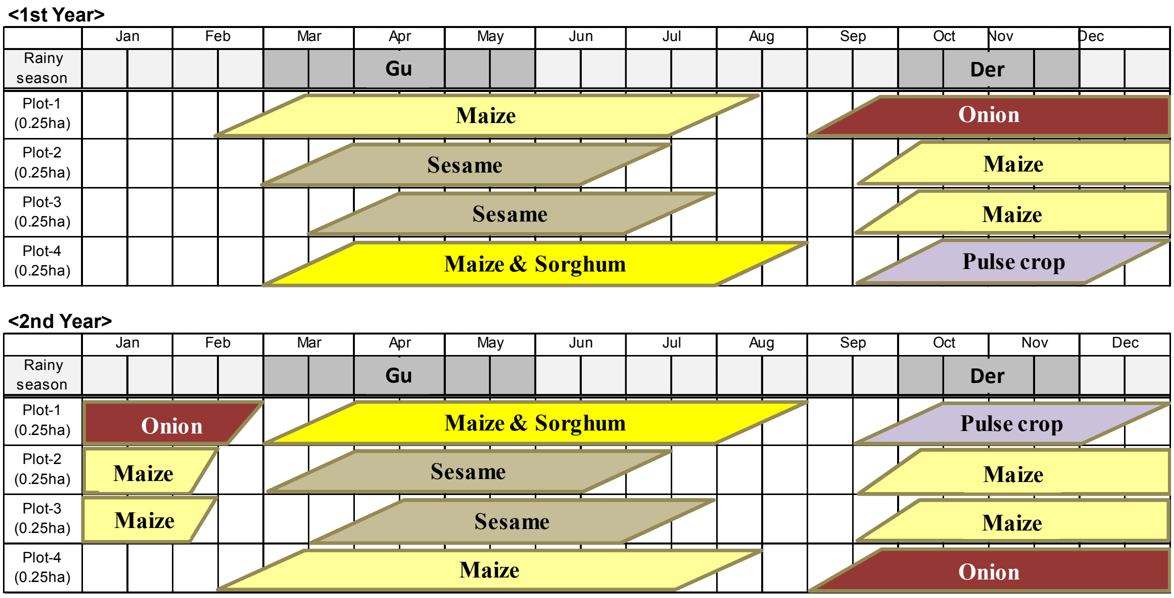


Figure 3.3.3 Cropping Pattern and Calendar for 4 Sub-plots Case
Source: JICA Project Team

4) Cropping Patten for 0.5ha of Farmland (reference)

A cropping pattern should be considered when beneficial households have only 0.5ha because of the lack of irrigation farmland in the target areas and due to lack of working family members or machinery. Since irrigated agricultural development plan recommends a rotated cropping pattern for the cultural benefit, the 0.5ha also shall be divided into four sub-plots as same as the other cropping patterns. Cereals shall be introduced in the two sub plots and cash crops are going to be produced in the other two plots in both rainy seasons. For the cereals, 2 cropping of 2 sub plots reaches total 0.5 ha planting, whereby producing 1.2 – 2.0 t/ha of maize, narrowly meeting the self-consumption.

The rotation cycle and crops to be introduced are almost same as the cropping pattern for 4 sub-plot case, thus the one for 0.5ha can be referred in the Table 3.3.4. However the crops introduced and variety are different from the above 4 sub-plot case; i) a sub-plot is used for one crop, maize or sorghum, not combined maize with sorghum, ii) the different maturing lengths of varieties of maize or an early matured variety of maize and a bird resistant variety of sorghum should be combined in Gu in order to avoid the risk of production decrease or annihilation caused by lack of irrigated water.

Sorghum is not appropriate to grow in Der because its rainy period is short. Thus it is favorable to introduce short-duration varieties of maize in this rainy season. As a cash crop in Der, the Fabaceae family crop must be planted on a sub-plot on the purpose of improving fertility and physical properties of soil. Onion, one of main cash crops, can be first place to be grown on the other one, however any crop such as tomato or watermelon are also possible to grow along-with for self-consumption, because 1sub-plot of 0.125ha can produce less quantity for potential big market.

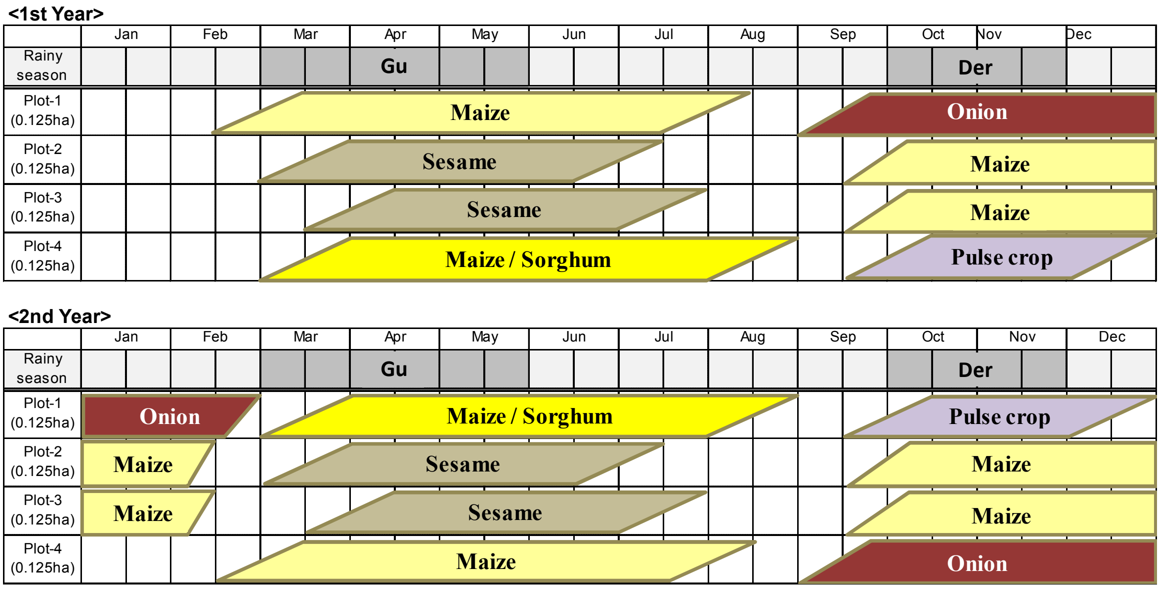


Figure 3.3.4 Cropping Pattern and Calendar for 0.5ha of Farmland

Source: JICA Project Team

CHAPTER 4 TENDERING AND CONSTRUCTION OF IRRIGATION SCHEMES

This chapter discusses the project implementation staring with pre-qualification of contractors, tendering, contract negotiation, and construction of the 4 irrigation schemes. In fact, the first tendering was not successful due to the high offers from the participant contractors, and therefore the contract of the construction was concluded in the second tendering. Then the construction was commenced by the successful contractor; however, the contractor could not complete the work and therefore the contract was terminated. Thereafter, the construction was taken over by the Team's direct force account work, and finally completed in July 2015, approximately one-year 4 month delay from the original schedule.

4.1 Tendering and Contract Negotiation

4.1.1 Pre-qualification and Bid Tendering

Construction of the 4 irrigation schemes need to engage civil construction company(ies) from the view point of work volume and also the circumstances wherein the construction is done. To engage contractor, as the first step, pre-qualification had been carried out inviting potential bidders of Ethiopian national construction companies. Then, those construction companies who passed the pre-qualification were invited to the tendering. Pre-qualification and also the tendering schedule are shown below, and in fact the first bid tendering resulted in not reaching agreement with the bidders whereby 2nd bid tendering was conducted in June 17, 2013.

Tender Pre-qualification Announcement	:	February 1, 2013
Deadline for Pre-qualification document request	:	February 8, 2013
Deadline for Submission of Pre-qualification	:	February 13, 2013
Announcement of Tender and Delivery of Tender Documents	:	February 19, 2013
Distribution of Tender Documents	:	February 20-21, 2013
Closing Day of Clarification on Tender Document	:	March 7, 2013
Bid Tendering and Tender Opening (1st Tender), unsuccessful	:	Aril 4, 2013-
Distribution of 2nd Tender Documents (for re-tendering)		June 3, 2013
2nd Bid Tendering and Tender Opening (for re-tendering)	:	June 17, 2013

Pre-qualification documents have been prepared and distributed to 5 potential bidders who showed an interest to participate in the tendering. All the 5 companies who received pre-qualification documents have submitted the required forms of documents. The contents for the submitted documents have been scrutinized by license, staff status, work experience, financial status, machineries and equipment owned as specified in the qualifications required for the bidders. Out of the 5 companies, 4 were pre-qualified, and the one who did not pass the pre-qualification was not in accordance with the level of the license and also the status of the staff.

4.1.2 Bid Tendering for the Irrigation Schemes (1st Tender)

Bid tendering and tender opening was held on April 4, 2015 from 15:00 at a Conference Room of JICA Ethiopia Office. Though all the pre-qualified 4 companies had shown the will to participate in the tender opening, one company came to the tender opening place later than the specified time and another one's document was not in conformity with the tender instructions. Therefore only 2 companies were allowed to participate in the bidding.

With the finally eligible 2 companies, tender was opened as scheduled. At the first bid, bidding prices were all higher than the ceiling price for both Package A (Godiray and Ilan) and Package B (Badilaid and Hididole), whereby second bidding was called after half an hour later. The second bid was opened and again the submitted prices were all higher than the ceiling. Therefore, the JICA team started price negotiation with the bidders; however the prices were still high and could not come down to the ceiling price. Therefore, the Team upon consent from JICA office has decided to modify some of the designs in order to reduce the construction cost.

4.1.3 Modification to the First Bid Document

Given the result of the 1st bidding, following modifications were made for the re-bid tendering in order to reduce the project cost. Of the modifications made, arrangement of the field canal construction is the most major change; originally it included in the contractor's work but with the modification the construction is planned to be undertaken by Gode Kelafo Irrigation Development Office supported by JICA Team.

- ✓ Originally the contract was divided into 2 packages as one for Godiray and Ilan and the other one for Badilaid and Hididole taking into account the work volume, and these 2 packages were combined as one package, so that the mobilization and demobilization cost can be minimized.
- ✓ Alignment of the delivery pipeline, from pumps to the discharge sump, was changed from pipe supported type to under-ground buried type, leading to cost reduction of pipe installation.
- ✓ All the field canals were excluded from the contract work undertaken by the contractor, and instead the construction was planned to be undertaken by Gode Kelafo Irrigation Development Project office.

Gode Kelafo Irrigation Development Project office, located in Gode town, has approximately 100 personnel, of whom 26 personnel are heavy machinery & tractors operators and assistants, and 8 personnel are engaged in heavy-light vehicle's operation. Functional machineries the office owns as at April 2013 are Dozer FIAT-HITACH (FD) 255 (1nos), FIAT HITACH Dozer Model 220 (1nos), Case Proclaim Model 998 Excavator (1nos), FIAT Grader Model FD 85 (1nos), Case Loader Model 821B (1nos), Roller (1nos) and UD Dump 16Ton Truck (1nos). It was agreed that the fuel is to be provided by JICA team and the Office takes the responsibility of constructing the field canals.

4.1.4 Re-Bid Tendering for the Irrigation Schemes (Re- tendering)

At the beginning of the 2nd bid tendering, 4 bidders who were qualified for the 1st tendering submitted required documents such as power of attorney, bid security, construction schedule, construction equipment schedule, personal dispatch schedule, and bidding price and priced bill of quantities. All the documents were confirmed and all 4 bidders were permitted to attend the bid opening. On the 1st bidding, Company A offered the lowest price 34,850,000 ETB, which is under the ceiling price (ETB 34,915,139).

Construction schedule proposed by the company is about 7 months, which is within the specified construction period. The company will organize 2 teams for the construction in order to accelerate the construction. All construction equipment is the company's own equipment according to the submitted document. Necessary construction equipment for main the canal construction such as excavator, wheel loader and roller compactor will be prepared 2 sets. As for the site staff, though only one site engineer was proposed by the original schedule, the company accepted during the negotiation stage to increase to 2 persons taking into account 2 teams to be arranged for the construction.

Judging from the evaluation made above, the lowest price bidder was concluded suitable for concluding the contract. Therefore, the Team recommended the company for the contract negotiation with JICA Ethiopia office. On 4th July 2013, contract negotiation for the construction of 4 irrigation schemes was held at JICA Ethiopia office. The negotiation between JICA and the candidate of the contractor (ZELEKE REDI GENERAL) was concluded on 19th July 2013, and finally the both sides signed the contract of this Gode irrigation development scheme.

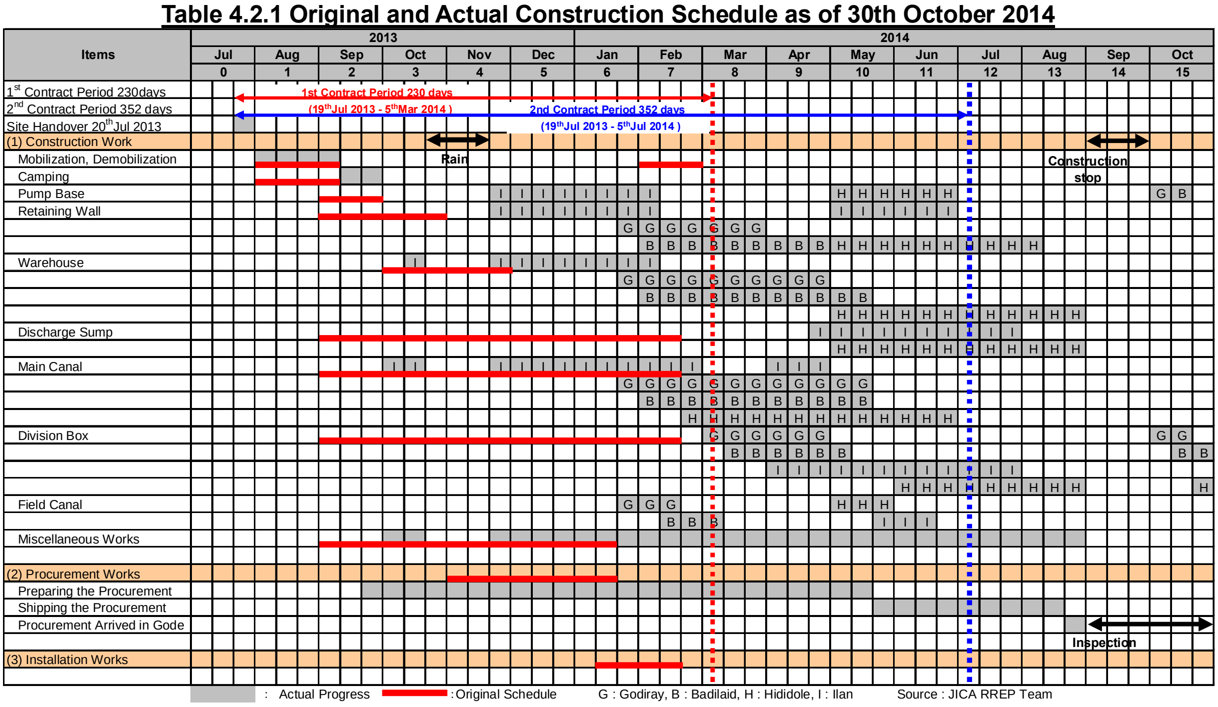
4.2 Overall Progress of the Construction

With the contract conclusion on 19th July 2013 between JICA Ethiopia Office and the contractor, ZELEKE REDI GENERAL, the site handover to the contractor was held on 20th July 2013 in each of the 4 construction sites attended by relevant local authorities. However, the construction started staggering since the beginning of the schedule and got very much delayed. In fact, the contract was once extended by 4 months but still the contractor could not complete. Finally, the contract itself was terminated at the end October 2014. This section reports the construction progress, issues arising, etc.

4.2.1 1st Contract Schedule (230 days from July 19th 2013 to March 5th 2014)

Original construction schedule and actual progress are comparatively shown in Table 4.2.1 (original schedule line, submitted by the contractor during the tendering). The original schedule was supposed to complete within the contract period of July 19th 2013 to March 5th 2014 (total 230 days), approximately 7.7 months. However, due to several reasons, the construction has been very much behind the planned schedule. In fact, major part of the main canal construction had started after the original contract period has passed.

Table 4.2.1 Original and Actual Construction Schedule as of 30th October 2014



Source: JICA Project Team

Faced with the delay, the contractor given instruction by the JICA team has submitted total 5 revised construction plans till the end of the original contract period (5th March 2014). Despite such revised construction plans, the total progress percentage of the 4 construction sites as at the end of the original contract had ended only in 40%. By work item, the progresses as at the original deadline were only 52%, 12%, and 0% for construction work, procumbent work, and installation work, respectively (see the following table and figure).

Table 4.2.2 Progress of the Construction (as of Contract Period, 5th March, 2014)

4 sites	2013					2014		
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	5th Mar
(1) Construction Work	2%	2%	6%	7%	20%	42%	52%	52%
Mobilization, Demobilization	50%	50%	50%	50%	70%	70%	70%	70%
Pump Base	0%	0%	0%	0%	7%	15%	15%	15%
Retaining Wall	0%	0%	0%	0%	36%	45%	67%	67%
Warehouse	0%	0%	2%	15%	19%	34%	54%	54%

4 sites	2013					2014		
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	5th Mar
Discharge Sump	0%	0%	0%	0%	0%	0%	0%	0%
Main Canal	0%	0%	6%	6%	22%	49%	60%	60%
Division Box	0%	0%	0%	0%	0%	0%	6%	6%
Miscellaneous Works	0%	0%	0%	0%	0%	1%	2%	2%
(2) Procurement Works	0%	0%	0%	0%	0%	12%	12%	12%
(3) Installation Works	0%	0%	0%	0%	0%	0%	0%	0%
(4) Total	1%	1%	4%	5%	15%	33%	40%	40%

Source: JICA Project Team

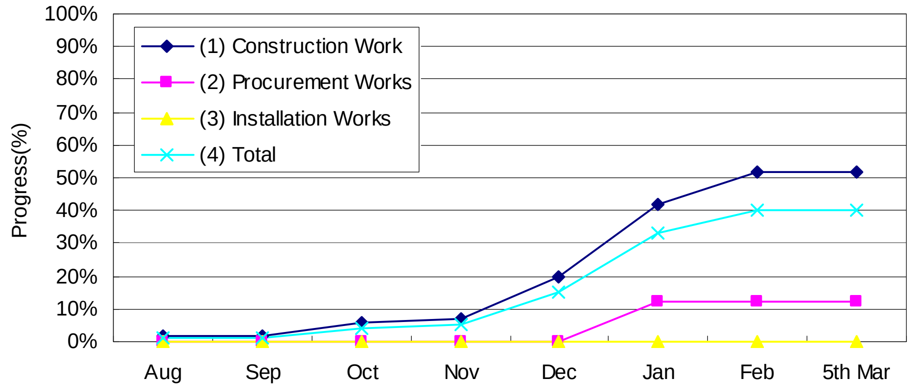


Figure 4.2.1 Progress of the Construction (as of 5th March, 2014)

Source: JICA Project Team

Reasons for the construction delay were; difficulty of machineries procurement, work stoppage by rainfall, security, breakaway of personnel, and difficulty of unskilled labor employment as elaborated below. Therefore JICA Ethiopia office has allowed the construction period to extend by 4 months till 5th July 2014 from the original 5th March 2014.

1) Machinery rental companies in the capital, Addis Ababa, had refused to send their machineries to Gode where security issue is always concerned, making the contractor spend more than one-month to arrange necessary machineries. In fact, according to the tendering document submitted by the contractor, the contractor was supposed to manage all the machineries out of his own possession; however it was not the case.

2) Though the first batch of the machineries had departed Addis Ababa on September 6th 2013, they had arrived in Gode on September 26th having required total 21 days, while normal transportation needs 3 days, thus 18 days delay had taken place. In addition, due to a festival of nations and nationality's day of Ethiopia on December 8th 2013, there was constraint on movement of cars and workers. Therefore, all activities on site were stopped totally 3 days from 7th to 9th December 2013.

3) Rainfall during the late rainy season had stopped machineries to operate several times. In fact, soil in and around Gode area is of silt, so that once the soil gets wet the machineries easily get stuck. In total, due to the rain and its consequence (flood & mud), all activities on the sites had been stopped total 27 days as indicated in Table 4.2.3.

Table 4.2.3 Work Stoppage due to Rainfall

Stoppage period	days
8th Oct. to 10th Oct.	3
17th Oct. to 19th Oct.	3
23rd Oct. to 25th Oct.	3
4th Nov. to 21st Nov	18
Total	27

Source: JICA Project Team (Field record)

4) The construction site is at Gode, Shebele zone, Somali region, which is far about 1,200 km from Addis Ababa, the capital city of Ethiopia. Gode is located in a low elevation area, and the climate, culture, social environment and security, etc. are very different from those of the highland. Accordingly, lots number of engineer, technicians and operators from Addis Ababa became disgusted to work in Gode, thus by January 2014 cumulative 40 persons have broken away or

escaped from the construction site, resulting in work force shortage.

Table 4.2.4 Escaped Persons from Gode Construction Sites

2013	Position	No.	Employed at:
July	Project manager	1	Addis Ababa
	Site Engineer	3	Addis Ababa
September	Soil laboratory technician	1	Addis Ababa
	Soil laboratory assistant	2	Addis Ababa
	Skilled labors	6	Addis Ababa
October	Project manager	1	Addis Ababa
	Site engineer	1	Addis Ababa
	Carpenter	1	Addis Ababa
	Mason	2	Addis Ababa
	Skilled labors	3	Addis Ababa
	Dump driver	3	Addis Ababa
December	Labors	11	Gode
	Dump driver	2	Addis Ababa
January, 2014	Mason	3	Gode
Total		40	

Source: JICA Project Team (Field Records)

5) The people in the target communities are given food stably through World Food Program (WFP) implemented by United Nations. They generally hesitate to work to get money as unskilled labor because of such substantial aid. In addition, employed labors sometime do not come to the site on time, making construction further behind the schedule. It is thus difficult to employ even unskilled labors around the sites. Therefore, the contractor had to bring even the unskilled labors from Addis Ababa with favorable terms. As at mid February 2014, for example, 10 unskilled labors are working recruited from Addis Ababa aside from only 9 local unskilled labors.

6) Aside from the unavailability of above unskilled labors, skilled labors are not available in and around Gode area either. Skilled labors who were recruited in Addis Ababa are 5 for masonry work and 1 for welding work as at mid February 2014 though there were another 2 masonries and one carpenter recruited from Gode. With these workforces, masonry is apparently in shortage according to the work as at February 2014.

4.2.2 2nd Contract Schedule (352days : from July 19th 2013 to July 5th 2014)

In spite of the extension of construction period, the contractor could not complete the works by the revised completion date of July 5th 2014. The overall progress percentage of the 4 sites as at the end of the 2nd contract period of July 5th 2014 had reached 81%, still leaving 19% of the construction works unfinished. By work item, the progresses were 95.2%, 50%, and 0% for construction work, procumbent work, and installation work respectively (see Table 4.2.5 and Figure 4.2.2 below).

Table 4.2.5 Progress of the Construction (as of 2nd Contract Period, 5th July 2014)

4 sites	2013					2014						
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	5th Jul
(1) Construction Work	2%	2%	6%	7%	20%	42%	52%	73%	82%	92%	93.7%	95.2%
Mobilization	50%	50%	50%	50%	70%	70%	70%	70%	93%	100%	100%	100%
Pump Base	0%	0%	0%	0%	7%	15%	15%	21%	21%	36%	64%	64%
Retaining Wall	0%	0%	0%	0%	36%	45%	67%	87%	87%	97%	97%	99%
Warehouse	0%	0%	2%	15%	19%	34%	54%	55%	73%	86%	88%	89%
Discharge Sump	0%	0%	0%	0%	0%	0%	0%	0%	4%	39%	81%	81%
Main Canal	0%	0%	6%	6%	22%	49%	60%	87%	96%	99%	100%	100%
Division Box	0%	0%	0%	0%	0%	0%	6%	7%	11%	55%	55%	71%
Miscellaneous Works	0%	0%	0%	0%	0%	1%	2%	3%	3%	7%	7%	16%
(2) Procurement Works	0%	0%	0%	0%	0%	12%	12%	50%	50%	50%	50%	50%
(3) Installation Works	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(4) Total	1%	1%	4%	5%	15%	33%	40%	65%	71%	79%	80%	81%

Source: JICA Project Team

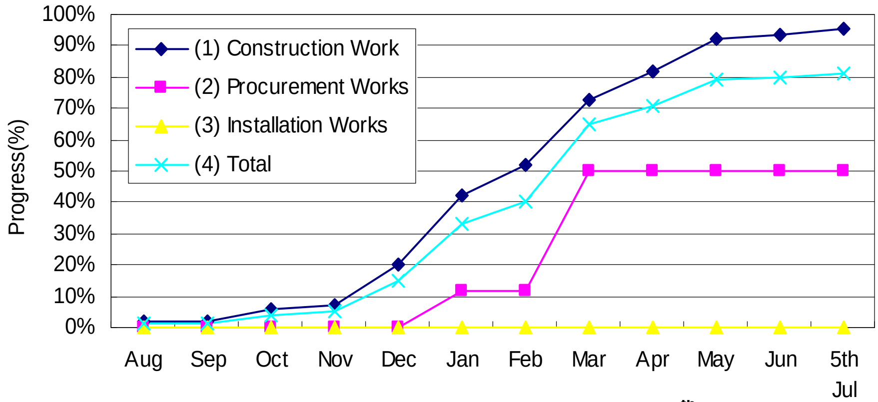


Figure 4.2.2 Progress of the Construction (as of 5th July 2014)

Source: JICA Project Team

4.2.3 Progress of the Construction as of the End October (Contract Termination)

Though extension of 4 months period was granted to the contractor, he still could not finish the construction by 5th July 2014, leaving around 20% of the contract work. In fact, as at the deadline of July 5th 2014, equipment such as pumps, motors and generators under procurement works had not yet arrived at the site. The equipment had arrived in August 2014, and it was found that the generators were not in accordance with the technical specification of the contract.

Given much delay and also the contract bleach, the JICA office finally notified the contractor to complete all the works by the end of October 2014, or to terminate the contract. The contractor could not fulfill this instruction, and accordingly the contract was terminated as at the end October 2014. The total progress percentage as of end October 2014 came to 89%. By work item, the progresses were 96.0%, 78%, 0% for construction work, procumbent work, and installation work respectively.

Table 4.2.6 Progress of the Construction (as of End of October 2014)

Total Progress	2013					2014									
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	5th Jul	Jul	Aug	Oct
(1) Construction Work	2%	2%	6%	7%	20%	42%	52%	73%	82%	92%	93.7%	95.2%	95.6%	96.4%	96.0%
Mobilization	50%	50%	50%	50%	70%	70%	70%	70%	93%	100%	100%	100%	100%	100%	100%
Pump Base	0%	0%	0%	0%	7%	15%	15%	21%	21%	36%	64%	64%	64%	64%	51%
Retaining Wall	0%	0%	0%	0%	36%	45%	67%	87%	87%	97%	97%	99%	99%	99%	97%
Drainage	0%	0%	0%	0%	0%	0%	0%	0%	0%	73%	100%	100%	100%	100%	100%
Warehouse	0%	0%	2%	15%	19%	34%	54%	55%	73%	86%	88%	89%	90%	93%	78%
Discharge Sump	0%	0%	0%	0%	0%	0%	0%	0%	4%	39%	81%	81%	82%	88%	73%
Main Canal	0%	0%	6%	6%	22%	49%	60%	87%	96%	99%	100%	100%	100%	100%	100%
Division Box	0%	0%	0%	0%	0%	0%	6%	7%	11%	55%	55%	71%	75%	75%	86%
Miscellaneous Works	0%	0%	0%	0%	0%	1%	2%	3%	3%	7%	7%	16%	16%	37%	37%
(2) Procurement Works	0%	0%	0%	0%	0%	12%	12%	50%	50%	50%	50%	50%	50%	50%	78%
(3) Installation Works	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(4) Total	1%	1%	4%	5%	15%	33%	40%	65%	71%	79%	80%	81%	81%	82%	89%

Source: JICA RREP Team

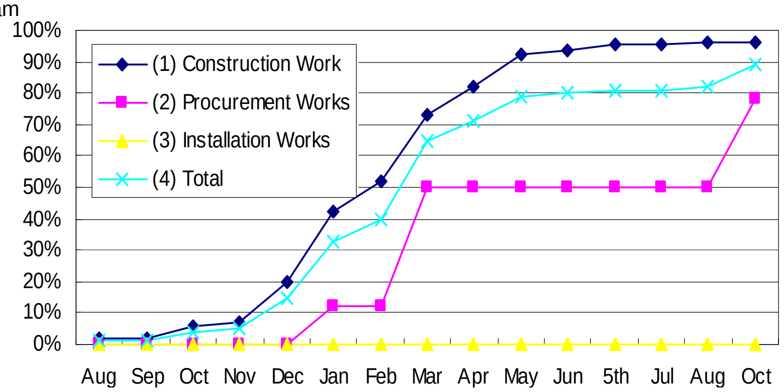


Figure 4.2.3 Progress of the Construction (as of end October 2014)

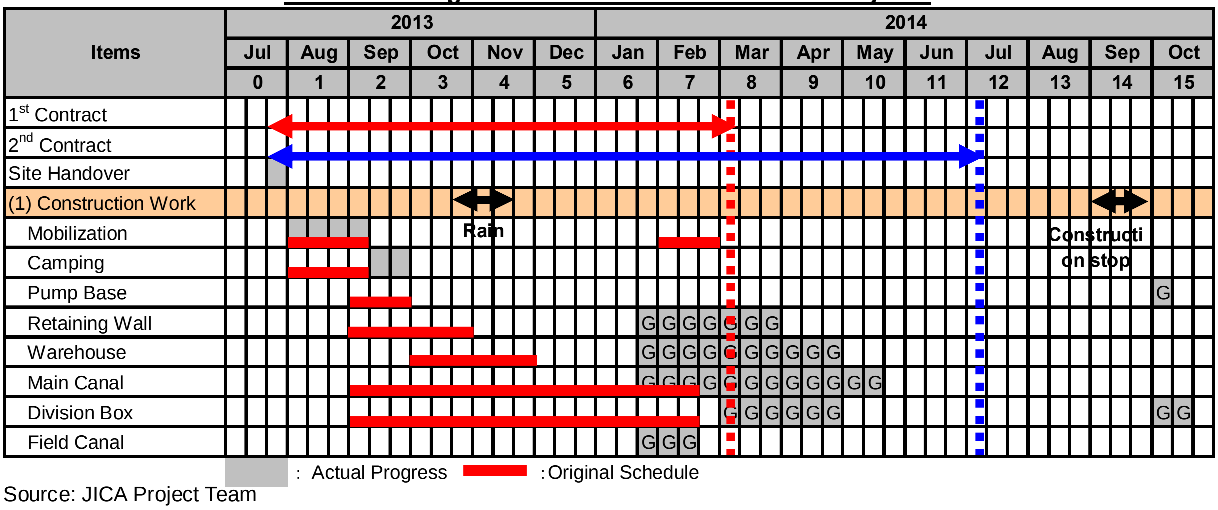
Source: JICA Project Team

4.3 Site Specific Progress and Challenge

4.3.1 Construction at Godiray Site

At Godiray site, located at the most upstream area among the 4 sites, rehabilitation of the main canal was started at the end of January 2014 and completed till April 2014, which is the major machinery construction part. Warehouse construction was also commenced at the end of January 2014, and completed in April 2014. On the retaining wall, the construction was commenced in January 2014, and by the beginning of February, all the structures had been completed except for the pipe setting. The construction of pump base has just been commenced in October 2014, much delayed due to a change of the place and labor and machinery shortages.

Table 4.3.1 Original and Actual Schedule for Godiray Site



Source: JICA Project Team

Main Canal Up-stream (Godiray)

Retaining Wall (Godiray)

The total progress percentage as of end October 2014 came to 83%. By work item, the progresses were 92%, 61%[1], and 0% for the construction work, procumbent work, and installation work respectively. The major works, which have remained as of end October 2014, are the construction of pump base, miscellaneous works e.g. windbreak, procurement of generators and installation. Although excavation of the main and field canals was completed before the original contract completion date, strong sand storms during May to September made the canals filled with sand. Consequently, the

[1] The achievement of the procurement was reduced from 50% for the previous months to 40% only. This is because; 1) upon shipment, half of the procurement was accounted as per the contract, 2) however, the generator procured was rejected, so that the final achievement was deducted.

excavation of the main and field canals have to be carried out again.

Table 4.3.2 Progress of the Construction at Godiray (as of End of October 2014)

Godiray	2013					2014									
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	5th Jul	Jul	Aug	Oct
(1) Construction Work	7%	7%	7%	7%	10%	23%	64%	67%	79%	92%	93%	93%	93%	93%	92%
Mobilization	50%	50%	50%	50%	70%	70%	70%	70%	100%	100%	100%	100%	100%	100%	100%
Pump Base	0%	0%	0%	0%	0%	16%	16%	26%	26%	26%	26%	26%	26%	26%	16%
Retaining Wall	0%	0%	0%	0%	0%	14%	96%	100%	100%	100%	100%	100%	100%	100%	95%
Warehouse	0%	0%	0%	0%	0%	38%	64%	71%	94%	98%	98%	98%	98%	98%	93%
Main Canal	0%	0%	0%	0%	0%	3%	90%	90%	90%	100%	100%	100%	100%	100%	100%
Division Box	0%	0%	0%	0%	0%	0%	50%	64%	78%	92%	92%	95%	95%	95%	96%
Miscellaneous Works	0%	0%	0%	0%	0%	0%	3%	3%	3%	3%	3%	3%	3%	3%	3%
(2) Procurement Works	0%	0%	0%	0%	12%	12%	12%	50%	50%	50%	50%	50%	50%	50%	61%
(3) Installation Works	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(4) Total	3%	3%	3%	3%	10%	16%	33%	55%	60%	65%	66%	66%	66%	66%	83%

Source: JICA Project Team

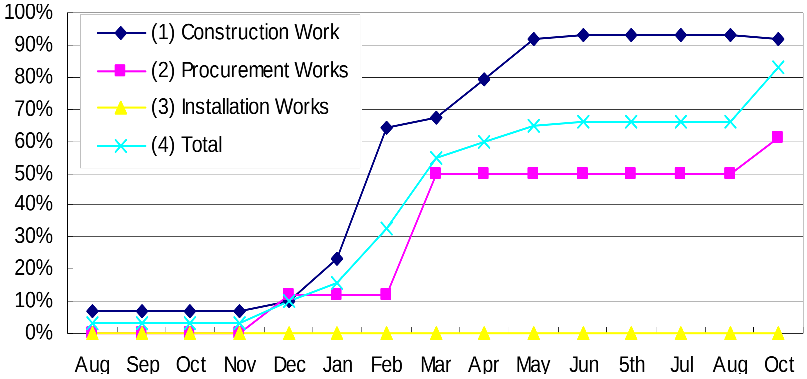
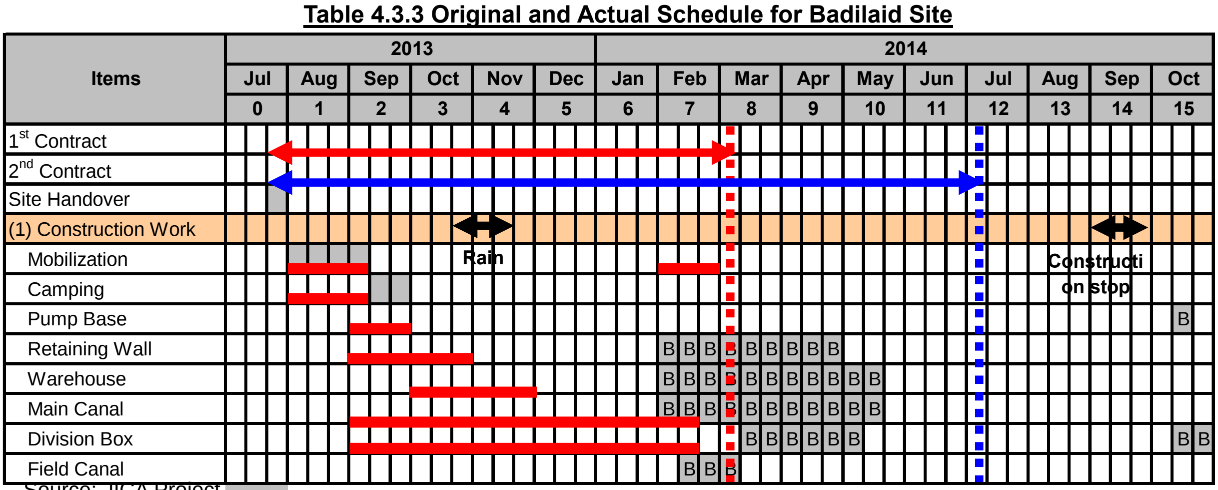


Figure 4.3.1 Progress of the Construction in Godiray(as of End of October, 2014)

4.3.2 Construction at Badilaid Site

For the Badilaid site, located at the 2nd upstream site among the 4 sites, rehabilitation of the main canal was started at the beginning of February 2014 and completed till May 2014 for the major machinery construction part. Warehouse construction was commenced at the beginning of February 2014, and completed in May 2014. On the retaining wall, its construction was commenced in February 2014. In April, all the structures had been completed except for pump base construction and the pipe setting. The pump base construction had just started in October 2014, but not completed till the contract termination.

Table 4.3.3 Original and Actual Schedule for Badilaid Site



Source: JICA Project

: Actual Progress :Original Schedule

	
Main Canal filled up by Sand Storm (Badilaid)	*Warehouse (Badilaid)*

The total progress percentage as of end October 2014 came to 75% for the Badilaid site. By work item, the progresses were only 80%, 61%, 0% for construction work, procumbent work, and installation work respectively. The principal works which have remained at the time of contract termination are construction of pump base, miscellaneous works such as windbreak establishment, procurement of generator and pipe setting. Alike Godiray site, strong sand storms, which had taken place from May to September, made the main canal and filed canal filled with sand (see photo). Consequently, the excavation of the main and field canals must be carried out again.

Strong Sand Storm in Badilaid

Table 4.3.4 Progress of the Construction in Badilaid (as of End of October 2014)

Badilaid	2013					2014									
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	5th Jul	Jul	Aug	Oct
(1) Construction Work	5%	5%	5%	5%	9%	9%	48%	53%	64%	82%	83%	88%	88%	88%	80%
Mobilization	50%	50%	50%	50%	70%	70%	70%	70%	100%	100%	100%	100%	100%	100%	100%
Pump Base	0%	0%	0%	0%	0%	0%	9%	13%	13%	26%	26%	26%	26%	26%	9%
Retaining Wall	0%	0%	0%	0%	0%	0%	33%	92%	92%	99%	99%	99%	99%	99%	97%
Warehouse	0%	0%	0%	0%	0%	0%	43%	43%	86%	99%	99%	99%	99%	99%	73%
Main Canal	0%	0%	0%	0%	0%	0%	92%	92%	92%	100%	100%	100%	100%	100%	92%
Division Box	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	50%	70%	70%	70%	69%
Miscellaneous Works	0%	0%	0%	0%	0%	0%	3%	3%	3%	3%	3%	3%	3%	3%	3%
(2) Procurement Works	0%	0%	0%	0%	12%	12%	12%	50%	50%	50%	50%	50%	50%	50%	61%
(3) Installation Works	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(4) Total	3%	3%	3%	3%	10%	10%	27%	50%	54%	62%	63%	65%	65%	65%	75%

Source: JICA Project Team

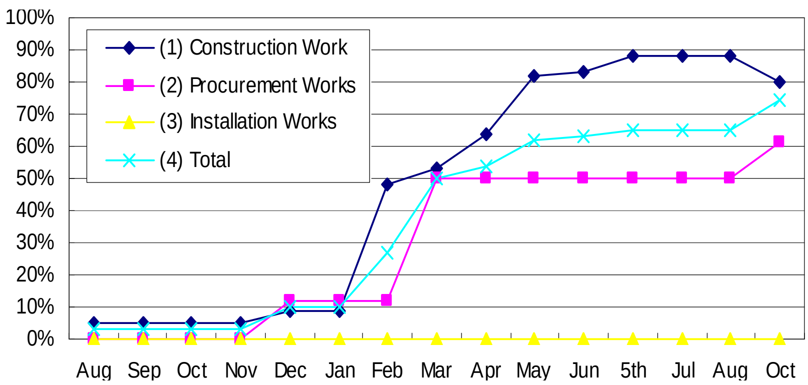
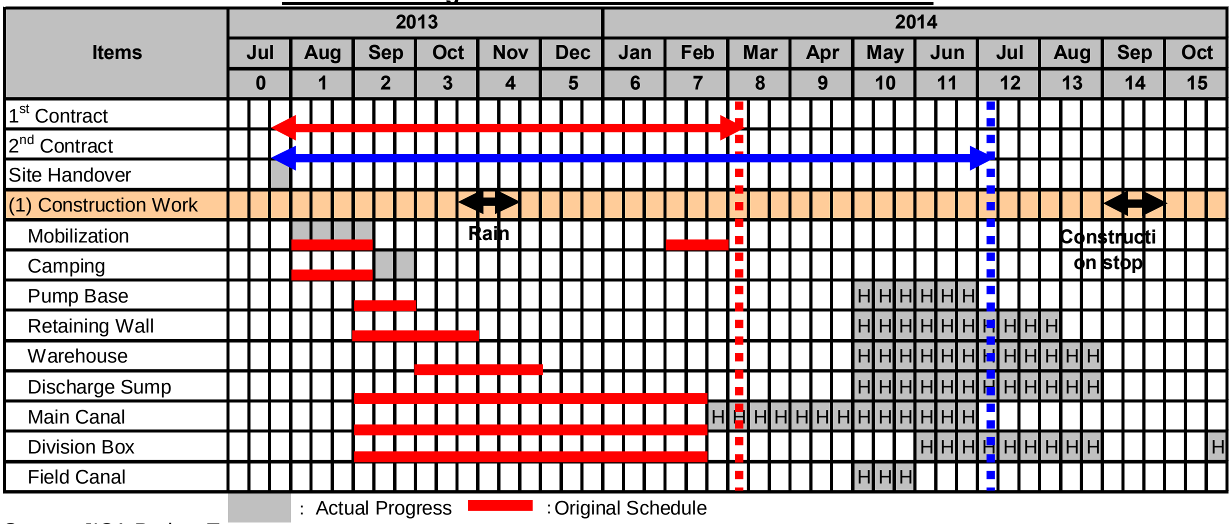


Figure 4.3.2 Progress of the Construction in Badilaid (as of End of October 2014)

4.3.3 Construction at Hididole Site

Hididole site is located at 3rd from the upstream. Main canal construction had started at the end of February 2014, at last of all the sites. The embankment had been completed till middle June 2014, and the canal opening completed by the end June 2014. Warehouse construction was commenced in May 2014 and was not completed by the time of contract termination. Retaining wall was commenced in May 2014 and not completed. Pump base was commenced in May 2014 and completed in June 2014. Discharge sump was commenced in May 2014 and completed in August 2014. Division boxes were commenced in June 2014, but it was not completed by the contract termination.

Table 4.3.5 Original and Actual Schedule for Hididole Site



Source: JICA Project Team

Main Canal Embankment (Hididole)

Discharge Sump (Hididole)

Overall progress percentage as of end October 2014 arrived at 95% for this Hididole site. By work item, the progresses were 98%, 96%, 0% for construction work, procumbent work, and installation work respectively. The main works which have remained as of the contract termination time were the construction of warehouse, division boxes including chute, drop structures and stone pitches.

Table 4.3.6 Progress of the Construction in Hididole (as of End of October 2014)

Hididole	2013					2014									
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	5th Jul	Jul	Aug	Oct
(1) Construction Work	1%	1%	1%	1%	2%	2%	14%	61%	76%	91%	93%	95%	95%	97%	98%
Mobilization	50%	50%	50%	50%	70%	70%	70%	70%	70%	100%	100%	100%	100%	100%	100%
Pump Base	0%	0%	0%	0%	0%	0%	0%	0%	0%	30%	100%	100%	100%	100%	89%
Retaining Wall	0%	0%	0%	0%	0%	0%	0%	0%	0%	78%	78%	97%	97%	97%	91%
Warehouse	0%	0%	0%	0%	0%	0%	0%	0%	0%	41%	50%	53%	61%	73%	70%

Hididole	2013					2014									
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	5th Jul	Jul	Aug	Oct
Discharge Sump	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	99%	99%	100%	100%	99%
Main Canal	0%	0%	0%	0%	0%	0%	15%	73%	92%	99%	99%	99%	99%	99%	99%
Division Box	0%	0%	0%	0%	0%	0%	0%	0%	0%	40%	40%	59%	64%	64%	90%
Miscellaneous Works	0%	0%	0%	0%	0%	0%	0%	3%	3%	3%	3%	3%	3%	3%	100%
(2) Procurement Works	0%	0%	0%	0%	13%	13%	13%	50%	50%	50%	50%	50%	50%	50%	96%
(3) Installation Works	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(4) Total	1%	1%	1%	1%	4%	4%	14%	58%	70%	82%	84%	85%	86%	86%	95%

Source: JICA Project Team

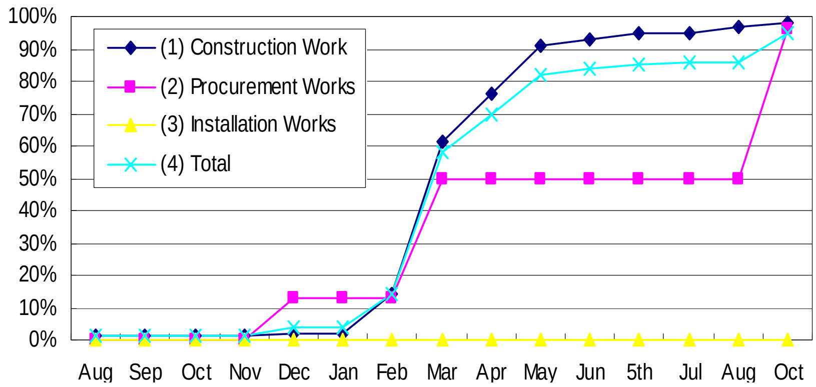


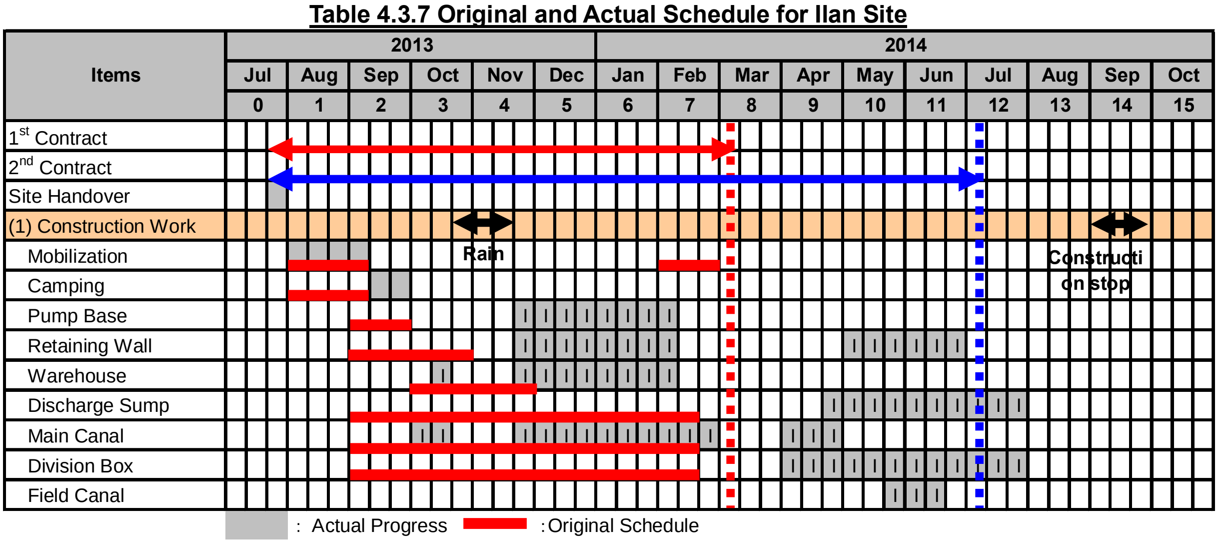
Figure 4.3.3 Progress of the Construction in Hididole (as of End of October 2014)

Source: JICA Project team

4.3.4 Construction at Ilan Site

Ilan site is located at the most downstream area among the 4 sites. The contractor commenced civil work at this site firstly. Main canal construction had started at the beginning of October 2013. The embankment of the main canal had been completed till the end of February 2014. Warehouse construction was started in October 2013 and completed at the middle of February 2014. Retaining wall was commenced at the beginning of December 2013 and competed in January 2014 except for pipe-settings. Pump base construction was commenced in December 2013 and its foundation completed in January 2014. At last division box and discharge sump construction was commenced in April 2014 and completed in June 2014.

Table 4.3.7 Original and Actual Schedule for Ilan Site



Source: JICA Project Team

Main Canal Compaction (Ilan)

Division Box and Field Canal (Ilan)

Overall progress percentage as at end October 2014 marked 96% for the Ilan site. By work item, the progresses were 98%, 97%, 0% for construction work, procumbent work, and installation work respectively. The principal works which have remained as of end of October 2014 are the construction of division box (gate works) and miscellaneous works such as windbreak tree planting.

Table 4.3.8 Progress of the Construction in Ilan (as of End of October 2014)

Ilan						2014									
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	5th Jul	Jul	Aug	Oct
(1) Construction Work	1%	1%	10%	12%	41%	76%	85%	89%	91%	95%	96%	97%	98%	98%	98%
Mobilization	50%	50%	50%	50%	70%	70%	70%	70%	100%	100%	100%	100%	100%	100%	100%
Pump Base	0%	0%	0%	0%	28%	28%	28%	28%	28%	28%	100%	100%	100%	100%	88%
Retaining Wall	0%	0%	0%	0%	96%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
Warehouse	0%	0%	9%	59%	76%	95%	95%	95%	98%	99%	99%	99%	99%	100%	68%
Discharge Sump	0%	0%	0%	0%	0%	0%	0%	0%	9%	34%	79%	79%	79%	96%	96%
Main Canal	0%	0%	11%	12%	43%	84%	95%	99%	99%	99%	99%	99%	99%	100%	99%
Division Box	0%	0%	0%	0%	0%	0%	0%	0%	9%	61%	61%	77%	83%	83%	91%
Miscellaneous Works	0%	0%	0%	0%	1%	2%	2%	2%	2%	13%	13%	41%	41%	41%	41%
(2) Procurement Works	0%	0%	0%	0%	13%	13%	13%	50%	50%	50%	50%	50%	50%	50%	97%
(3) Installation Works	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
(4) Total	1%	1%	8%	10%	36%	64%	72%	81%	83%	86%	87%	88%	88%	89%	96%

Source: JICA Project Team

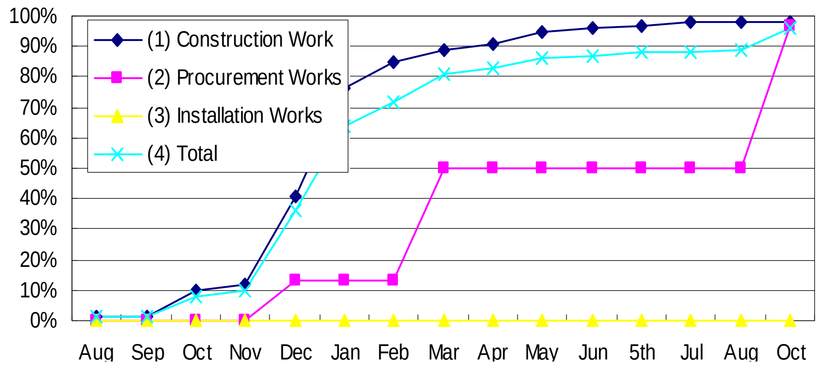


Figure 4.3.4 Progress of the Construction in Ilan (as of End of October 2014)

4.4 Field Canal Construction

The construction of field canals was entrusted to Gode Kelafo Irrigation Development Project Office (GKIDPO) provided with fuel from JICA team. The memorandum of understanding for the construction by the GKIDPO was concluded on 24th June 2013. However, GKIDPO handed over his machines such as loader, grader, dump truck, water truck to Gode council two years ago, complying with the instruction from the zonal chairman. Though GKIDPO has been trying to retake the machines from the council after the memorandum made, the zonal chairman and the council have given no answer to the office.

On 15th January 2014, zonal chairman finally stated that machines could not be returned back to the office. At that time, the GKIDPO did not have machines which were supposed to deploy for the construction of field canals. This issue was then shared with MOA, SLCRDB and Gode woreda administration office. On 25th January 2014 Gode woreda administration offered to JICA team that the Woreda administration office could help the project for the sake of the 4 kebele beneficiaries and construct field canals instead of GKIDPO given the fuel/lubricant and technical assistances by the JICA team.

Having taken time for availing one grader returned from the council this time to Gode woreda administration office, field canal construction was finally commenced on 14th February 2014. However, since the sole available machine was a grader, embankment work could not be done requiring excavation of soils from borrow area, transportation of soils to the construction site and embankment and compaction of the soils. Therefore, the arrangement had covered only Godiray and Hididole sites and ended on 7th March 2014 since the work was rehabilitation by nature, namely, excavation and dreading of silted soils in the existing field canals.

Finally field canal construction started on 14th February 2014 at the Godiray site with a grader.

Faced with this problem the Team issued a letter to GKIDPO on 30th March 2014 stating that; 1) the Team will provide fuel and lubricant oil for the contractorøs machineries within the maximum price of one million Birr (ETB 1,000,000), and 2) the Contractor will transport soil materials necessary for constructing the field canals from borrow areas to the respective places of field canals; namely, the contractorøs work covers up to the dumping of the soils while the remaining work such as spreading, water-content adjusting, compaction and shaping into ditch form are left out to the GKIDPO.

Responding to the above letter, on 28th April 2014, MOA issued a letter to the JICA team, saying that MOA would think there should be a difficulty for the GKIDO to complete the field canals of Hididole and Ilan sites taking into account their capacity, and therefore there should be the contractorøs involvement not only in transporting the soils to the respective places of filed canals but also up to completing the filed canal construction.

With above recommendation given to the JICA team, the Team had discussed with the Contractor engaged in constructing the irrigation facilities other than the field canals. Through the discussions made, both sides, the JICA team and the contractor, have come to an agreement on 5th May 2014 for the field canal construction

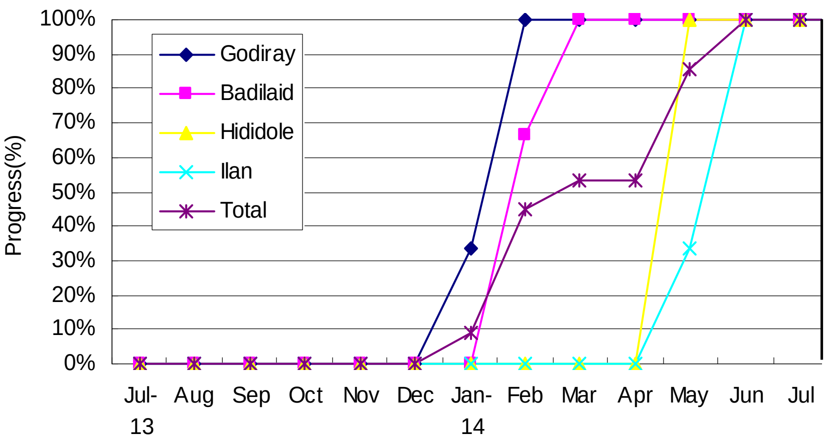


Figure 4.4.1 Progress of the Field Canal Construction

in Hididole and Ilan with a contract price of 2.69 million Birr as the rental machineries, fuel and lubricant fee. Accordingly, all the field canal construction for Hididole and Ilan sites was completed in mid June 2014 (see Figure 4.4.1).

4.5 Procurement Works for Pump and Generator Facilities

Procurement works requires the contractor to procure such major items as 16 pumps, 16 motors, 4 generators, and steel pipes and necessary appurtenant items including spare parts, valves, distribution boards, control panels, power cables, etc. This procurement works have also been very much delayed. In fact, of the procured items by the contractor, all the 4 generators were rejected because they were not in conformity with the technical specifications, or rather they were faked products similar to Cummins UK generator. Following section reports the progress and result of the procurement works.

4.5.1 Proposed Specification of the Pump Facilities

Regarding procurement works, since the contractor had not submitted the specification and product information, the JICA team officially instructed the contractor to submit it on September 13, 2014. However, the contractor still had not submitted it for the next 2 months. Therefore, the team again instructed the contractor to submit on November 23, 2014, and then the contractor offered some proposals. However, JICA team rejected them and further instructed the contractor to propose other better products according to the technical specifications of the contract.

After a series of discussions with the contractor, the contractor officially proposed CAPRARI pump (Italy) and Cummins Power Generation (UK) generator on December 12, 2014. The contractor further submitted the specifications of Cummins Power Generation (UK) C150D5 on December 19, 2014 and then submitted the specification of CAPRARI pump MEC-AZ3-125A on December 21, 2014 as briefed below. The team had scrutinized those specifications with reference to those specified in the technical specifications, and finally approved the proposed procurement.

【Pump, Motor and Generator Specification Proposed by the Contractor】

Pump	: Caprari
Model	: MEC-AA3/125
Origin	: Italy
Flow	: 60 lit/sec
Total head	: 24.5m
Pump type	: Single head pump
Shaft power	: 19.8 KW
Motor (Origin)	: Italy
Normal speed	: 1450 r/min
Number of poles	: 4
Tropical treatment	: withstand against high temperature
Generator	: Commins
Model	: C150D5 (120KW/150KVA)
Origin	: UK
Engine	: 4 cycle, in-line, turbo charged, 3 phases
Cooling system	: Water cool
Tropical treatment	: withstand against high temperature

4.5.2 Shipping of the Pump Facilities

1) Process of Shipping

On March 15, 2014 the Contractor submitted the shipping documents including bill of loading, which is a condition for interim payment of the procurement works. As bill of loading had been issued, JICA team thought all the procurement items had been already loaded on the ship and would leave for Djibouti soon. The Team several times requested the contractor to inform when the ship would arrive in Djibouti. However, the Contractorøs reply was changed many times. On May 21, 2014 the Contractor officially informed that the containers had been delaying on travel due to some unexpected conditions such as wind effect, etc.

On June 11, 2014, the Contractor officially informed by a letter that he changed the transistor from THIO INTERNATIONAL FZE to GREEN CARE INTERNATIONAL FZE (the Green Care). The reason why he changed was that THIO INTERNATIONAL FZE failed to deliver on time and refused to give the clear information to the Contractor. According to the agreement the Contractor attached on the letter, the contract between the Contractor and the Green Care was made on May 15, 2014.

The Contractor has not given important information timely to the JICA team. Further worse, given above two facts at almost same time, the Team came to an understanding that the Contractor intentionally gave wrong information to hide the fact that the container must still have had stayed in a port or just left at the time of May 21, 2014. This is because only 6 days from the agreement done to the shipment is not enough, and further worse the Contractor has not submitted the bill of loading, which is arranged this time by the Green Care, despite several times instruction from the Team as well as from the JICA office.

2) Arrival of the Pump Facilities

On June 29, 2014 the Contractor informed JICA team that the containers had arrived in Djibouti. On July 9, the Contractor submitted JICA office the relevant documents such as truck way bill to clear the items by duty free, and at the same day JICA office requested MOFA for necessary arrangement of duty free import. By this time, however, the bill of loading was not still included in the documents submitted by the Contractor. Therefore, JICA team further instructed on July 15, 2014 the Contractor to submit it immediately and as soon as possible. The Contractor replied that the Green Care kept it and would submit photocopy after having received the document from the Green Care.

3) Tracking of the Pump Facilities

On the other hand, JICA team tried tracking containers by using container numbers indicated on the track way bill. The tracking record indicated the following; namely, the first two containers had been loaded at Huangpu, a port in China. Therefore on July 22, 2014, JICA office inquired the Contractor to clarify what was happening referring to the discrepancy between the documents submitted by the Contractor and the port loaded. In addition, JICA office further instructed the Contractor to submit the bill of loading document at an earliest possible time.

Table 4.5.1 Tracking Record of Containers

Container No.	Date of Loading	Port of Loading	Transit	Date of Discharge
MSKU6793340	May 22,2014	Huangpu, Chain	Nansha (China), Malaysia	June 23, 2104
MRKU8380507				
MSCU5800110	June 23, 2014	Ancona, Italy	Greek, Oman	July 22, 2014

Source: RREP Team Survey

On August 1, 2014, the Contractor replied to the inquiry about the containers as; the problem was lack of the information between the Contractor and the Green Care, when the unloading of the materials from the original rented containers and reloading of the materials into the Green Care own containers for the purpose of saving cost. According to the information from the Green Care, the three containers by which the materials were shipped were WECU2043510, MRKU6934900 and MRKU8782661. After the arrival of the materials at Djibouti, the material were transferred from the rented containers to the Green Careös own containers (MSKU6793340, MRKU8380507 and MSCU5800110) to avoid the cost of container deposit and containersô demurrage for cost minimization.

Though above explanation could not satisfy the JICA team, the three containers anyway passed Jijiga custom clearance office on August 19, 2014. On August 21, 2014, the three containers had arrived in Gode town and the procured equipment and materials were unloaded on the following day, August 22, 2014. JICA office and the Team checked the condition and technical information for the arrived equipment with the manuals, product stickers/plates and others. Then, it was found that some of the products, especially the generators procured, could not be in accordance with the technical specifications specified in the Contract.

4.5.3 Inspection Result of the Procured Equipment

1) The Generators (4 Sets)

The generators, which the Contractor proposed before the procurement for the Engineerös approval, were Cummins Power Generation UK C150D5. Regarding the technical specifications, as the Team already confirmed before the procurement, this model is in conformity with the requirements specified in the technical specifications of the Contract. Though the stickers on the procured product mention Cummins Power Generation UK C150D5, actual procured generators were not the genuine product in view points below, and therefore the procured 4 generators were rejected:

- ✓ The procured products were of different shape from the genuine product (see the photos below). Further, this C150D5 model has not been manufactured in UK since one year ago, and instead the remodeled product is manufactured in India at present. Therefore, the product the Contractor proposed is old type and must have been manufactured on or before 2013 year. However, the procured products were manufactured on April 2014 according to the product stackers on them. Therefore, it cannot be understood that the procured products were manufactured in UK in April 2014.
- ✓ Explanation by the supplier to the Contractor about assembling of procured generator was as follows; ñfor the generator assembled here in Italy and other country, due attention is given for the engine part since it is the main part of the generator which helps to determine the origin and type (brand) of the generator. Since our generatorös engine is Cummins UK, the generators origin is said UK origin. The remaining parts may be from different parts of world.ò Against this statement, it was rather indicated that the procured product was not the C150D5 manufactured by Cummins Power Generation UK since the Cummins Power Generation UK does no longer manufacture such product in Italy according to information from a regional distributer of the Cumminsô products.
- ✓ Regarding the engines, since all the serial number plates have been removed, JICA team could not identify the actual engine model and the product maker from the product. However, from the attached manual, it was found that the engines were manufactured by Dongfeng Cummins Engine Co., Ltd. (a Chinese maker which is a joint venture with Cummins to produce the engine) with the injection pump part by Asimco Tianwei Fuel Injection (Beijing) Co., Ltd (Chinese maker). Therefore, it was concluded that the engines were not the product of Cummins UK. In addition, the Team confirmed on September 22, 2014 that one of the serial number plates on injection pump part, which was painted and was found after scratching during the inspection on September 11, 2014, had been removed by someone.
- ✓ In addition, though there was a logo STAMFORD on the top of alternator of the procured products, it did not have the serial number sticker and product sticker on it. Therefore, it was concluded that the alternator should be a faked STAMFORD. Regarding the stickers of the

generators, there were many different points from genuine products and there were also spelling mistakes on the stickers. Further, most of the main parts did not have necessary serial numbers, and some of the product plates had been removed. It means that it is impossible to order necessary parts for replacement, when the part needs to be replaced.

✓ With above situation, JICA office and the Team contacted Cummins Power Generation to confirm whether procured products are genuine one and discussed with concerned people several times. On September 18, 2014, JICA office and the Team conducted joint inspection with one technician who came from EBG (Equatorial Business Group PLC), the official dealer for the Cummins products in Ethiopia. Based on the inspection result, EBG certificated that procured product was not genuine product. In addition, Cummins South Africa Pty. Ltd issued a letter to JICA office on November 6, 2014, stating that the procured generators are not authentic to the original Cummins model.

Left photos show the genuine EBG generator while the ones which arrived in Gode shown in right photos show different parts from the original one.

Given the above findings, the 4 generators were rejected and JICA office instructed the Contractor to replace them with genuine products within 14 days according to the Contact. The Contractor obeyed the instruction, and procured and delivered 2 generators of Cummins C150D5 model, which were available at EBG in Addis Ababa at that time. However, the rest of the generators, 2 numbers of the Cummins model C150D5 generators, could not be procured by the Contractor since the model was not available within Ethiopia. Therefore, the 2 generators were eliminated from the Contract, and it was decided that the JICA office is to procure directly.

2) The Pumps and Motors (16 Sets)

Regarding the country of origin for the pumps and motors, there was no certificate of origin issued by the chambers of commerce in Italy. The pumps were manufactured by CAPRARI; the motors were manufactured by SEIPEE and assembled by Green Power System s.r.l according to the information provided by the Contractor. These companies have the office and factory in Italy. Therefore, the Team inquired Green Power System s.r.l whether the procured products are genuine by serial numbers of the products. According to the reply from them, all the products were found to be genuine product. Therefore, the pumps and motors have been accepted.

The controller for the pump is STARDELTA produced by IDROFOGLIA, which is an Italian maker to produce pump irrigation system. This controller is often used with CAPRAI pumps and is in conformity with the requirement specified in the technical specifications of the Contract according to the technical information on the attached manuals. Therefore, the controllers have also been accepted. Note that actual operation will be confirmed during the trial operation after the installation of the pumps, motors together with the controllers at the sites.

3) Pipes and Valves

There was no technical information and documents on the pipes to confirm whether they are as per the requirements of the technical specifications. Therefore, the Team conducted material test such as chemical compassion test, strengthens test and Zinc (galvanized) coating quality test. The test results were acceptable level, with a concern of carbon content, in terms of strength of the material and coating quality according to the JIS standard on galvanized steel pipes as in the following tables:

Table 4.5.2 Chemical Composition on Galvanized Steel Pipe

Particular	C (%)	Si (%)	Mn (%)	P (%)	S (%)
JIS G5452	-	-	-	< 0.040	< 0.040
Result	**3.190***	0.333	0.230	0.038	0.000
Judgment	-	-	-	accepted	accepted

Note: steel pipe usually contains less than 2% C, above which welding becomes difficult.
Source: JICA Team's Survey

Table 4.5.3 Tensile Test on Galvanized Steel Pipe

Particular	Thickness	Tensile Strength	Elongation (%)
JIS G5452	Over 5mm up to and incl. 6mm	-	< 22
Result	5mm	462	10.25
Judgment	-	-	accepted

Source: JICA Team's Survey

Table 4.5.4 Zinc (galvanized) Coating Quality on Galvanized Steel Pipe

Particular	Thickness	Average thickness of coating (mm)	Total weight of coating (g/m2)
JIS H 8641	More than 5 mm of steel	> 69εm (0.069mm)	> 500
Result	5mm	0.10mm	Ave. 647 per one side
Judgment	-	accepted	accepted

Source: JICA Team's Survey

On the carbon content, it was found the composition exceeded 3%, indicating difficulty of welding the pipes (see table below). The Contractor plans to connect pipes by welding and not by mechanical joint, and therefore has not procured such joint accessories. Hence, the pipes were accepted only on condition that the Contractor can demonstrate enough welding quality for joining parts, or otherwise supportive mechanical joints have to be provided by the Contractor. For the valves, they were found within the requirements specified in the technical specifications according to the figures engraved on the products, thus accepted.

4.6 Design Changes

On the course of the implantation, beneficiaries and in cases the Contractor requested the JICA team some design changes on several facilities including irrigation command area of Hididole site due to topographic condition, site construction condition, etc. The JICA team has evaluated the appropriateness of the change from engineering point of view, and undertaken the following major design changes.

Table 4.6.1 Major Design Changes

Item	Site	Original and Changed Design	Reason
(No.1) Treatment of a Gully	Ilan	Original: Retaining wall (L=50m, Gabion) Changed: Embankment for the Gully (L=200m)	To protect the main canal (No.0+145.0-195.0) from a gully, the Team designed the retaining wall and gabion originally. Due to the shortage of the retaining wall materials and masonry labors, the Contractor requested to change the design to pile up embankment on the gully. The Team has judged the appropriateness of the change.
(No.2) Drainage Method Change	Ilan	Original: Drainage pipes (D=1.0m x2) Changed: Excavation of the drainage (L=2,000m)	Surface stream water comes into the beneficiary area during rainy season. To protect the main canal and beneficiary area from this water, the Team designed a drainage pipe (D=1.0m x2) through the main canal at the No.0+535.0. The Ilan beneficiaries requested to change the design to excavate the drainage (L=2,000m) instead of the pipes. The Team has judged the appropriateness of the change.
(No.3) Change of the Pump Place (see figure below)	Godiray Badilaid	Pump base location change from the original lower position to a higher position	The Team designed the pumps at the location where government pumps were previously placed. Due to the successive two years flooding, the beneficiaries in Godiray and Badilaid requested the Team to construct enclosed high retaining wall to protect the pumps from flood. Even if the enclosed wall construction were done, seepage through the wall would damage the pumps. Therefore the Team re-designed the pump base level to a higher place still operational within the suction head's allowance.
(No.4) Change of Irrigation Area	Hididole	End part of the irrigation area was cancelled and instead moved to the area located at north-eastern side.	The beneficiaries raised that the end point of the original irrigation area may have difficulty of getting irrigation water since there are number of small hills in and around the area, Therefor, the Team made a design change that the downstream area, the area after Division Box No.6, be cancelled, and instead be compensated by taking such measures as: 1) placing the area in between the beginning point of the irrigation area and the existing old main canal into irrigable one, and 2) extending the field canals to some extent whereby enlarging the irrigation area.

Source: RREP Project Team

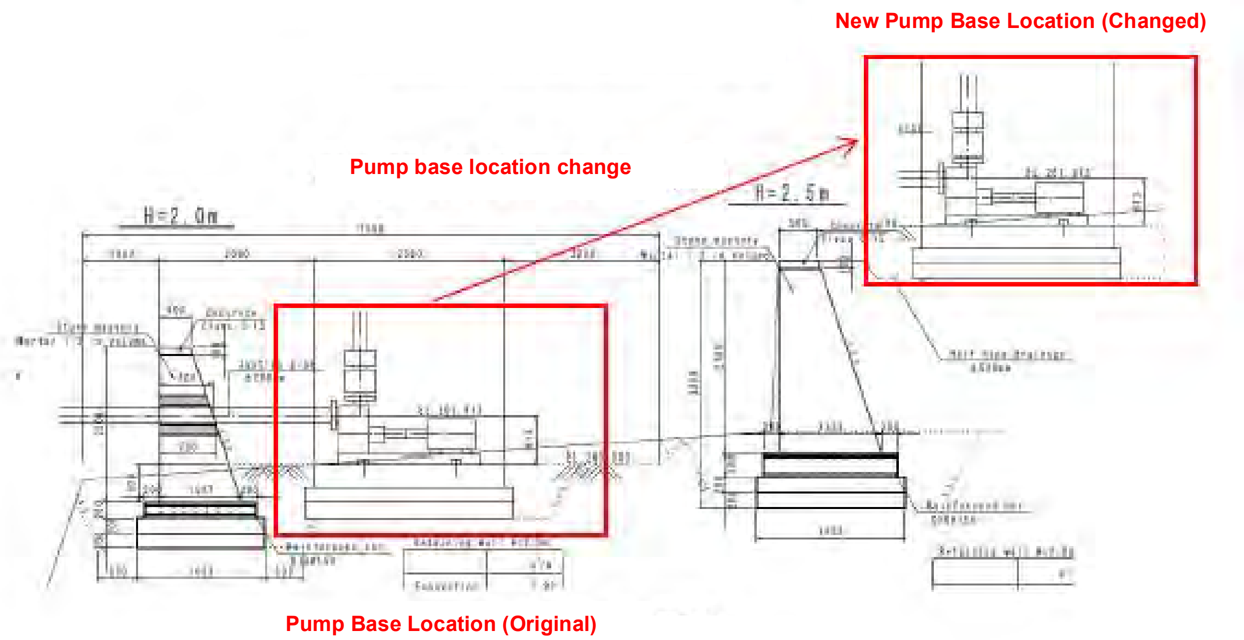


Figure 4.6.1 An Example of Major Design Change (Change of the Pump Base, Godiray and Badilaid)

Source: JICA Project Team

4.7 Contract Cancellation and Final Inspection of Performed Amount

The JICA Ethiopia office had given a notice to the contractor that the contract shall be cancelled if the construction would not be completed by 31st October 2014. In the result, the construction works has not been completed by that day. Therefore, official personnel of Gode, MOA, Somali Department of Agriculture, the contractor and JICA Team had a meeting to settle the situation on 4th November 2014. At the meeting, the official personnel of Gode claimed immediate cancellation of the contract and completion of the construction works under the direct management of the JICA Team. The JICA Ethiopia office issued an official letter informing of the contract cancellation as of 5th November 2014.

Since the security unrest around Gode was observed, inspection for the cancelation and handover of the facilities and construction sites was postponed and it was implemented on 18th and 19th of November after the notice of safety confirmation from WFP. This inspection was done under the supervision of Zone Administration Office, Woreda Administration Office, Woreda LCRDO and Kebele Chairman. The JICA Ethiopia office, the JICA Team and the contractor confirmed completed amount of the construction works, and conditions and quality of the facilities. Their comments were recorded as an inspection result with signatures of all of the participants of the inspection and the handover was completed.

Final completion rate of construction works was 89% as a whole, and detail completion rates were 96%, 78% and 0% for construction works, procurement of pump facilities and installation of the pump facilities, respectively (see Table 4.7.1). In terms of monetary amounts, total amount, construction works, procurement of pump facilities and installation of the pump facilities were 27,052,759 birr, 20,583,026 birr, 6,469,733 birr and 0 birr, respectively (tax exclusive). Final payment to the contractor and remained construction cost are described in Table 4.7.2. The amount of contract was 34,850,000birr (tax inclusive), while the amount of final payment was 29,776,891 birr (85%), which means that the remained one is 5,073,109 birr (15%). Moreover, the contractor has already paid the penalty, consequently, the final payment rate, 85%, is less than that of final completed amount of construction, namely, 89%.

Table 4.7.1 Final Completion Amount by the Contractor (% and Amount of Money)

Works	Competed (%)	Completed in Birr (without VAT)
Construction	**95.97**	**20,583,026 Birr**
Godiray	91.54	1,454,584 Birr
Badilaid	79.36	1,497,084 Birr
Hididole	98.14	8,245,947 Birr
Ilan	97.94	9,385,411 Birr
Procurement	**78.33**	**6,469,733 Birr**
Installation	**0**	**0 Birr**
Total	**89.27**	**27,052,759 Birr**

Source：JICA Team

Table 4.7.2 Final Payment to the Contractor and Remains of the Construction Cost

Particulars	Procurement (Settled)	Construction	Installation	Total
Contract price (with VAT)	**9,498,828**	**24,665,718**	**685,454**	**34,850,000**
Contract price (without VAT)	8,259,850	21,448,450	596,045	30,304,345
Amount of the Completed Works (without VAT)	**6,469,733**	**20,583,026**	**0**	**27,052,759**
Completed percentage	78.33%	95.97%	0.00%	89.27%
Penalty amount for the delay (without VAT)	351,137	121,196	37,160	509,493
20% of the remaining work base on the contract 13.4	358,023	173,085	119,209	650,317
Total amount of penalty $ 20% of the remaining work	709,160	294,281	156,369	1,159,810
Amount of Completed Works after reduction of penalty & 20% of the remaining work (w/o VAT)	5,760,573	20,288,745	-156,369	25,892,949
		20,132,376		

Particulars	Procurement (Settled)	Construction	Installation	Total
VAT	864,086		3,019,856	3,883,942
Total of payment (with VAT)	**6,624,659**		**23,152,232**	**29,776,891**
Payment				
Advance payment (with VAT)	2,849,000	7,399,000	0	
1st Interim payment (with VAT)	1,899,000	7,399,000	0	
2nd Interim payment (with VAT)	718,566	4,933,000	0	
Final payment (with VAT)	**1,158,093**		**3,421,232**	
Balance (with VAT)	**ETB 2,874,169**		**ETB 2,198,940**	**ETB 5,073,109 US$ 255,315**
2 x Generators (estimation)	**ETB 2,432,377**			**@19.87**

Source：JICA Team

4.8 Work under the Direct Management after the Cancellation

4.8.1 Procurement of Generators by the JICA Ethiopia Office

The JICA Ethiopia office refused to receive the generators procured initially by the contractor, since it was revealed that they were not genuine products according to the inspection. The JICA office gave an instruction to the contractor to re-procure 4 (four) genuine products within 14 days based on the contract. The contractor agreed on this matter and purchased two C150D5, which had been kept by a qualified dealer of Cummins generator in Ethiopia, namely, Equatorial Business Group (EBG), and transported them to Gode. Remaining two generators have not been found in Ethiopia, and it was decided that the JICA Ethiopia office would procure them directly.

Bidding of generators for re-procurement by the JICA office was conducted on 16th December 2014. However, one of the participants was disqualified, since the company proposed generators using made-in-China Cummins engines, which did not satisfy the stipulated technical specification. At the re-bidding on 5th January 2015, EBG tendered for the bidding at lower price than predetermined one and the company satisfied the technical specification. Since there was a condition that the procurement period was about 90 days after L/C issuance, it was difficult to complete the procurement by the end of March 2015, the end of Japanese financial year.

Therefore, the JICA office requested EBG to shorten the procurement period during negotiation. The negotiation took place over weeks and finally it was found that the EBG could not procure the specified generators by the end of March 2015 including installation and test run. Therefore, both sides agreed that the EBG provide two sets of C175D5 available in their stock and similar to the originally intended C150D5 with the output of 175 KVA instead of 150 KVA. The procurement contract was concluded with this C175D5 model and the EBG started arrangement of the shipment to Gode.

The generators including distribution boards, cable and the other accessories were delivered to Gode and unloaded at the Godiray and Badilaid schemes to install such facilities by end of March 2015. Regarding the installation works, while EBG had responsibilities for installation of the generators and the distribution boards procured by EBG and cable works from the generators to the distribution boards, JICA team installed the control panels and conducted cable installation works from the distribution boards to the motor of pump panels.

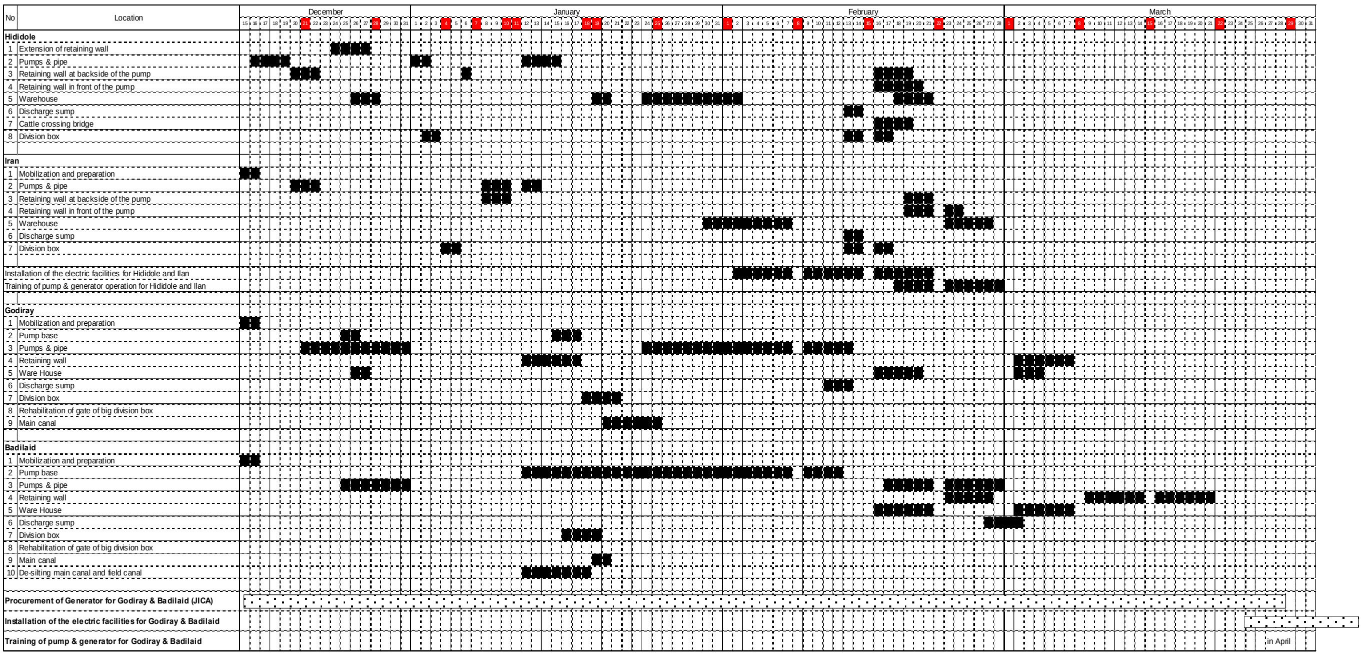
4.8.2 Direct Construction Works by the JICA Team for the Remains

The JICA Team started the direct construction works on the following day after the handover of the facilities and the construction sites was completed. It was needed to remove deposited soil due to floods for pump setting, and sediment removal was started on 20th November 2014 in collaboration with the beneficiaries of Hididole and Ilan. For the purpose of securing materials handed over from the contractor, installation of door and windows, and construction of roof for a storehouse were implemented at the same time.

In the 1st week of December 2014, procurement of necessary equipment, especially those which could not be procured in Gode, such as pumps, pipes and other materials for generator setting, was made in Addis Ababa. In addition, tools for construction and welding machines were purchased, and other necessary tools and construction survey machines were arranged by rent. All of the materials were transported to Gode from Addis Ababa in the 1st and 2nd weeks of December 2014.

After the cancellation of the contract, the JICA Team has started negotiation with some carpenters, welders, pipe layers and so on available in Gode for the remaining works, and confirmed their current workloads and technical levels. Upon the negotiation between the team and workmen, necessary contracts were made. It was in fact decided that the payment be done according to not only daily base, but also how much amount the workmen have finished. For example, as for construction of masonry retaining wall, the monetary amount was paid based on the amount of completed works (m3) and the specified unit price pre-agreed. According to the contracts, the employed workmen undertook construction by using materials which were provided by the JICA Team.

Table 4.8.1 Schedule of Direct Construction



The direct construction works were started on 11th December 2014. The key works of remaining construction, namely, pump and pipe settings, have been undertaken mainly with other minor works together depending on the progress of the overall works. The pipe installation started with welding of pipe and flange, and the work was completed by the end of December at four sites. After that, pipe setting, valve installation around the pumps and pump installation were commenced at Hididole site and followed by other three sites.

By the end of January 2015, above works were completed at Hididole site and Ilan site, and installation of electric equipment such as generators with distribution boards and control panels was started since early February 2015 at those two sites. The construction of the two sites had been completed in the 1st week of March 2015 with test-run included. During the test-run, some leakage and minor breaches of canals happened and with a help of the beneficiaries necessary repairs were made.


Scenes of direct construction works:
Pipeline setting from pump to outlet (left) and installation of pumps and motors (right)


Electric arrangement for motor & pumps had been done (left photo), and test run was started lifting the water to the discharge sump.

In the Ilan site, since the embankment canal had seriously collapsed at division box (DB) No.1 due to big water leakage and accordingly DB was also damaged, they were needed to repair and reconstruct. The cause of this problems could be attributed to that water entered from edge of the stone pitching, which was located at up & downstream of DB, and flowed under the stone pitching and along the wall of drop structure through basement of DB, and then flowed out from edge of the drop structure.

Water leakage from DB No.1 in Ilan;
Amount of water leakage increased quickly after starting its leakage, then canal embankment collapsed.

Although it was found that water flowed between structure such as pitching, division box and drop structure and soil, it may have resulted from that 1) mortar filling of stone pitching (wet masonry) was not enough, especially part between soil and stone, 2) stone pitching was constructed on incompacted soil or without removal of loose soil, 3) compaction of backfill soil around DB and drop structure may have not been enough.

Since same problem would possibly occur at the other DBs in Hididole and Ilan, JICA team decided to conduct strengthening works for all the DBs, such as grouting of cement milk to the foundation of the DBs, adding cut-off concrete at edge of stone pitching, and plastering of pitching were implemented. Since precipitation in April and May 2015 was much more than that in the same months of the previous years, vehicles were unable to access the project sites of Hididole and Ilan until middle of May 2015. Thus, the strengthening works started from the middle of May 2015 and completed around the beginning of July 2015. After the completion of the works, water running test was conducted again on 10 of July, 2015 in Ilan and on 11 and 12 of July, 2015 in Hididole respectively. Thus, the quality of DB was improved by JICA team.

For the Godiray and Badilaid sites, pump installation was started at mid February and completed within March 2015. However, delivery of generators were delayed and in fact arrived at those two sites in late March 2015. The installation of the generators, cables, distribution boards and control panels was commenced in late March and completed in April 2015. However, because flooding occurred in Wabe Shebele River on 23 of March 2015, the pump facilities had to be evacuated from the pump sites. After the flood ended, since river water level was still high due to relatively much rainfall as compared to previous years, re-installation of the pumps and cable work started from the middle of May 2015 after the river water level decreased.

4.8.3 Flooding of the Wabe Shebele River and Repair Works and Additional Improvement

It had heavily rained in Gode on 23rd March, 2015 and water level of the Wabe Shebele River started increasing from the afternoon. It finally reached to the level totally covering the pump facilities in all the project sites. The kebele chairmen of Godiray and Badilaid informed JICA Team of flood condition and requested to take necessary measurements to secure the pump facilities against the flood. The community people in fact confirmed that the river water was reaching to danger level.

JICA Team went there on foot from the place a vehicle could not move, because the earth road became too muddy to drive due to heavy rainfall in Gode. After confirming the conditions in the sites, JICA team and the community people started to remove the pump facilities, and finally all the pumps were evacuated safely. It took 6 hours to evacuate them at each site in Godiray and Badilaid, because access road from the pump sites to the warehouses was not constructed yet, and the entire pump facilities should be evacuated.


Godiray before and after the flood on March 23, 2015; Water level rose by about 7 m.

On the other hand, the pump facilities at Hididole and Ilan were flooded, because the WUA members had not taken the training for the evacuation to that date and were not able to evacuate the facilities by themselves. In addition JICA Team was not capable to reach there while the Team tried to evacuate the pump facilities in Godiray and Badilaid. After the flood passed, JICA Team started maintenance of the pump facilities waterlogged in Hididole and Ilan. The motors were removed from the pumps, then washed by clean water, dried up, coated with grease and reassembled. Regarding the pump, only oil for shaft was replaced. After finishing the maintenance, the motor was re-installed to the pump.

Operation test was conducted after reconnecting the motors to the pumps and it was confirmed that all the motors waterlogged once smoothly started functioning. After the confirmation of the motor operation test, all the motors were again removed from the pumps and stored at the warehouses in Hididole and Ilan. This is because the river water level was still high and the motors were not in need until completing maintenance works of main canals and strengthening works of Division Box.

Re-installation of the motors to the pumps was again implemented at the sites of Hididole and Ilan in July 2015.

Concrete pavement was constructed for improvement of the access road. In addition, retaining wall was extended and raised for flood .protection.

From the lessons learnt from this flood, method of evacuation should have been changed. Community members should evacuate only the electric equipment motors after removing from the whole pump facilities in order to save time and effort. Only replacement of oil is required for maintenance of the pumps even if they would be flooded and this is not hard work and does not take time and cost.

In order to evacuate the motor smoothly, slope part of the access road was paved with concrete for improving access from the pump sites to the warehouses. Besides, since each motor is about 180kg and hard to be carried and the access road is rapid upslope, especially in Hididole, mechanical winches attached to the carts were installed in the four sites.

Further, it was found that a part of the river flow returned back to the area of the pump sites due to the shape of river in Badilaid, Hididole and Ilan. This reverse flow stays and brings much sedimentation around the pump sites. Since removal of sedimentation was hard work and required much time, it was needed to prevent the sedimentation from flowing into the sites as much as possible. Therefore, the retaining wall, which was constructed for the purpose of fixing the pipe, was extended to surround the pump sites and heightened to avoid inflow of water to the pump sites by flood.

However, it is still necessary to evacuate the motors as the original design concept, when flood comes because the retaining wall was constructed by wet masonry and it is difficult to completely prevent water from entering through joint. Those additional works such as improvement of the access roads, installation of the mechanical winches, expansion of the retaining wall, started from the middle of April and completed on July 2015.

4.8.4 Inspection and Handover of the Project Schemes

JICA Ethiopia Office and the JICA Project Team held a meeting with the Ministry of Agriculture (MOA) to discuss the handover process on 2nd June 2015. As the result of the meeting, they concluded that the irrigation scheme should be handed over to MOA and Somali Livestock, Crop Rural Development Bureau (SLCRDB), which are the counterpart organizations of the Project. In addition, the JICA Project Team, MOA and the JICA Ethiopia Office confirmed that the irrigation scheme should be transferred to the local government in Gode from MOA and SLCRDB.

The JICA Project Team and JICA Ethiopia Office also recommended that Gode Kelafo Irrigation Development Project Office (GKIDPO) should take over the irrigation scheme because they are responsible for maintenance and operation of the irrigation facilities in Gode area; yet, SLCRDB makes a final decision whether GKIDPO takes over the irrigation scheme or not. The following are detailed reasons of the above recommendation:

- GKIDPO is a governmental organization specialized in management of irrigation schemes in West Gode, South Gode, and Kelafo with approximately 80 staff in Gode.
- GKIDPO has a number of construction machinery such as backhoe, loader, grader, and dump truck. They have enough capacity to manage civil engineering work such as excavation and

repair of canals.

- A wide range of experts are working for GKIDPO such as electronic technicians, machinery experts. These experts are able to manage pump facilities including pumps, generators, and operation panels.
- An irrigation scheme, developed by West Gode Irrigation Development Project, was also handed over to GKIDPO and GKIDPO conducts operation and maintenance of the irrigation scheme.

On 15th July 2015, MOA, JICA Ethiopia Office, and the JICA Project Team had a meeting with SLCRDB, and they agreed that JICA handed over the irrigation scheme to MOA and SLCRDB. SLCRDB explained although it was still necessary to discuss handover process at local level with the regional President Office, GKIDPO should have the responsibility for the irrigation schemes, and SLCRDB has responsibility for agricultural development. In addition, SLCRDB expressed they would prepare a MOU to clarify responsibility of each stakeholder. Also, SLCRDB showed their intention that they would like to take over the irrigation scheme from JICA and handover to Gode at once. The JICA Project Team, MOA, and SLCRDB confirmed that they conduct a joint inspection the irrigation scheme before the handover.

On 16th July 2015, the JICA Project Team, JICA Ethiopia Office, MOA, and SLRDB had a meeting in Gode. The following parties also attended the meeting and discussed the handover process: Shabele Zone Administration Office, Gode Woreda Administration Office, Gode Woreda Livestock Crop & Rural Development Office (GWLCRDO). SLRDB explained the handover process which was discussed at the meeting on 15th July 2015 (described in the above paragraph).

During the meeting, the stakeholders in Gode insisted that water running test and pump operation test should be done as condition for taking-over. The JICA Project Team, MOA, SLCRDB, and JICA Ethiopia Office decided that water running test be included in the joint inspection. Site visiting to confirm the latest condition was also conducted. The JICA Project Team agreed to complete the remaining and repairing works by 27th July 2015 and conduct the join inspection from 27th July 2015.

Since the overall construction works had been completed, final inspection was conducted and issues related to handover of the project schemes were discussed from 27 to 31 of July, 2015 by Ministry of Agriculture, Somali Livestock Crop & Rural Development Bureau, Shabele Zone Administration Office, Gode Woreda Administration Office, Gode Woreda Livestock Crop & Rural Development Office, Gode Kelafo Irrigation Development Office and JICA Ethiopia Office in the presence of JICA Team.

JICA Team explained construction works of each facility conducted by the contractor and team's direct force account work during the inspection. The team further referred to the extra and repair works carried out by the team, for which the contractor has defaulted. In addition, water running test was also implemented during the inspection.

After that, the respective stakeholders discussed issues pointed out at the inspection. Since the beneficiaries in the Godiray and Badilaid sites already irrigated the farmland using pumps provided by the government through the MDG project, sediment was piled up in the main canal making cross section of the canal to narrow. On the other hand, since more than one year has passed since the completion of the main canals in Hididole and Ilan, the side slope partly collapsed due to wind erosion and being passed by livestock. The cross section of the canal has also narrowed because of sediment attributed to sandstorm. Therefore, the stakeholders suggested that the WUA should continuously dredge the sediment and maintain effective areas of the cross section.

Water leakage was observed between the DB No.6 and the DB No.7 during the water running test at the Ilan site. Community members repaired the water leakage; yet, another water leakage was found just ahead the previous water leakage part. This second water leakage was also repaired by the community members. Because of these water leakage problems, the water running test did not cover the last 300m of the canal (total 2,670m). The main reason of the water leakage is small cracks called sinkholes[2] in the canal. Even if there is water leakage in this remaining 300m at the time of irrigation, the community members are still able to cope with the problem. Therefore, the water running test concluded that the canals including the main canal part at the Ilan site were accepted.

Finally, the quality of the schemes has been granted by the stakeholders and all of them agreed on the further handover of the schemes. Responding to this result, JICA Ethiopia office has launched procedures of the handover and finally, Ministry of Agriculture, Somali Livestock Crop & Rural Development Bureau signed the document on 14th August 2015, and the handover of the project schemes has been achieved.

Then, SLCRDB commenced the transfer of the irrigation schemes to the local authority following a prepared handover document. MOA and SLCRDB discussed the local handover process with administration offices of Shabele zone and Gode Woreda. These offices, however, refused to take over the irrigation scheme with the following reasons:

- The handover should be done at the end of December 2015 at the Project completion after follow-up period.
- The irrigation scheme should be handed over with other project equipment such as project cars.
- Inspection of the irrigation scheme should be conducted again before the handover in December 2015.
- The JICA Project Team did not provide enough fuel to irrigate the area of 100ha. The JICA Project Team should provide enough fuel for irrigation of 100ha. Note that the arrangement by JICA was to provide only the start up support in terms of fuel.

Responding to the above requests, the JICA Project Team explained to MOA and SLCRDB;

- The handover of the irrigation scheme was completed from JICA to MOA and SLCRDB. It is now necessary to transfer the responsibility of the irrigation schemes to the local authority soonest possible. Capacity of the local authority should be strengthened through OJT and by feed-backing their operation during the follow-up period.
- The Government of Ethiopia takes responsibility for the irrigation schemes. The JICA Project Team provides technical assistance. MOA and SLRDB should be in the position to manage the irrigation schemes because they already took over the irrigation schemes from JICA. Thus, the JICA Project Team cannot take any responsibility for operation and management of the irrigation schemes even till December 2015.
- Although the irrigation schemes have not been handed over to the local authority yet, Woreda Administration Office strongly requested that the JICA Project Team should operate the irrigation schemes. The JICA Project Team had been operating the irrigation scheme based on a request from Woreda Administration Office. The JICA Project Team, however, decided no

[2] Sinkhole is a sort of cracks or small holes inside canals. These cracks and small holes lead water to outside of canals and cause water leakage. These cracks and small holes are natural condition of earth canals. Particularly, water leakage often happens when first water comes through an earth canal that is not used for a long period. For this reason, it is important to check water leakage carefully when famers use earthen canals at the first time of irrigation season. In case if the amount of leakage water is large, canals should be repaired after water flow stopped.

longer to operate the irrigation schemes according to the reason mentioned above.

- Handover of the irrigation schemes cannot be mixed with the handover of other project equipment such as the project cars. In addition, the irrigation schemes were already inspected and all the stakeholders agreed to proceed to the handover process. Hence, the request on re-inspection of the irrigation scheme is not reasonable at all.
- Providing fuel and the handover process should be separated. Project provides fuel for start-up operation of the irrigation shcemes. The Project does not have any intention to provide fuel for the whole irrigation season with the 100ha irrigable area. Besides, the stakeholders already agreed that the Project provide 3,600 litters to each of the sites when the final inspection was conducted.

The JICA Project Team reported the situation to the JICA Ethiopia Office. Further, The JICA Project Team and JICA Ethiopia Office reported to the State Minister and requested to solve the handover problem. The State Minister considered the hand over problem between state/regional government and the local authority as an internal matter of Ethiopian government. The State Minister promised making efforts on this handover problem.

In the meantime, SLCRDB continued to have discussions with the Administration offices of Shabele Zone and Gode Woreda. SLCRDB informed the JICA Project Team that the handover problem was solved. The JICA Project Team, JICA Ethiopia Office, and MOA members visited Gode to confirm the situation on 22nd October 2015. The irrigation schemes, however, were not handed over to them. It was found that local administration offices still refused to take over the irrigation schemes, newly assigned zone administrator agreed, though. For this situation, SLCRDB had also a discussion with Regional President Office to proceed to the handover process. MOA suggested that SLCRDB should receive the irrigation schemes physically and resume operation of the irrigation schemes due to only a short period of time left in the Project.

Great efforts of Regional President Office moved the Administration offices of Shabele zone and Gode Woreda. They finally agreed to take over the irrigation schemes. On 12th November 2015, the JICA Project Team started a discussion with SLCRDB again. According to the explanation of SLCRDB, they would transfer the irrigation schemes to the GKIDPO, and they needed to make an agreement with Somali Basin Development Coordination Bureau (SBDCB), a higher level organization of GKIDPO. SLCRDB discussed the handover with SBDCB; however, they did not reach an agreement. The JICA Project Team had to consider a next action with SLCRDB.

The JICA Project Team had a meeting with SLCRDB on 30th November 2015, and announced to transfer the irrigation schemes physically to SLCRDB between 7th and 8th December 2015. In addition, the JICA Project Team requested SLCRDB to organize a wrap-up meeting with all the project stakeholders to discuss sustainability of the irrigation scheme as well as responsibility of each stakeholder.

In the meantime of the wrap-up meeting arrangement, SLCRDB and SBDCB had agreed that the irrigation systems were to be handed over to GKIDPO together with remaining construction materials, and tools, spare parts, operation manuals for pumps and generators, keys for equipment, valve handles, etc. Accordingly, the JICA Project Team transferred to GKIDPO those materials together with the parts/ tools at the presence of MOA, SLCRDB, and SBDCB on 6th and 7th December 2015. In addition, the JICA Project Team provided 100 bags of cement and four trucks of sand to GKIDPO for the readiness of future maintenance of the irrigation schemes.

The JICA Project Team also provided 50 shovels and 50 pickaxes to each of the WUAs. These shovels and pickaxes enable the WUA members to maintain the irrigation schemes, especially the earth canals by themselves. The remaining fuel was also supposed to be handed over to each WUA for staring up the irrigation in the next season. The JICA Project Team had handed the remaining of the 3,600 litters of fuel to each of the WUAs at the presence of SLCRDB, SBDCB, and GKIDPO.

4.8.5 Wrap-up Meeting for Gode Irrigation Development Project

The wrap-up meeting was held on 8th December 2015 in Gode after all the handover process had been competed. The purpose of the meeting was to discuss responsibilities of the project stakeholders and sustainability of the irrigation schemes. Almost all the project stakeholders participated in this meeting; JICA Ethiopia Office, the JICA Project Team, MOA, SLCRDB, SBDCB, and GKIDPO. Only the following three organizations did not attend the meeting; Shebele Zone Administration Office, Gode Woreda Office, and Gode Woreda Livestock, Crop & Rural Development Office. Although SLCRDB requested them to attend the meeting, there were no representatives from these organizations.

Chairman (center, Mr Badri Mowlid from SLCRDB) gives the certificate of reward to Mr. Jin, chief representative of JICA Ethiopia Office (right) and Mr. Hirota, Co-chief of the JICA Project Team (left) at the project office in Gode.

The meeting was kicked off by an introduction of the all the participants. The co-chief of the JICA Project Team expressed his appreciation for the counterpartsô continuous cooperation to the Project. He also explained the project activities from the beginning to the end. Chairman, Mr. Badri Mowlid from SLRDB, conferred the certificate of reward to Mr. Jin, chief representative of JICA Ethiopia Office and Mr. Hirota, co-chief of the JICA Project Team.

Following the conferral of the certificate, the chairman made an introduction for the discussion. He confirmed that all the Project stakeholders were aware of the completion of all the project activities. He asked the participants what responsibilities the communities and the governmental organizations should have in order to ensure sustainability of the irrigation schemes.

The manager of GKIDPO started off the discussion with showing appreciation to the Project. He mentioned that all the problems under this Project were finally solved. He explained that he already assigned machinery such as loader and farming tractor to conduct follow-up (maintenance) activities of the irrigation schemes. These machineries will be used for land preparation in Hididole and Ilan as well. He also remarked that follow-up budget had already been submitted to SBDCB; and it is under examination. He stressed that woreda and zonal administrative offices have responsibilities for agricultural inputs, DAs activities, and market linkage of agricultural production.

A senior extension expert from MOA (Emerging Regions Support Directorate) questioned that how JICA can provide agricultural inputs such as seed. This is because not only did the senior extension expert concern the irrigation schemes, but also he concerned agricultural inputs to sustain the irrigation schemes. The chairman clearly responded to this question that agricultural inputs were not provided under this Project, and he emphasized that only the physical facilities were handed over. The chairman, therefore, concluded that agricultural inputs should be concerned after the Project as one of the follow-up activities. The JICA Project Team also pointed out that fuel was provided only for a smooth start-up for the irrigated agriculture covering parts of the fields, and agricultural extension services should be provided by the Ethiopian government including seed and others if needed.

A MDG coordinator from MOA shared his experience of an irrigation project in West Gode. One of the major challenges in the irrigation project in West Gode was peopleôs attitude toward farming. He emphasized on providing of agricultural techniques to the communities. If only the irrigation schemes are provided to the communities, people do not change their mindset toward farming. He also added that the stakeholders should concern the local situation when they provide agricultural inputs. The MDG coordinator finally raised a topic that the government has to think about how the regional authority could provide fuel for the irrigation facilities.

An expert from MOA (Small Scale Irrigation Directorate) commented that key intervention is still necessary even after the construction of the irrigation schemes because the most challenging task is still remaining, which is to ensure sustainability of the irrigation schemes. Commitment of the regional level on follow-up is a key to sustain the irrigation schemes. The expert also noted the importance of comprehensive intervention including peopleôs awareness raising, post-harvest activities, making market linkage of agricultural production, and providing agricultural techniques.

The senior irrigation engineer from MOA (Emerging Regions Support Directorate) mentioned that a key issue was the commitment of woreda level because DAs do not have enough skills. The senior irrigation engineer raised a problem about FTCs (Farmersô Training Center). He pointed out that FTC in the Project site was not active, and it should be activated in the future. He suggested that FTC should be established in the project sites as a model. The FTCs at the project sites could be models for other areas, and the project stakeholders could expand these FTCs to other areas in the future.

The chairman summarized the discussion and shared his idea that the follow-up budget should be provided to GKIDPO because they are the main actor to maintain the irrigation schemes. Therefore, fuel and other activity costs should be included in their budget. He agreed on the importance of awareness creation toward farming. If people do not change their mind, there is nothing to change even if the Project provides the irrigation schemes. He also pointed out the importance of a discussion with woreda and zonal administration offices, which did not attend this consultation meeting, to make the irrigation schemes sustainable.

The chairman further mentioned that a FTC was not working properly because the number of DAs was not enough. The chairman told as a representative of SLCRDB that they would try to work with woreda administrative office to establish a FTC. If a FTC is established successfully, this means that SLCRDB and woreda administrative office also succeed at raising peopleôs awareness of farming. He emphasized the importance of support from Federal level to Gode because the Project stakeholders in Gode have to conduct follow-up the irrigation schemes in order to improve livelihood in the communities.

A program officer of JICA Ethiopia Office agreed on the discussion in the meeting. Yet, he pointed out that a problem is a responsibility of each of the stakeholders. He concerned that nothing would happen after the meeting was over. He addressed that all the stakeholder have to implement what they discussed in the meeting. He also provided a viewpoint that all the stakeholders should contribute to the Project in one way or the others. If this irrigation project fails, all the efforts fail and nothing is achieved even at personal level. Therefore, he expected all the stakeholders to implement what they discussed in the meeting in the future.

The program officer of JICA Ethiopia Office also concerned about security of the irrigation schemes. He was afraid that some items might be missing in the future. In fact, some of the items have been missing and the Project Team had to provide these items again. According to the manager of GKIDPO, GKIDPO has already assigned guards in each project site and they have a plan to send tracks to take all the materials from the sites. The JICA Project Team also suggested that not only the small materials, but also GKIDPO should take care of batteries, fuel, and breakers because these materials will not be provided again once they are missing.

The JICA Project Team also recommended that pump operators in Godiray and Badilaid should give on-the-job training to the pump operators in Ilan and Hididole. This is because pump operators in Godiray and Badilaid already had on-the-job training; whereas, these in Ilan and Hididole did not get on-the-job training at the sites. As such, it will be better off if the pump operators in Godiray and Badilaid conduct on-the-job training at the other two sites for the next irrigation season. SLCRDB has staff with experience in pump operation. They are also able to transfer skills and knowledge of pump operation to the pump operators in Ilan and Hididole.

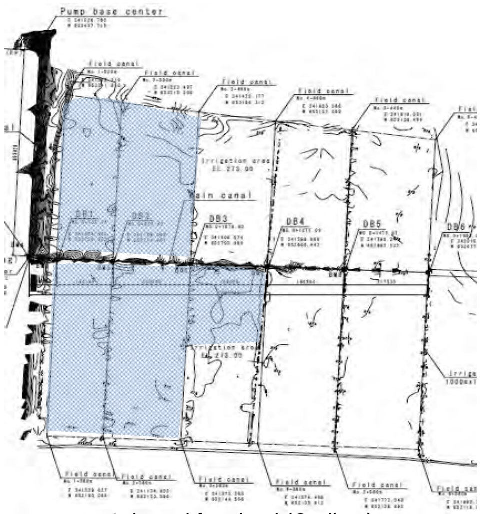
At the end of the meeting, the Chief Representative of JICA Ethiopia Office, gave closing remarks. He mentioned that all the project stakeholders made great efforts on the Project and achieved development of the irrigation schemes. The real challenge, however, is sustainability of the irrigation schemes after the Project. He stressed that operation of the irrigation schemes is a challenging thing. JICA has many experiences in the area of irrigation development in many other countries. Operation of irrigation schemes is always challenging. The chief representative of JICA Ethiopia Office finally commented that JICA would follow-up the stakeholders whether they could manage the irrigation schemes or not.

After the discussion, Mr. Jin, chief representative of JICA Ethiopia Office commented as closing remarks

4.9 Irrigated Agriculture after the Completion of the Construction

At the inspection of the construction works in the end of July 2015, the concerned stakeholders agreed that Woreda Administration Office encourages the beneficiaries to start land preparation and promotes irrigated agriculture in the four sites. Since the president of the Somali Region was supposed to visit the Godiray and Badilaid sites and observe the conditions, the beneficiaries there had started the land preparation from the beginning of August under the strong leadership of the government. The WUAs divided the irrigated areas into several plots for each beneficiary by renting a tractor. Then, the beneficiaries ploughed the land by tractors or manpower and was ready for starting irrigated agriculture.

Cultivation of Land : The community divided the land area by using a tractor owned by Gode Woreda Livestock, Crop and Rural Development Office.



Irrigated farmland (Godiray)

Although the handover of the irrigation schemes had not been completed yet from JICA to MOA and SLCRDB, Gode woreda administration office requested JICA Team to start the operation of the pumps in Godiray and Badilaid where the people completed the land preparation and waited for irrigation water. Since land preparation had not been started in the Hididole and Ilan sites, the office targeted only the sites in Godiray and Badilaid at that time.

Although a responsible government office should usually start the operation of pumps by authority of itself, JICA Team reflected strong demands of the beneficiaries and commenced operation of the pumps as a sort of trial. Operators trained by JICA Team actually and successfully operated the pumps from the end of August 2015 under the supervision of a team member.

The four pumps in each area had been operated 3 to 8 hours per day since 28th August 2015 and the community members had irrigated the area. JICA Team provided 3,600 liters of fuel to each area to make a good start of the irrigation. And then, the WUAs took into account the amount of fuel provided and irrigated 41ha of the farm land in Godiray and 38ha in Badilaid during about one month. It is reported that this first irrigation consumed 2,050 liters of fuel in Godiray and 1,850 liters in Badilaid[3]. It is estimated that when the four pumps are operated, it takes 1.5 hours to irrigate 1ha of farm land and consumes about 50 liters of fuel. Note that it is common practice that farmers irrigate three times a cropping season in this area.

The beneficiaries mainly have cultivated maize in the irrigated farmlands as of the middle of September 2015. Maize has grown well in most of the areas, though the growth has been worse than before in some areas because the people started the irrigation earlier than usual and maize was seriously affected by strong wind. Interviews done before the irrigation started revealed that some farmers showed an interest in intercropping of sesame, haricot beans, etc and maize, which was introduced by JICA trainings; however, most of the beneficiaries practiced mono-cropping of maize. In addition, some farmers actually tried furrow irrigation and application of fertilizer learnt from the training. The growth of maize the farmers applied fertilizer was superior to that without fertilizer.

Then, second irrigation of the areas has been conducted since 21st September 2015. However, soon after the pumps procured by the Project were mobilized, the operation was stopped on 25th September 2015. This is because that although the handover of the Project schemes had been completed from JICA to MOA and SLCRDD in written form, actual handover from MOA and SLCRDD to the local government at woreda level had not yet been accomplished. Since about two months had passed after the final inspection was concluded, JICA Team stressed that if the schemes cannot be handed over to the local government, the schemes should be operated by the authority of itself; namely, the SLCRDB. Thus, JICA Team finally decided not to continue the operation of the pumps on one's own responsibility.

After the decision, the WUA in Badilaid collected money from the beneficiaries and restarted the irrigation by using pumps provided by the government before. Moreover, they further added about 12ha of irrigated areas responding to the beneficiary membersô requests. Although the WUA in Godiray owns engine pumps provided by the government, it did not restart the irrigation. Since it did not rain enough in September 2015, growth of crops being cultivated there were affected by the shortage of water. Finally, all the farmers harvested the maize stalks and sold them at one birr per one stalk as animal feed in the market of Gode.

[3] As of 19 of November 2015, the rest of fuel to be provided to the project sites are reserved by the Project team. The Project team handed the remaining fuel over to the responsible WUAs on December 7, 2015 after the handover process of the irrigation schemes at woreda level was completed.

A farmer applies fertilizer after second irrigation

Second irrigation; Most of farmlands practices basin irrigation.

The growth of maize in Badilaid (22 of September, 2015); At about 1.5 months after the sowing, maize is growing well. The farmers plan to harvest in December 2015.

CHAPTER 5 BENEFICIARY SELECTION AND INSTITUTIONAL DEVELOPMENT

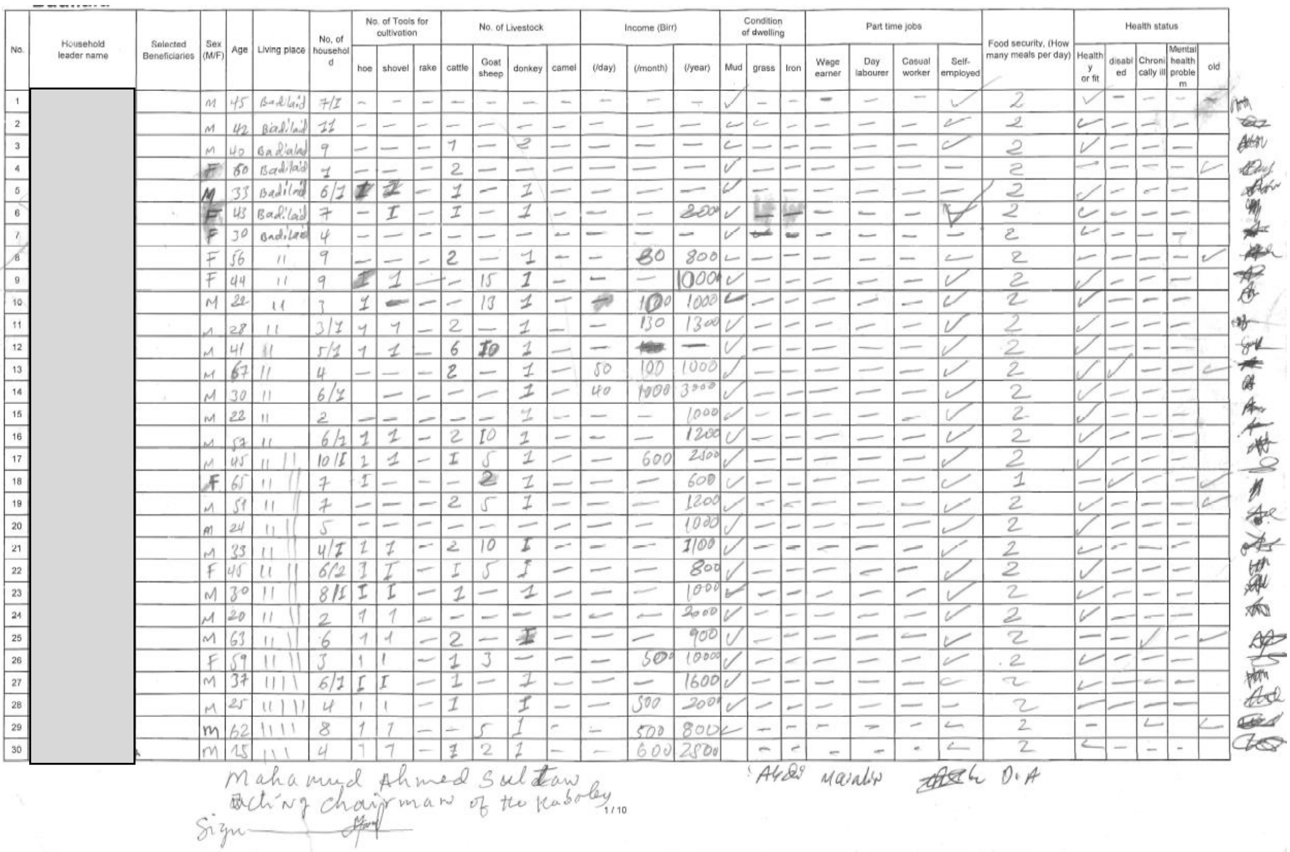
This chapter discusses the institutional development principally composed of 2 issues; 1) beneficiary selection for the irrigation schemes and 2) establishment of water users association by scheme. The beneficiary selection starts with registration of all the villagers for the 4 kebeles, followed by establishment of selection criteria, and finally beneficiary selection at the present of relevant government offices. Water users association is in charge of operation and maintenance of the irrigation schemes, which is very crucial part for sustaining the schemes.

5.1 Beneficiary Selection

5.1.1 Registration of Household in the 4 Sites

Each kebele's DA establishes household registration.

Like most other development projects, this irrigation development project also has specific target beneficiaries and attempts to benefit mainly the rural poor households. For the identification of the intended beneficiaries, firstly the registration of all the households in the project 4 sites was conducted by agricultural Development Agents (DAs) at each kebele (see photo right). The registration data included; 1) household composition, 2) possession of goods & means of production, 3) income level, 4) condition of dwelling house, 5) type of part time jobs, 6) level of food security, 7) health status of each household head, etc. in order mainly to know their living condition and the level of poverty. As an example of the registration of the households, Figure 5.1.1 shows the registration for Badilaid kebele attached with the signature of each and every household.



No.	Household leader name	Selected Beneficiaries	Sex (M/F)	Age	Living place	No. of household	No. of Tools for cultivation: hoe	shovel	rake	No. of Livestock: cattle	Goat sheep	donkey	camel	Income (Birr): (/day)	(/month)	(/year)	Condition of dwelling: Mud	grass	Iron	Part time jobs: Wage earner	Day labourer	Casual worker	Self-employed	Food security, (How many meals per day)	Health status: Healthy or fit	disabled	Chronically ill	Mental health problem	old
1			M	45	Badilaid	7/1	—	—	—	—	—	—	—	—	—	—	✓	—	—	—	—	—	✓	2	✓	—	—	—	
2			M	42	Badilaid	11	—	—	—	—	—	—	—	—	—	—	✓	✓	—	—	—	—	✓	2	✓	—	—	—	
3			M	40	Badilaid	9	—	—	—	1	—	2	—	—	—	—	✓	—	—	—	—	—	✓	2	✓	—	—	—	
4			F	60	Badilaid	1	—	—	—	2	—	—	—	—	—	—	✓	—	—	—	—	—	—	2	—	—	—	—	✓
5			M	33	Badilaid	6/1	1	1	—	1	—	1	—	—	—	—	✓	—	—	—	—	—	—	2	✓	—	—	—	
6			F	43	Badilaid	7	—	1	—	1	—	1	—	—	—	2000	✓	—	—	—	—	—	✓	2	✓	—	—	—	
7			F	30	Badilaid	4	—	—	—	—	—	—	—	—	—	—	✓	—	—	—	—	—	—	2	✓	—	—	—	
8			F	56	"	9	—	—	—	2	—	1	—	—	80	800	✓	—	—	—	—	—	✓	2	—	—	—	—	✓
9			F	44	"	9	1	1	—	—	15	1	—	—	—	1000	✓	—	—	—	—	—	✓	2	✓	—	—	—	
10			M	22	"	1	1	—	—	—	13	1	—	—	100	1000	✓	—	—	—	—	—	✓	2	✓	—	—	—	
11			M	28	"	3/1	1	1	—	2	—	1	—	—	130	1300	✓	—	—	—	—	—	✓	2	✓	—	—	—	
12			M	41	"	5/1	1	1	—	6	10	1	—	—	—	—	✓	—	—	—	—	—	✓	2	✓	—	—	—	
13			M	67	"	4	—	—	—	2	—	1	—	50	100	1000	✓	—	—	—	—	—	✓	2	✓	✓	—	—	✓
14			M	30	"	6/1		—	—	—	—	1	—	40	1000	3000	✓	—	—	—	—	—	✓	2	✓	—	—	—	
15			M	22	"	2	—	—	—	—	—	1	—	—	—	1000	✓	—	—	—	—	—	✓	2	✓	—	—	—	
16			M	57	"	6/1	1	1	—	2	10	1	—	—	—	1200	✓	—	—	—	—	—	✓	2	✓	—	—	—	
17			M	45	"	10/1	1	1	—	1	5	1	—	—	600	2100	✓	—	—	—	—	—	✓	2	✓	—	—	—	
18			F	65	"	7	1	—	—	—	2	1	—	—	—	600	✓	—	—	—	—	—	✓	1	—	✓	—	—	✓
19			M	51	"	7	—	—	—	2	5	1	—	—	—	1200	✓	—	—	—	—	—	✓	2	✓	—	—	—	✓
20			M	24	"	5	—	—	—	—	—	—	—	—	—	1000	✓	—	—	—	—	—	✓	2	✓	—	—	—	
21			M	33	"	4/1	1	1	—	2	10	1	—	—	—	1100	✓	—	—	—	—	—	✓	2	✓	—	—	—	
22			F	45	"	6/2	1	1	—	1	5	1	—	—	—	800	✓	—	—	—	—	—	✓	2	✓	—	—	—	
23			M	30	"	8/1	1	1	—	1	—	1	—	—	—	1000	✓	—	—	—	—	—	✓	2	✓	—	—	—	
24			M	20	"	2	1	1	—	—	—	—	—	—	—	2000	✓	—	—	—	—	—	✓	2	✓	—	—	—	
25			M	63	"	6	1	1	—	2	—	1	—	—	—	900	✓	—	—	—	—	—	✓	2	—	—	✓	—	✓
26			F	59	"	3	1	1	—	1	3	—	—	—	500	1000	✓	—	—	—	—	—	✓	2	✓	—	—	—	
27			M	37	"	6/1	1	1	—	1	—	1	—	—	—	1600	✓	—	—	—	—	—	✓	2	✓	—	—	—	
28			M	25	"	4	1	1	—	1		1	—	—	500	2000	✓	—	—	—	—	—	—	2	—	—	—	—	
29			M	62	"	8	1	1	—	—	5	1	—	—	500	800	✓	—	—	—	—	—	✓	2	—		✓		✓
30			M	45	"	4	1	1	—	1	2	1	—	—	600	2800		—	—	—	—	—	✓	2	✓	—	—	—	

Mahamud Ahmed Sultan
Acting chairman of the kebeley
Sign

Abdi Mahalin D.A

1/10

Figure 5.1.1 An Example of the Registration of Households in Badilaid Kebele

5.1.2 Criteria for the Beneficiaries Selection

The selection of beneficiaries should be guided by specific criteria. After having completed the registration of each household in the 4 sites, the Team had drafted criteria for selecting the beneficiary households. The following criteria were set as the draft for selection of the irrigation beneficiaries in the target areas.

- ✓ Farmers who are members of the kebele in which the irrigation site is located and living in the same kebele. Farmers living in the urban (Gode township area) or other kebeles will not be treated as potential beneficiary even if they are member of the kebele,
- ✓ Villagers who are unemployed (either self or the spouse) at present,
- ✓ Poor households, as the intention is to reach and cater the benefit for the rural poor,
- ✓ The householdŝ head should basically be in a range of aged 18 to 55 years, physically fit and potentially able to make productive use of the land allocated, and
- ✓ Farmers who show interest and willingness to make productive use of the farmland and to be a member of the water users associations to be organized.

Priority will be given for female-headed households. In addition, households with dependents have more chance to be selected than such households without dependents. Older persons, persons with disabilities, persons with chronic diseases or serious medical conditions and persons with a mental health problem will not be given the priority to be selected[1]. Concerning such households whose family dependents are not many, an arrangement of giving 0.5ha should also be discussed among the concerned kebele members so that more number of beneficiaries can be accommodated in the total 100 ha of each irrigation area.

5.1.3 Beneficiaries Selection

The drafted criteria of the beneficiaries selection was presented at a meeting held on 14th June 2013 in Gode district administration office in the presence of Shebelle zone administration, Gode district Cooperatives, Gode district Livestock, Crop and Rural Development office (GLCRDO) and Gode Kelafo irrigation development office (GKIDPO) representatives. The participants have agreed the criteria after they had substantial discussions.


Beneficiaries' selection meeting has been held with the concerned parties.

On the based of the registration data of each household collected by the agricultural DAs, the selection of the beneficiaries was undertaken by a committee organized by Gode district Livestock, Crop and Rural Development offices (GLCRDO), Gode district Cooperatives and Gode Kelafo irrigation development offices (GKIDPO), DAs and chairpersons of each kebeles. In addition, community elders, women groups and youth groups from each kebeles also participated in the process of selecting the beneficiaries.

The selection of beneficiaries was guided by the above-mentioned specific criteria, which were approved by the district cabinet members and concerned government offices. Following the first meeting held in the Gode administration office, subsequent meetings were also organized by the district cabinet members, JICA team and GKIDPO officers. These meetings took place at the 4 different target beneficiary kebeles such as Godiray, Badilaid, Hididole and Ilan participated by the

[1] Note that such persons shall be undertaken by other social related care program(s) rather than this irrigation development project.

community elders, youth group, women groups, kebele administration committees and DAs.

The established committee had selected 100 irrigation beneficiary households each per target kebele. The selected total 400 households, 100 from each kebele, are the poorer income families living in the rural kebeles of Godiray, Badilaid, Hididole and Ilan. The committee has submitted their report to the Gode woreda administration office for its approval. Accordingly, the administration office approved the work done by the committee and the beneficiaries have thus been finalized. At last, Gode woreda administration office collected the consent signs from all the villagers of the 4 kebeles for the beneficiaries selected.

Table 5.1.1 Selected Beneficiaries Nos. of Each Kebele

Target kebele	Existing Households	Selected beneficiaries
Godiray	180HH	100HH
Badilaid	240HH	100HH
Hididole	300HH	100HH
Ilan	300HH	100HH

Source: Registration data conducted by DAs

5.2 Establishment of Water Users Association (WUA)

A Water Users Association (WUA) is a voluntary, nongovernmental, nonprofit entity established and managed by a group of farmers located at each of the irrigation schemes. Water users consist of farmers who combine their financial, material and technical resources to improve the productivity of irrigated farming through equitable distribution of water and efficient use of the irrigation system.

Membership in a WUA enables members to play an active role in the democratic management and distribution of water within an irrigation system. The formation of a WUA also enables farmers to collectively resolve common water and agriculture related problems. WUAs benefit from increased crop yields through more efficient water use. As a result, farmers are becoming more confident in carrying out future agricultural production activities.

5.2.1 Basic Organizational Set-up for WUA

Basic organization set-up for the pumping irrigation scheme in Gode area is indicated in Figure 5.2.1. Role and authority on planning, decision-making and implementation should be clearly defined in a proper organization as indicated in the figure. For example, when an irrigators association thinks about the following dry season crop, they go through a process of planning of water use and allocation, decision-making of the plan, and execution of the approved plan. Authority for these three aspects must be independent at the levels of Planning Committees, General Assembly, and Management Committee.

The highest organ in the irrigators association is the General Assembly as indicated in the above figure, which shall be composed of all the irrigator members. This is the supreme organ in the irrigators association especially vested in the decision making power. All the plans shall be forwarded to the general assembly and the decision shall be made in this assembly, meaning all the important decision shall be made by all the members themselves.

Under the general assembly, there should be the management committee in charge of responsibility of execution and day-to-day management of the irrigation scheme. The members of the management committee shall, of course, be selected by the general assembly, and in general the members would be composed of; 1) chairperson, 2) vice chairperson, 3) O&M responsible, 4) treasurer, 5) auditor, and 6) members. This composition can be modified as the general assembly is to decide.

The members included in the management committee shall be the leaders of sub-groups. The sub-groups are established by irrigation block, namely irrigation area commanded by specific field canals. There are 4 sub-groups to be established per scheme. This sub-group is in charge of their own irrigation area in terms of operation, maintenance, and management. For example, though the maintenance of the main canal shall be done by all the members, or selected members from each sub-group, such maintenance pertinent to the irrigation block shall all be made within the sub-group members.

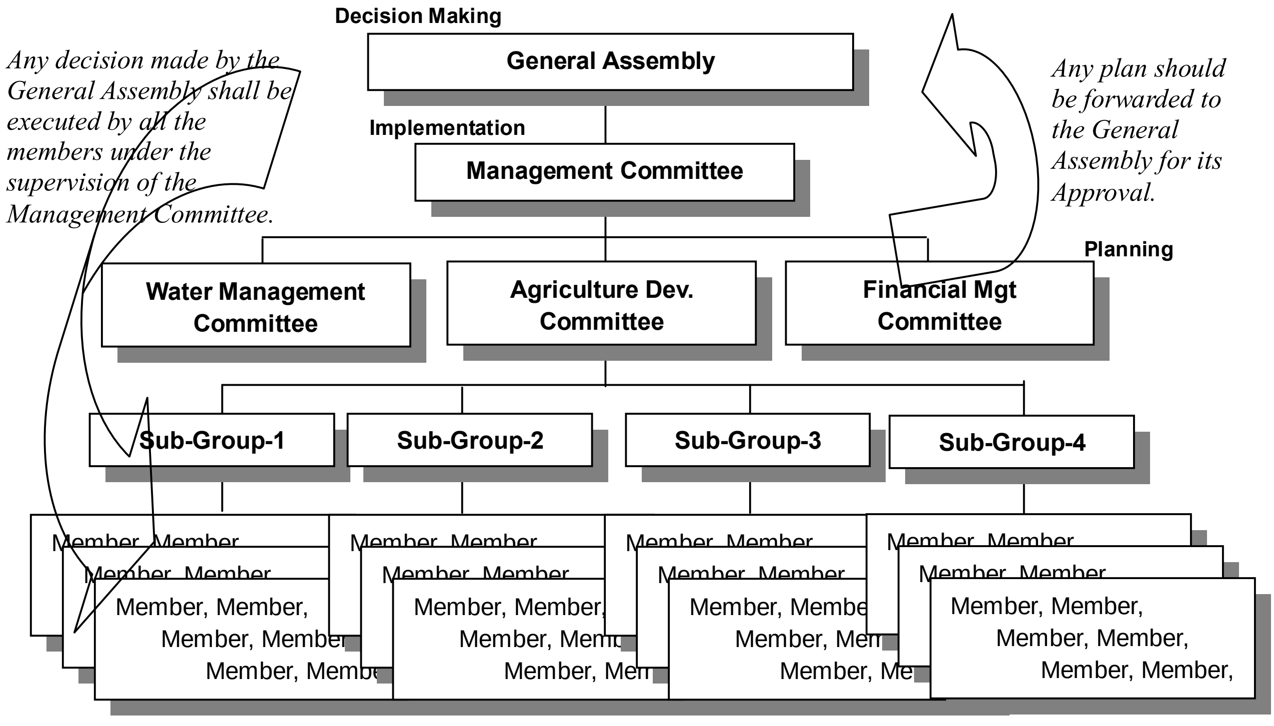


Figure 5.2.1 Internal Organization Setting-up for the Irrigators' Association

Planning will be done by a committee like agriculture development committee or water management committee depending upon the issue formed by volunteers or elected persons within the association (see the 3rd row from the top in figure above). These committees can be led by the members of the management committee; e.g., vice chairperson may lead the Agriculture Development Committee, O&M responsible person may lead the Water Management Committee, and likewise treasurer may lead the Financial Management Committee. Note that the chairperson of the management committee should be free from those responsibilities of the planning committee. The basic role of the planning committees is to prepare for a plan, and forward it to the General Assembly.

The lowest cadre of the irrigators association is the individual general membership. They are organized under their respective sub-group. They are located at the lowest cadre of the association, while they can discharge their supreme power at the level of the general assembly whenever they are to do some important decision making. They are the element of the supreme organ of the association; namely, general assembly, while they are the implementers at the lowest cadre of the association who implement the decision made at the general assembly. They are the highest in terms of decision making while they the base in terms of implementation.

In above regard, management committee is, in principle, in charge of execution or day-to-day management of the irrigation scheme. It means that the management committee shall be in charge of supervision of implementation activities. The implementation is in fact carried out according to the decision made by the general assembly. The management committee shall have no power in decision making, but have the power to supervise the implementation. Any implementation, for which the decision was made at the general assembly, shall therefore be carried out under the executive power of the management committee.

5.2.2 Water Users Association Established

1) Consultative Meeting with Relevant Government Stakeholders

To establish the water users association, the Team held a consultative meeting as the first step inviting relevant government officers as follows. The objectives of the meeting were to; 1) familiarize the representatives of government offices about Water Users Association in terms of objective of establishing the Association, members of the association, management mechanism of the association, and major organs of the association, and 2) agree on what extent these offices should participate in the establishment of the association and capacitating association.

- ✓ Date of the meeting 1st July 2014
- ✓ Avenue RREP Gode Office, WFP compound
- ✓ Participants as following table

Table 5.2.1 List of Participants in the Consultative Meeting

No	Name	Office represented
1	Feyisal	Agriculture Office of Gode Woreda
2	Did Abdi	Gode Kelafo Irrigation Office
3	Hussien Umar	Gode Woreda Water and Sewerage Office
4	Mr. Mohamud	Gode Woreda Cooperative Office
5	Mr. Toshima Ryu	RREP team
6	Mr. Solomon Messele	RREP team
7	Mr. Abiyot Tilahun	Subcontractor

Source: JICA Project Team

At the meeting, the JICA team welcomed the participants and provided detail presentation on key issues in each agenda of the meeting (i.e. explained the objective of establishing WUA, how to establish, and the way how relevant offices can cooperate in the process of establishing WUA). In addition, the roles that should be played by the offices in building the capacity of the association and trucking its activities after the project is phased out are presented and discussed among the participants. At the end, all representatives of the relevant offices have reflected their willingness to work with JICA team.

First consultative meeting was held in the team's Gode office inviting relevant government officers.

2) Consultative Meeting with Kebele Administrations

First culsultative meeting at the kebele level was held on 5th July 2014 inviting relevant kebele leaders to a venue prepared at Godiray site to establish the WUAs At the meeting, comprehensive explanations were provided in the areas of; 1) purpose of WUAs, 2) how the associations will be established, and 3) the responsibilities of the target kebele leaders and members of the communities in establishing the association. By the end of the discussion, the participants expressed their willingness to work with the JICA team and their willingness to support WUAs to establish:

Table 5.2.2 List of Participated in Consultative Meeting held at Kebele Level

No	Name	Affiliation	Position
1	Slob Hassan	Ilan	Chair Person
2	Abdinur Ismael	Ilan	Vice chaperon
3	Abdusamer Abdulahi	Hididole	Chair Person

No	Name	Affiliation	Position
4	Bshir Abdi	Hididole	Vice chairperson
5	Yonis Delmar	Badiliad	Chair Person
6	Ursin Farah	Badiliad	Representative of vice chair person
7	Mehamed Afi	Godiray	Chair Person
8	Sahan Mohamed	Godiray	Representative of vice chair person
9	Mr. Toshima	RREP tem	Irrigation Engineer
10	Mr. Abiyot Tilahun	SuDCA team	Sociologist
11	Mr. Daniel Mekonnen	SuDCA team	Rural Development Specialist

Source: JICA Project Team

There were participants concerned with the delay of the construction, saying what the meaning of establishing WUA is before the pumps come. The team replied that though the construction is delayed, it takes long time to establish WUAs including the official registration, and also the members should be given capacity building trainings such as leadership, accounting and financial management, operation and maintenance of the schemes, etc. The team further said that the establishment of WUAs should therefore be completed on or even before the completion of the construction.

All of the kebele chairpersons and vice chairpersons have come into agreement with the explanation afore-mentioned, and said they are ready to mobilize the relevant water users as well as community members to participate in the general assembly, establish the association and elect the management committee members as well as planning sub-committee members. At last, date and venue for holding the first general assembly meeting were discussed and agreed.

3) General Assembly Meetings (1st WUA Training)

In order to establish WUAs, 4 subsequent meetings were held with the beneficiary community members in each target kebeles of the project (for the date and the participants, see Table 5.2.3 below). At the beginning of the meeting, following were presented and shared among the participants as;

- ✓ Purpose of establishing the association,
- ✓ How the association will/should be managed,
- ✓ Key responsibilities of the association,
- ✓ Major bodies (organs) of the association,
- ✓ Importance of management committee and other sub-committees under WUA, and how these committees will be formulated,
- ✓ Gender sensitive on the selection of management committee members, and
- ✓ Sources of finance of the WUA and its management mechanism.

Table 5.2.3 Date of General Assembly Meeting held in each Kebele and Number of Attendees

No	Kebele	Date	Number of Participants (by gender)			
			Female	Male	Total	% of the Participants
1	Ilan	8/07/2014	32	24	56	56%
2	Hididole	10/07/2014	39	14	53	53%
3	Badilaid	13/07/2014	30	22	52	52%
3	Godiray	15/07/2014	27	26	53	53%

Source: JICA Project Team

After such explanation, the beneficiaries were asked to reflect on the issues raised and any other concerns they have. The participants said they are willing to have association to manage the irrigation scheme, and further said they need development and they contribute whatever the project and the association demand for the completion of this project. Then, election of the members of the management committee was held, followed by the election of members of sub-committees, and in fact all the participants to the general assembly actively participated in the selection process in all kebeles.

WUAs were thus officially established.

Election of Management Committee members in Hididole where total 53 beneficiaries

On the course of establishing the WUAs, two challenges were encountered. As the time was coincided with dry season, some beneficiaries were away from their home to look for fodder for their livestock, and as a result they were not able to attend the meeting. However, this has rarely created problem in the establishment of WUA as more than half of the beneficiaries attended the meeting and also the kebele chair persons and committee members were to deliver all the information to the rest of the beneficiaries. The other problems encountered were the spontaneous meetings that the woreda administration held with administrators of the kebeles, resulting in postponing general assembly meeting 2 times.

CHAPTER 6 TRAININGS FOR GOVERNMENT OFFICERS AND BENEFICIARIES

This chapter presents the results of trainings undertaken in relation to Gode irrigation development composed of Godiray, Badilaid, Hididole and Ilan schemes. A series of trainings have been provided to the relevant government officers who are working in the field of irrigation & draining and agriculture extension, and to the beneficiary farmers as well.

6.1 Training on Irrigation and Drainage for Government Officers

6.1.1 Objectives and Contents of the Training

The objective of the training is to strengthen the capacities on irrigation development for the relevant government officers. The training was a one-day live-in training arranged on May 17, 2013, and invited 12 trainees (all males) from Somali Livestock Crop Rural Development Bureau (SLCRDB), 5 trainees (all males) from Gode Woreda Livestock Crop and Rural Development Office (GLCRDO), and 4 trainees (all males) from Gode Kelafo Irrigation Development Office (GKIDPO). The training was held in a SLCRDB meeting room, Jijiga.

The training focused on technical aspects of how to design irrigation schemes with special emphasis on pump irrigation system. The one-day training was divided mainly into 4 sessions as; 1) calculation of crop water requirement, 2) basics of pump facilities design, 3) design of pump facilities with practices, and lastly 4) training evaluation. The first 2 sessions were administered in the morning time while the latter 2 sessions in the afternoon session. Following table indicates the training program:

Table 6.1.1 Program of the Pump Irrigation Design

Time	Program	Remarks
AM	1. Calculation of Crop Water Requirement	
	2. Basics of Pump Facilities Design	
	(1) Pump General	
	(2) Procedure of Pump Design	
PM	3. Design and Calculation of Pump Facilities with Practices	
	(1) Design of Pipeline	
	(2) Calculation of Suction Head	
	(3) Calculation of Total Pump Head	
	(4) Calculation of Pump Power	
	(5) Design of Canal	
	4. Evaluation of the Training	

Source: JICA RREP Team

The training started with overall introduction of Rural Resilience Enhancement Project. Then, the JICA team started the training session on the “Calculation of Crop Water Requirement”. Given an example of maize as typical crop and by using climate data recorded at Gode Meteorological Station, the Team explained how to estimate crop water requirement step by step. In addition, irrigation efficiencies such delivery efficiency, distribution efficiency and on-farm application efficiency were also explained in order to estimate gross water requirement.

A Team member is presenting a presentation on “Design of pump facilities”.

Following the Session 1 ‘Calculation of Crop Water Requirement’, the Team presented the basics of pump facilities design to the participant trainees. The topics were composed of general information of pump facilities and the design procedure of pump irrigation scheme. Then, in the afternoon design of pump facilities had been undertaken with practices including some calculations. This session has in fact covered a number of steps such as design of pipeline, and calculation of suction head, total pump head, pump operating power, etc. The participants tried very hard to answer the examples given for the practices.

During the one day training, the participants learned how to estimate the crop water requirement and how to undertake the basic design of pump irrigation system. In fact, since this training was a first step for the government officers engaged in irrigation, drainage and irrigated agriculture, the contents covered only the preliminary stages of designing pump irrigation schemes. Some more advanced topics related to irrigation and drainage such as water management, on-farm irrigation, and irrigated agriculture were also to be undertaken along the construction of Gode Irrigation Scheme.

6.1.2 Key Findings from the Technical Training

At the end of the training, an evaluation form was distributed to all the participants, of whom 16 replied. From the replies, we can realize the level of their understandings whereby we also can improve the contents of next trainings. Some of the replies are summarized as follows:

- ✓ For the level of the training contents, 2 (13%) out of 16 replied the contents were easy, 5 (31%) replied difficult and 9 (56%) replied moderate. Difficult topics were separately asked and it was found that 9 replied 'pump general' was difficult, followed by canal design (4 replies), calculation of pump head (3 replies), calculation of pipe diameter (3 replies), estimation of water requirement (2 replies), and pump power by one reply (plural answer accepted). 'Pump general' included general concept of pump irrigation, overall system design, type of pumps and those applications, etc., which may have been too broad to well understand for the participants.

- ✓ Usefulness was also asked in a 4 levels such as; 1) very useful 2) useful, 3) somehow useful, and 4) useless with reasons. 8 replied the training was very useful, and each 4 replied it was useful and somewhat useful respectively. The major reason why they though useful was that most of them are in fact engaged in irrigation development and/or irrigated agriculture promotion whereby the training contents contributed to enhancing their current activities.

- ✓ On the satisfaction level, 4 replied they were 'very much satisfied' and 5 replied 'satisfied' while there were 7 participants who replied 'not satisfied'. The reason why they were not satisfied was separately asked. The majority answer was 'just only one-day training is not enough for those topics'. In fact all the respondents requested the JICA team to conduct such training sfor at least 2-3 days and if possible for a period of around 5 days.

- ✓ Other comments that are to be incorporated to the next trainings were; there should be more practices, softwares such as estimating water requirement, AutoCAD and etc. should be provided; training should be done in Gode with reference to the actual irrigation schemes there; trainees should be taken to an actual irrigation site e.g. Gode area; and method of irrigation e.g. on-farm irrigation should also be incorporated in the training, etc.

6.2 Training on Irrigated Agriculture for Government Officers

6.2.1 Objective and Contents of the Training

To achieve sustainable operation of the irrigation facilities, relevant governmental officers should know about the irrigation system and also irrigated agriculture to support the irrigation beneficiary farmers. Therefore, the training for governmental officers was planned two times in 2014. The aim of the training was to build the capacity on irrigation and irrigated agriculture for the concerned government officers in Jijiga and Gode woreda. The training has been conducted two times in middle of April and late August, 2014.

The 1st training, held in April 2014, focused on the irrigation facilities and the construction which was on-going at the sites. The training was contented with irrigation scheme design, practical soil test, earthwork, operation of irrigation facilities, maintenance of the facilities, and water user association, etc. Also general agriculture situation in Gode area was shared at the same time. Then, 2nd training was carried out late August, and the topics mainly covered agriculture basic technics using irrigation such as farm management, fertilization, inter and mixed cropping, and also function of water user association, etc.

Both of the trainings included a visit to the construction sites. Since the irrigation facilities were under construction, on-going works and the facilities being constructed were explained to the participants by the Team members during the first training. Soil tests, both for compaction and permeability tests, have also been explained during the site visiting. A demonstration farm was also visited during the second training which was established with tailored irrigated agricultural methods such as furrow irrigation, mixed and inter-cropping.

6.2.2 First Training on Irrigated Agriculture

First training on irrigated agriculture was conducted on 15th and 16th of April 2014 with 28 participants from Jijiga and Gode woreda. The training consisted of one and half days training for theoretical parts in a classroom and another half day for site observation. The site observation was conducted at Hididole and Ilan sites. Major training sessions are shown in Table 6.2.1.

Table 6.2.1 Program of the 1st Training

Time	Program
Day -1 AM	Irrigation scheme design
Day-1 PM	System operation & maintenance
	Establishment of water users association
	Irrigated agriculture in Gode area (basic)
Day-2 AM	Construction management including Quality assurance
Day-2 PM	Site observation (Hididole and Ilan sites) 1) Embankment and excavation work 2) Masonry work 3) Concrete work
	Demonstration of field dry density test Demonstration of permeability test
	Training Evaluation

Source: JICA RREP Team

The first session included several topics regarding the Gode irrigation project such as target sites selection, irrigation facility design, construction schedule, types of earth works, progress of the construction to date, some tips of supervising irrigation construction work, etc. Then, operation and maintenance (O&M) for the irrigation facilities and water users association to be in charge of the O&M were explained. At the end of the Day-1, current irrigated agriculture situation in and around Gode area has been explained to and shared with the participants. At this first training, a draft manual of irrigated agriculture made by the Team was also distributed to the participant as a training textbook.

A team expert is explaining design and operation and maintenance of the irrigation schemes being constructed in Gode.

Participants visit Hididole site and then Ilan site in Day 2 where canal construction is on-going.

At the morning session of Day-2, construction management was presented including quality assurance. In the afternoon, field observation was conducted in Hididole and Iran sites. During the site visiting, the Team explained irrigation structure design, progress of the earth work, quality test, etc. with reference to the on-going construction. A soil test has also been demonstrated at the Hididole site in order to check the field permeability of canal embankment.

At the end of the training, the participants provided some comments as evaluation. Major comments given are as follows; 1) the training is quite important but the length of the training was short to understand all the contents, 2) it would have been possible to emphasize on practical aspects of irrigation water management, 3) the knowledge and technics are very fundamental, so they are going to share with co-workers in the same office, and 4) the next training had better to include more agronomical topics such as farming system, crop protection and fertilization, cropping pattern and on-farm irrigation.

6.2.3 Second Training on Irrigated Agriculture

Following the 1st training, the second training was carried out 3 days from 28th to 30th of August 2014 with 16 participants who are from Gode Woreda Livestock Crop and Rural Development Office (GLCRDO) and Gode Kelafo Irrigation Development Office (GKIDPO). The 2nd training focused on software components of irrigated agriculture such as farming techniques, operation of the irrigation facilities, function of water user association, and etc. It was composed of 2 days theoretical training and one day field visiting.

Based on the comments provided by the participants of first training, training contents included farm management, fertilization, irrigation method, mixed cropping and inter-cropping (see Table 6.2.2). Farm management was one of the fundamental knowledge of irrigated agriculture undertaken during the training since irrigated agriculture requires much higher input cost than that of rain-fed agriculture. Therefore the trainer stressed that recording of the agricultural activities with the input cost and the estimation of income out of irrigated agriculture is the first step for farm management.

Fertilization method, which was also requested by the previous training, was explained at the second session of Day-1. The session included several topics regarding the fertilization such as types of fertilizer, appropriate fertilizers available in Gode town, applying method, characteristics of fertilizer, appropriate amount and timing by each crop. Then, in the afternoon of Day-1, irrigation methods with advantages and disadvantages were explained with emphasis on furrow irrigation. The present irrigation practice is still primitive and most of the farmers apply basin irrigation only. Basin irrigation often induces salinity problem, so that during the session furrow irrigation was emphasized which can reduce such salinity problem. At the end of the Day-1, inter-cropping and mixed cropping methods were explained.

Table 6.2.2 Program of the 2nd Training

Time	Activities
Day-1 AM	Farm management
	Fertilization on irrigation agriculture
Day-1 PM	Irrigation method
	Intercropping & Mixed cropping
Day-2 AM	Agricultural situation in Gode
	Group Session 1: Situation analysis on irrigation agriculture in Gode area
	Group Session 2: Agriculture extension method in Gode area
Day-2 PM	Water Users Association (structure)
	Water User Association (how to establish)
Day-3 AM	Design & objectives of demonstration farm
	Site visiting at Godiray and Badilaid demonstration farm
Day-3 PM	General discussion & evaluation

Source: JICA RREP Team

Agriculture situation in and around Gode area was explained and shared with the participants in the morning of Day-2. Following the explanation, the participants were grouped, and discussion was made among the group members on the current situation, problems, and opportunities on the agriculture in Gode area. The agricultural problems were clarified using SWOT tool, and then the solutions were shared at plenary. In the afternoon, water users association was tackled. The role, responsibility, tasks, and steps to establish water users association were explained with reference to the on-going process of establishing the water users association at the sites.

Visiting the demonstration farm was carried out on Day-3. The Team explained the benefit of the advanced agriculture technics and the practices at the demonstration farmland. In addition, the DA in charge of the farmland explained the merit of the technics introduced and tips of the agricultural practices. Most of the participants had not seen such advanced agriculture techniques e,g, furrow irrigation, inter cropping, and mixed cropping. The participants checked the each agricultural technics by themselves and raised some questions to the trainers.

A team member is explaining recommended spacing of onion at demonstration farmland in Day 3.

Finally, the participants commented the training and evaluated by the evaluation form. According to the result of the questionnaire, 14 out of the 16 participants had answered that the training contents were relevant to their needs and expectation. Further, all the participants mentioned that the irrigated agriculture manual provided by the Team during the training was useful for enhancing their capacity. Most of the participants at the end emphasized that they need more agricultural trainings.

6.3 Training on Irrigated Agriculture for Beneficiaries

6.3.1 Objective and Contents of the Training

To introduce irrigated agriculture to the beneficiaries, the Team has provided 3 times trainings in 2014. The objective of the trainings was to teach basic irrigated agriculture knowledge and technics to the beneficiaries of the irrigation schemes in order to have them start irrigated agriculture smoothly and continue. The trainings were carried out in May and June, August, and October to December 2014. The target group was the entire irrigation beneficiaries. Due to the large number of the beneficiary, same topics were undertaken 2 times per one site.

6.3.2 First Training on Irrigated Agriculture for Beneficiaries

The first training has been done from 27th of May to 5th of June 2014. The number of participants by site by gender is shown in Table 6.3.1. This training is composed of theoretical part and practical part. First, agricultural background in Gode area e.g. characteristics of temperature and rainfall, available and appropriate crops, current cropping patterns and etc. were explained as a part of the theoretical training. Then, irrigated agriculture practices for each crop available in Gode area were described and shared with the participants.

Table 6.3.1 No. of the 1st Training Participants

Site	Date	Male	Female	Total
Godiray	29th & 30th of May	42	46	88
Badilaid	27th & 28th of May	76	24	100
Hididole	4th & 5th of June	61	39	100
Ilan	2nd & 3rd of June	38	62	100

Source: JICA RREP Team

According to a survey conducted by the Team, several improvement points were found regarding irrigated agriculture in the area. Though the farmers have been taught several agricultural trainings by government organizations and NGOs, the agricultural technics which they applied to at the field is still

Table 6.3.2 Program of the 1st Beneficiary Training

Time	Agenda
9:10 - 10:30	Irrigated agriculture in Gode area
10:50 - 11:50	Irrigated agriculture practices
14:00 - 16:00	Site observation and onion nursery making
16:00 – 16:10	Wrap up and closing Remarks

Source: JICA RREP Team

primitive. For example, mixed cropping is one of the common agricultural methods but it was not found around the area. Worse, some farmers applied much amount of chemical fertilizer and agricultural chemicals with high frequency for cultivating onion. Based on these findings, appropriate agricultural practices were explained during the training.

Onion nursery making was conducted in the afternoon. Furrow irrigation method was explained at that time which is a new technique in the area. Though they have more than 20-year experience of irrigated agriculture, the farmers have not applied the irrigation method except for some advanced farmlands run by outside capital. Most of the farmlands are at present irrigated by basin irrigation method and some areas can hardly cultivate due to salinity problem. The Team therefore stressed the benefit of the furrow irrigation method able to decrease salinity problem.

Participants are sowing onion seed for nursery bed at Godiray demonstration site.

6.3.3 Second Training on Irrigated Agriculture for Beneficiaries

The second beneficiary agriculture training was conducted from 4th to 12th of August. In total 378 (115 male and 263 female) participated in the training (see Table 6.3.3). This training also consisted of theoretical session in the morning and practical session in the afternoon. The training focused on the good agricultural practices during the growing period of crops such as irrigation schedule, weeding, top-dressing of fertilizer, crop protection method, and etc. In addition, animal driven ploughing method was also explained. This method is quite common in other areas of Ethiopia, but they have never used that. Though the soils are soft and easy to plow by hand in the area, animal driven ploughing should be introduced if they cultivate larger size of farmland, e.g. 1 ha of farmland per household.

Table 6.3.3 No. of the 2nd Training Participants

Site	Date	Male	Female	Total
Godiray	4th & 5th of Aug.	28	72	100
Badilaid	6th & 7th of Aug.	23	61	84
Hididole	9th & 10th of Aug.	38	56	94
Ilan	11th & 12th of Aug.	26	74	100

Source: JICA RREP Team

As a site observation, the demonstration farm was visited by the participant beneficiaries for Godiray and Badilaid sites. Several agricultural techniques were explained to them such as recommended crops including cash crops, fodder crops, mixed cropping, furrow irrigation method, etc. Though early harvesting of maize and sorghum is common in Gode area as animal feed, the Team emphasized the high profit of the crop production. The Team further explained it can be used not only as grain for human consumption but also as livestock feed for the remaining plant parts.

Table 6.3.4 Program of the 2nd Beneficiary Training

Time	Agenda
9:10 - 10:30	Irrigation schedule and top-dressing method
10:45 - 12:00	Weeding and crop protection method
14:00 - 16:30	Site observation
16:30 – 16:40	Wrap up and closing

Source: JICA RREP Team

Meanwhile, an advanced farmland run by outside capital was observed for Hididole and Ilan beneficiaries since demonstration farm was not started at the time of training. The advanced farmland is owned by a foreign capital and it is managed by local manager who live in Gode town. There were good agricultural technics and new crop varieties found in the farmland. For instance, furrow irrigation was adopted at the farmland, and sweet potato, water melon and groundnut that were uncommon crops in the area were growing. The Team explained the advantage of the irrigation method and also shared with the participants the cultivation method of the new crops.

Watering to the furrow irrigation at the maize & haricot bean intercropping field at Badilaid PA site.

A trainer demonstrates the cuttage method of sweet potato which is a new plant at Ilan site.

6.3.4 Third Training on Irrigated Agriculture for Beneficiaries

The third training was carried out from 25th to 28th of September at Godiray and Badilaid and 22nd to 25th of December at Hididole and Ilan (see Table 6.3.5). The purpose of the training was to teach the appropriate pre- and post-harvesting methods for the main crops in the area. Topics of theoretical training covered pre- and post-harvesting technics such as harvesting timing and methods, threshing, store in bag/container, storage condition, transportation, seed moisture contents, prevention of pests and pathogens, etc. Although most of the participants have an experience of agriculture, they do not pay much attention to post harvesting, and as a result the selling price of their products drops. The Team stressed that the application of appropriate pre- and post-harvest methods can achieve high quality crops, and it has potential of selling with a higher price.

Table 6.3.5 No. of 3rd Training Participants

Site	Date	Male	Female	Total
Godiray	25th & 26th of Sep.	29	71	100
Badilaid	27th & 28th of Sep.	39	57	96
Hididole	22nd & 23rd of Dec.	22	43	65
Ilan	24th & 25th of Dec.*	29	48	77

Source: JICA RREP Team

Practical session was implemented in the afternoon. Both the participants of Godiray and Badilaid sites were taken to the demonstration farmland at Godiray site. The Team showed appropriate harvesting method, drying method, post-harvest treatment, storing method, and etc. at the site. On the sesame which is one of the crops cultivated in the demonstration farm, the team explained carefully that finding out the appropriate harvesting stage is very important in order to decrease the harvesting loss. For the Hididole and Ilan sites, same practices had been conducted in an progressive farm as was done during the second training.

Table 6.3.6 Program of 3rd Beneficiary Training

Time	Agenda
9:10 - 10:30	Harvesting preparation of crops and onion for selling
10:45 - 12:00	Postharvest treatment, insect and disease control and storage
14:00 - 16:30	Site observation
16:30 – 16:40	Wrap up and closing

Source: JICA RREP Team

6.4 Demonstration Farms

6.4.1 Objective of Demonstration Farms

In order to show agricultural technics to the beneficiaries practically, demonstration farm has been prepared for each of the 4 irrigation sites with 1 ha size each. The demonstration farms were designed to show advanced irrigated agriculture technics such as furrow irrigation, cultivation of feed crops, maize and haricot bean intercropping, Sudan grass and groundnuts mixed cropping, sesame cultivation with thinning method, introduction of onion as cash crop.

The demonstration farm centered on the introduction of cash crops. Indeed, irrigated agriculture needs more cost such as fuel, facility maintenance fee, etc. than rain-fed agriculture. In order to sustain such high cost irrigated agriculture, cash crops were planned as target crop. Another thing was feed production for livestock. The farmers in and around Gode area usually harvest grain crops at the growing stage for feeding animal due to the shortage of animal feed, and therefore fodder crops if introduced can also contribute to the income generation.

6.4.2 Demonstration Farmland Design and the Implementation

The demonstration farm has started from Godiray and Badilaid since April 2014 where the beneficiaries are more familiar with irrigated agriculture than the other two sites (see Table 6.4.1). The demonstration farms of Godiray and Badilaid have tried mostly new technics while the demonstration farms of downstream two sites, Hididole and Ilan, included the demonstration of conventional methods aside from the new technics in order to show the difference comparatively. In addition, sweet potato, a new crop of the area, was introduced for the downstream 2 sites as potential cash crop.

Table 6.4.1 Schedule of Demonstration Farmland Activities

Activities	Date by Demonstration Site			
	Godiray	Badilaid	Hididole	Ilan
First plowing	21st Apr.	21st Apr.	24th Sep.	25th Sep.
Second plowing	24th Apr.	24th Apr.	27th Sep.	28th Sep.
Ridge and furrow making	19th May	21st May	5th to 7th Oct.	8th to 9th Oct.
Planting Date : Maize	23rd May	10th June	10th Oct.	11th of Oct.
: Sesame	25th May	12th June	14th Oct.	15th Oct.
: Sudan Grass	27th May	14th June	17th Oct.	18th Oct.
: Onion (Nursery)	29th & 30th May	27th & 28th May	13th Oct.	15th Oct.
: Onion (trans planning)	22nd Jul.	23rd Jul.	27th Nov.	30th Nov.
: Groundnut (mixed with Sudan grass)	14th June	13th June	17th Oct.	18th Oct.
: Haricot bean (mixed with Maize)	27th o June	28th June	13th Nov.	15th Nov.
: Sweet potato	-	-	27th Nov.	6th Dec.
Handing over to the community	30th Sep.	1st Sep.	23rd Dec.*	25th Dec.*

Source: JICA RREP Team

The demonstration farm was divided by 4 types of cultivation; namely, 1) intercropping maize with haricot bean, 2) sesame, 3) onion, and 4) mixed cropping Sudan grass with groundnut (see Figure 6.4.1 and Figure 6.4.2). After the site visiting, participants commented that intercropping and mixed cropping are new approaches in the area which have high benefits. Other beneficiaries said furrow irrigation was once introduced but it has disappeared because of lack of tractor. They further continued that they understood they can make by hand tools and it has some benefits especially against salinity problem and also saves the fuel cost.

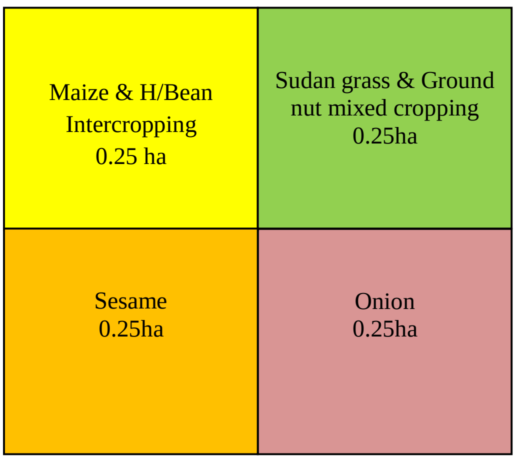


Figure 6.4.1 Layout of the demonstration farmland at Godiray site.

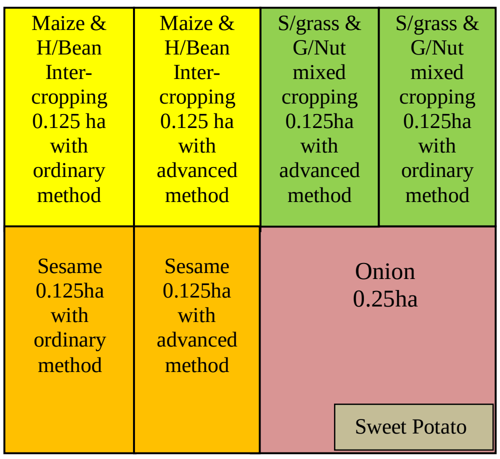


Figure 6.4.2 Layout of the demonstration farmland at Ilan site.

6.5 Training on Operation of the Pump Facilities

6.5.1 Objective of the Training

A training of pump facility operation was carried out to make sure proper operation of the pump facilities in each site in parallel with the construction schedule. The training was held three times; February, July and August 2015 and main target participants were pump operators who actually work in the schemes. Each WUA selected five pump operators, so that 25 pump operators were selected in total. JICA Project team requested the WUAs to select pump operators who have some experience in pump operation and a level of education. As a result, the WUAs selected at least two operators with pump operation experience at each site.

6.5.2 Implementation of the Practical Training

The first training was conducted in February 2015 at the time of installing the generators. EBG,, an agent of Cummin's generators in Ethiopia, carried out the on-site training. The training covered a wide range of topics about techniques to operate the generators. The topics included such as basic know-how of generators, pre-operation inspection, operation procedure, handling errors, and daily maintenance of the generators. The operators learned these topics through both lectures and actual operation on the site. Some of the operators commented that they wanted to learn more detail about maintenance of the engines. The trainer from EBG introduced a further professional training course to the operators. Also, the trainer recommended that the operators should bring technicians from the agent when they need to exchange oil and air filters. The operators could receive on-the job training about these basic maintenance works from the technicians.

The second training was carried out in the middle of July 2015. The construction of the facilities was expected to complete in July 2015. This training focused on pump operation consisting of seven topics; 1) pre-operation inspection of the pump facilities, 2) preparation for pump operation including water injection to the suction pipe, 3) pre-operation inspection and operation of the generators, 4) operation procedure and inspection on the power distribution panel and the operation panel, 5) the number of the pump operators to be assigned and their roles when starting the operation, 6) cautionary instruction and handling errors, and 7) implementation of shutdown operation of the system. Since the training included on-site practical operation, the operators

On-site training about operation of the generator at Hididole and Ilan.

Training on pump facilities and operation (Badilaid)

Evacuation of the motors from the facilities and displacing them to the warehouse with wheeled platform (Ilan).

learnt some points of pump operation possibly leading to simple mistakes and errors.

The third training was carried out at the beginning of August 2015. The purpose of the training was to learn how to evacuate and protect motors from flood damage. It is important for the beneficiaries to know how to protect motors from flood damage because flooding season comes in August at Wabe Shabele River. The motors procured by the Project weights around 180 kg each and therefore it requires several people to evacuate them. For this reason, not only the pump operators but also representatives of the WUAs have participated in this training. The training participants actually removed the motors from the pumps and placed them to the warehouse, and it took around two hours to complete the whole process of evacuation of the four motors. Due to this practical training, the WUAs in Godiray and Badilaid sites successfully evacuated the motors without any damages when Wabe Shabele River was swollen in October 2015.

Although the irrigation schemes were not yet handed over from JICA to MOA and SLCRDB as at August 2015, Gode Woreda Administration Office requested Project team to operate the irrigation schemes in Godiray and Badilaid. The beneficiaries in these areas already started land preparation and they needed irrigation water. Basically, irrigation schemes should be operated under the supervision of a local government after the handover finishes; however, the irrigation facilities started their operation with the trained operators under the supervision of the JICA team. A member of the team stayed at the sites during their pump operation and provided on-the job training to the operators. This on-the job training was continued for around one month and enabled the operators in Godiary and Badilaid to properly operate and manage the pump facilities.

CHAPTER 7 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

Gode area is a severer place where food aids and other emergency assistances have been continuously provided. On the other hand, Gode area maintains high development capacity for irrigated agriculture in terms of temperature, soil fertility and topographic condition coupled with the plentiful water resources from Wabe Shebele river, a perennial stream. The irrigation systems developed through this project provides a new type of livelihood for the beneficiary farmersð an irrigated agriculture. It is expected that approximately 100 households per site, totaling to 400 farmer households, can benefit in the four irrigation systems.

Essentially, the project is to support beneficiary households to become independent from the food aids in the long run. To this end, Ethiopian government and Somali regional government should promote irrigated agriculture, where requested by the people in the area, especially for those who have lost their livestock due to droughts, and thus they become independent fully from the food aids. In this regard, two major issues should be considered:

1) The irrigation schemes were handed over to Ministry of Agriculture (MOA) and Somali Livestock, Crop and Rural Development Bureau (SLCRDB) from Japan International Cooperation Agency (JICA) in August 2015. On 7th of December 2015, it was further handed over to Gode Kelafo Irrigation Development Project Office (GKIDPO) from SLCRDB. GKIDPO should maintain the structures for operation and management of the irrigation scheme at the Gode site level, so that the irrigation scheme will be used properly for the coming irrigation season starting from March 2016 as well as future operation .

2) Due to delay of the transfer of the irrigation schemes to the Gode site level, the irrigation schemes have not unfortunately been operated by GKIDPO during the project period. MOA, SLCRDB and Somali Basin Development Coordination Bureau, which are higher authorities of GKIDPO should give necessary technical support to GKIDPO, and must monitor and support GKIDPO until it will be able to operate and manage the irrigation schemes properly.

3) For the sustainable use of pumping irrigation, beneficiary farmers need to produce certain amount of cash crops as to save money necessary for the operation and maintenance of pumping facilities. At the early stage of the development process, it would be necessary for the farmers to be engaged in a low-input and low-income type of farming systems, which is similar to what prevails in the area today. As they accumulate an experience in irrigated farming, then, farmers should be able to shift their farming systems toward a more high-input and high-income type of farming systems.

4) As to ensure the collection of water usersôfee and an appropriate operation and maintenance of irrigation facilities, water usersôassociations have been established in the project and a series of trainings have been provided. Yet, the real practice in organizational management and the operation of the facilities is about to start. For water usersô associations to become able to appropriately manage the organization, it may take some years in practice. Therefore, continuous support from the government needs to be given to the groups as to ensure the sustainable use of pumping irrigation systems until they become capable to manage by themselves.

7.2 Recommendations

Thorough the implementation of the project in and around Gode area, some lessons have been learned and some issues have been identified. The following summarize the recommendations made based on these lessons, which should be taken into consideration when pursuing irrigation development in this area, but can be changed or modified according to the specific circumstance of social, economic and natural conditions of the area.

Development Strategy in the Area where People Depend on the Food Aids

1) Gode area is one of the priority areas of the food aids, making it difficult to satisfy both emergency assistance and development project at the same time. In some area, beneficiaries are allegedly afraid of losing a right of materialistic support by accepting development projects. In such areas, it is not easy to cultivate a proper understanding of the beneficiaries to the project. It must be remembered that beneficiaries are willing to get benefits from both development projects and other direct support like the food aids.

2) Considering the dependency syndrome harnessed by the food aids in the area, Ethiopian government needs to state a clear vision shifting from the food aids to the development assistance, by which the awareness of the people can be gradually changed. Although Gode area is politically unstable and affected by the frequent droughts, it still maintains high potential for irrigated agriculture enabled by the water resource from Wabe-Shebele river. Thus, a long-term development strategy should be established. By sharing that strategy with other donors and NGOs who are engaged in emergency assistance, departure from the food aids as well as the regional development should be pursued.

Use of Government’s Construction Equipment for the Irrigation Development in Gode

3) Along with JICA’s irrigation development project in Gode area, Ethiopian government has distributed number of mobile engine-pumps to the communities in and around Gode. As to expand the irrigated area in the future, construction of irrigation canals are also necessary. What is challenge in construction of canals is an extremely high renting cost of construction equipment in Ethiopia, hourly fee of which in Ethiopia is almost equal to the daily fee in Japan. When developing irrigation systems in Gode in the future, therefore construction equipment owned by the government should be employed for direct force account of the government. Even for the irrigation development initiated by the donor or the NGOs, the government should consider renting out the equipment for free as to minimize the total cost.

Proper Management and Maintenance of the Irrigation Schemes

4) In order to continue to the irrigated agriculture, letting the irrigation schemes keep good condition is required, and accordingly it is necessary to maintain the irrigation schemes properly and periodically. Therefore, it is necessary to finish the delegation of the irrigation scheme to the local government organization as soonest and to ensure the structure for operation and management of the irrigation scheme in the field level,

5) Water User Association (WUA) has responsibility to take daily base check and repair such as earth canal maintenance, on other hand the government organization has responsibility to take the maintenance need technical, such as maintenance of water structure which WUA cannot deal with, periodical maintenance of pump facilities and replacement of the spare parts for the equipment. It is important for each organization to understand the role and to fulfill their responsibility, in order to keep the irrigation scheme proper.

Capacity Development of DA for the Promotion of Irrigated Agriculture using Pumps

6) In Gode area, pumping irrigation is the only choice for irrigated agriculture due mainly to the topographic condition of the area. As to continue pumping irrigation in such areas, profitability of irrigated agriculture is the key for the beneficiaries to be able to bear the running cost of

pumping facilities. Unfortunately, the number of agricultural specialists and DAs who are knowledgeable about the plant physiology and/or farming techniques is limited; thus quite limited extension activities are done at moment. Furthermore, as NGOs working in the area are engaged mostly in the emergency assistance or humanitarian support, their expertise in agriculture sector is limited. In fact, agricultural specialists can be found in the cities like Addis Ababa and Jijiga, but they are not usually willing to work in such an area for a longer period of time where natural conditions are pronouncedly severer.

7) Therefore, increase in the number of such experts and their capacity development should be considered as a long-term target, including the capacity development of existing officers deployed in Gode and the employment of new officers. In particular in developing human resources in Gode, it can be a strategy to select those who are willing to work in Gode in the future, and then provide them with training opportunities at colleges or vocational schools. As discussed earlier, the food aids are embedded in the social system of Gode area, development policy can be only accomplished with a long-term strategy in human resource development.

Strengthening of Water Users Associations and Further Support by the Government Institution

8) As to make the pumping irrigation systems sustainable, budget for operation of pumping facilities, proper operation of the facilities, and periodical maintenance of the facilities are essential, for which collection of water usersô fee and daily operation of water usersô associations need to be in practice. The water usersô associations of the irrigation systems developed by the project are composed of approximately 100 households per system. Different from those for small-pump irrigation managed by a few number of people, beneficiaries need to coordinate and share the running cost of the irrigation system in such a bigger system. Water usersô associations usually requires a few years of experience to be able to do proper management of the system. Therefore, continuous support from the government agency needs to be provided until they become capable of doing operation and maintenance.

9) It is difficult for the water usersôassociations to procure spare parts of the pumping facilities by themselves. Knowing that Ethiopian government has introduced a large number of engine pumps in the area, an area-wide distribution system of the spare parts should be better established, in which an enough number of spare parts will be in stock and a timely distribution can be realized. In addition, while the daily maintenance should be under the responsibility of water usersô associations, periodical maintenance done every after operation period reached a certain hours should be supported by the government. Particularly, the government should dispatch mechanics and arrange the parts for the periodical maintenance.

Climate Change and Ensuring of Pump Evacuation from Flood

10) Only available irrigation means in and around Gode area is of pump irrigation as established under this project. Taking into account the suction head able to lift up the river water, the pump should be installed on the slope of the river frequently affected by flood. In previous years, high flood level used to take place in May (as was the case in 2013); however recent climate change all affects the rainfall pattern over Ethiopia and for example the maximum flood took place in October in the year of 2014. Therefore, to cope with this sort of unpredictable floods associated with climate change, evacuation of the pumps before flood reaches the location should be well organized or otherwise the pumps shall be set at the predetermined location only during the pump operation period.

PART IV

COMPONENT III

(WEATHER INDEX INSURANCE)

CHAPTER 1 AGRICULTURAL RISKS AND WEATHER INDEX INSURANCE (WII)

The overall purpose for Weather Index Insurance (WII) introduction in this Project is to enhance resilience for those farmers who practice agriculture in the low and erratic rainfall areas of Oromia Region. Woredas and kebeles selected as the pilot project target areas have been suffering from various agricultural risks including weather related ones. This chapter discusses general concepts of agricultural and weather risks, crop insurance including WII in order for us to have clear picture of how WII can be one of effective risk management tools. In addition, WII related experiences in Ethiopia and lessons learned are presented:

1.1 Agricultural Risks and Crop Insurance

1.1.1 Agricultural and Weather Risks

Table 1.1.1 shows key risks farmers face. The existence of multiple risks in agriculture should be well noted. Managing risks in agriculture is challenging as risks that the rural farmers are facing are highly correlated, resulting in whole communities being affected at the same time. For farming communities, there is often no other options than to sell assets, normally at distressed price when they are hit by natural calamities, e.g. drought.

Table 1.1.1 Key Risks Facing the Farmers

Risk	Example/Factors	Effects
Weather	Rainfall or temperature variability or extreme events	Lower yields, loss of productive assets or income
Biological	Pest, disease, contamination	Lower yields, loss of income
Price	Lower price, market supply and demand, volatility	Lower price, loss of income
Labor and health	Illness, death, injury	Loss of productivity, loss of income, increased costs
Policy and political	Regulatory changes, political upheaval, disruption of markets, unrest	Changes in costs, taxes, market access

Sources: "Weather Index Insurance For Agriculture: Guidance for Development Practitioners" The World Bank, p2

From a weather risk management point of view, there are two main types of risks: 1) sudden, unforeseen events for example, wind storms or heavy rain, and 2) cumulative events that occur over an extended period for example, drought. The impacts vary widely according to crop type and timing of the occurrences of mishap. Then, key weather risks are summarized in Table 1.1.2. Short-duration extreme weather events such as hail, windstorm or heavy frost can directly cause devastation of crops. While the final outcome of cumulative events could be devastatingly obvious, much of the damage would have already occurred earlier during a stage of crop development.

Table 1.1.2 Key Risks Faced by Farmers

Risk	Description
Drought	-Crop varieties adapted to mean rainfall and water balance -Rain-fed agriculture predominates globally -Annual or multi-annual -Key risk to livestock
Excess rainfall and flood	-Excess rainfall causes direct damage and indirect impacts -Riverine, flash, coastal floods, -Watershed management, drainage, irrigation have impact on flood
High temperatures	-Impact on evapo-transpiration and related to drought -Seasonality and vulnerability to crop stage
Low temperatures	-Frost (shot-term low temperature, early and late season damage) -Freeze (winterkill) -Growing degree days (lack of warmth during season)
Wind	-Cyclonic severe events (hurricane or typhoon) -Frontal windstorm -Local sandstorm and tornado
Hail	-Localized, but may be severe

Sources: "Weather Index Insurance For Agriculture: Guidance for Development Practitioners", p6, The World Bank, November 2011.

1.1.2 Types of Agricultural Insurance

Insurance is one of the tools that farmers can use to hedge risks that are too large to manage on their own. Part of that risk is transferred to another party, who takes it in return for a fee or called premium. Where available and affordable, agricultural insurance can provide great benefits to farm households in following ways that:

i) Insurance can be used to complement other risk management approaches. Farmers can rely on informal household- and community-level strategies such as crop and labor diversification to manage small to moderate risks. In the event of major weather related shocks, insurance, if available, can be used to protect the insured households against production loss This enables such households to avoid selling livelihood assets or drawing on savings, and

ii) Insurance can assist farmers in accessing new opportunities by improving their ability to borrow either money or in-kind credits. In doing so, farm households may potentially experience safer and possibly higher returns.

Crop insurance products can be broadly classified into two major groups as shown in Table 1.1.3: indemnity-based insurance which is represented by Multiple Peril Crop Insurance (MPCI) and WII. WII is a simplified form of the insurance in which indemnity payments are based on values obtained from an index that serves as proxy for losses rather than upon the assessed losses of each individual policy holder. The sum insured is normally based on production cost on an agreed value basis, which is fixed in the policy in advance, and payouts are made based on a pre-established scale set out in the insurance policy.

Table 1.1.3 Summary of Comparison between WII and Conventional MPCI

Particular	**Weather Index Insurance (WII)**	**Multiple Peril Crop Insurance (MPCI)**
Summary	• Payouts based on weather based indices • Index trigger, exit, increments set to expected loss of yield • Can be complex to design • Limited experience to date	• All perils, few exclusions • Yield-based policy • Measure harvested yield • Compare to a % of average yield • High cost, often requires subsidy • Many failed attempts
Perils	• Main: rainfall deficit and excess; high, low, or prolonged temperatures • Other: high wind, sun • Combinations of above	• A wide list of perils • Difficult to exclude perils, as causes of loss cannot be identified • Occasionally includes some price risk
Benefits	• No adverse selection*, moral hazard, • Can address catastrophe perils affecting group • Transparent, objective	• More easily made into a “universal” product type • Limited technical adaptation required for different crops • Guarantees farmer production and income
Challenges	• Basis risk* is key challenge • Setting up the index parameters is • technically complex • Need good meteorological and • agronomic data, crop modeling • Difficult to correlate damage for sudden-impact weather	• Individual farmer loss assessment, major loss adjustment task, impartial loss adjustment difficult • Adverse selection (worst farmers benefit) • Moral hazard (exploitation of policy) • Major work to set up yield history for each farmer, poor data • High premium and administrative cost

Summarized by RREP based on “Weather Index Insurance for Agriculture: Guidance for Practitioners “, p10, The World Bank, November 2011.
*Basis risk is the potential mismatch between contract payouts and the actual loss experienced by individual farmers. Basis risk occurs when the weather index does not adequately indemnify the grower for his losses. However, basis risk can often be minimized by effective and simple contract and pilot design.

Although the development and application of WII is still in its early stage over the world and especially in Africa, there are a number of theoretical advantages as indicated in the following:

i) Reduced risk of adverse selection; adverse selection[1] can occur in agricultural insurance

[1] Adverse selection is a situation wherein an individual's demand for insurance is positively correlated with the individual's risk of loss (e.g., higher risks buy more insurance), and the insurer is unable to allow for this correlation in the price of insurance.[1] This may be because of private information known only to the individual (information asymmetry), or because of regulations or social norms which prevent the insurer from using certain categories of known information to set prices (e.g., the insurer may be prohibited from using such information as

because farmers are more likely to buy insurance if there are higher risk. Underlying this is an asymmetry of information, which places the insurer at risk. Advantage of WII is therefore that farmers subscribe based on terms, conditions and payout scale for all farmers in their defined area, virtually eliminating the adverse selection problem for insurers.

ii) Reduced moral hazard; in traditional insurance farmers may be able to influence the claim (by exacerbating physical losses) through their behavior, a phenomenon referred to as moral hazard. With WII, farmers have no ability or incentive to influence the claim since payout is based on an independent and exogenous weather parameters, which are completely independent from farmers' behavior.

iii) Eliminated field loss assessment; loss assessment is a challenge for any crop insurance program because of the need to mobilize large numbers of skilled or semi-skilled assessors who should possess some agronomic knowledge. The ability of WII to make payouts without field assessment clearly reduces administrative cost by eliminating the need for assessors.

iv) Assured transparency; the assessment process in traditional products often leads to disputes between farmers and assessors due to the partly subjective nature of the loss adjustment process. WII contracts are based on the measurement of weather at defined weather stations (or satellite weather data) and are therefore extremely objective and theoretically less likely to lead to disputes. It is however noted that basis risk sometimes becomes the real driver for dispute.

Despite the apparent advantages of the WII product, practical implementation through existing pilot projects and feasibility studies has shown that there are a number of challenges or disadvantages inherent with WII products. These challenges or disadvantages can be summarized as follows:

i) Basis risk; basis risk is the most problematic feature of WII. It is the difference between the payout as measured by the index and actual loss incurred by farmer. Because no field loss assessment is made under WII, the payout is based entirely upon the index measurement, and therefore could be either higher or lower than the actual loss.

ii) Data availability: Despite simpler data requirements, accurate and complete data sets are required for WII product construction/development. This applies to the historical records of the chosen weather parameter(s) for underwriting and pricing purposes and for the recording of the parameter(s) for payout calculations during the period of insurance, as well as historical yield data to assess risk, and design and price the product.

iii) Need for farmer/ insurer/ regulator capacity building and education; WII is a new concept for farmers, and therefore any rollout of the product requires intense education programs to help them to understand the principle of the payout system and also the fact that it covers only one risk variable; that is rainfall. For insurers, this is new type of insurance product, whereby they require substantial technical assistances in construction of WII contracts and the indexes, and extensive capacity building should also be conducted to enable them to undertake product construction on sustainable basis.

1.1.3 Contract Parameters

The concept of payout based on amount of rainfall is shown in Figure 1.1.1. There are two technical terms that we need to be familiarized to know the mechanism of the WII payouts. First key term is a "Trigger"; point showing rainfall amount at which payout begins, while the other is an "Exit"; point which shows rainfall amount at which maximum payout is made. Between trigger and exit points, the

gender, ethnic origin, genetic test results, or preexisting medical conditions, the last of which amount to a 100% risk of the losses associated with the treatment of that condition).

payout amount will be partially made depending on the pre-set indices[2].

There is an issue here to discharge the above mechanism. If a trigger is determined only by “total” accumulated rainfall amount during the period, farmers may face following problem; payout never happens even if the total amount of rainfall was to be more than the trigger point suppose if farmers have had heavy rainfall at very limited time while in the rest of the period they faced small rainfalls. In order to avoid this problem, a concept of “Cap” which specifies ceiling rainfall amount during each 10 days is included for the index construction. The concept of cap is as follows;

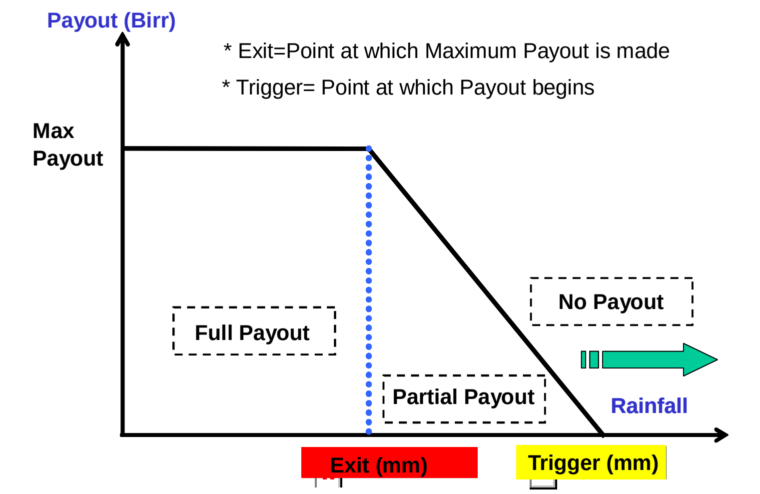


Figure 1.1.1 Graphic Image of Payout
Source: JICA RREP Team

Case 1: Given actual rainfall data for eight dekads (10days) in Table 1.1.4 and **trigger is set at 70mm** and **exit is set at 35mm** as a simulation;

Table 1.1.4 Simulation of CAP and Payout (Actual Rainfall)

Dekad	1	2	3	4	5	6	7	8	Total
Rainfall	20mm	3mm	0mm	9mm	40mm	5mm	10mm	45mm	**132mm**

Table 1.1.5 Simulation of CAP and Payout (Adjusted Rainfall): Case 1 (CAP 15mm)

Dekad	1	2	3	4	5	6	7	8	Total
Rainfall	**15mm**	3mm	0mm	9mm	15mm	5mm	10mm	**15mm**	**72mm**

Table 1.1.6 Simulation of CAP and Payout (Adjusted Rainfall): Case 2 (CAP 10mm)

Dekad	1	2	3	4	5	6	7	8	Total
Rainfall	**10mm**	3mm	0mm	9mm	**10mm**	5mm	10mm	**10mm**	**57mm**

Table 1.1.7 Simulation of CAP and Payout (Adjusted Rainfall): Case 3 (CAP 5mm)

Dekad	1	2	3	4	5	6	7	8	Total
Rainfall	**5mm**	3mm	0mm	**5mm**	**5mm**	5mm	**5mm**	**5mm**	**33mm**

If cap is set at 15mm (Case 1), ARF (Adjusted Rainfall) is calculated as **15**+3+0+9+**15**+5+10+**15** = **72 mm** as shown in Table 1.1.5. ARF (72mm) is larger than the trigger (70mm) amount, and therefore payout will not be made in this situation. Then, if cap is set at a smaller amount than Case 1, say 10mm, ARF is calculated as **10**+3+0+9+**10**+5+10+**10** = 57 mm. ARF for Case 2 now exceeds the trigger amount, but still it is not smaller than exit amount. Payout in this Case 2 will therefore be made partially. Last example, Case 3, if cap is set at 5mm, ARF is calculated as; **5**+3+0+**5**+**5**+5+**5**+**5** **=** 33 mm and this amount is smaller than that of the exit amount. Therefore, the payout will be made at full amount.

After the “Exit”, “Trigger” and “Cap” have been determined, the payout shall be calculated as follows, and there will not be payout in case the payout rate $\leq$ 0, and in case ARF $\leq$ Exit, the payout will be maximum.

◆Payout Rate= $\frac{\text{Trigger-ARF}}{\text{Trigger-Exit}}$ x 100% ◆Total Payout Rate=Payout Rate x Total Sum Insured

[2] See Chapter 4.3 for a detail procedure of calculation of partial payout.

1.2 Overview of WII Related Projects in Ethiopia

Drought or shortage of rainfall is one of the main natural disasters in Ethiopia. Some donors and international organizations have tried to introduce "Index-based Insurance" to overcome this disaster. This new type of insurance has been applied for variety of weather related problems such as drought damage on crops and loss of livestock due to severe drought conditions. For instance, Oxfam America launched a WII Project to reduce drought risk in Tigray in 2009 and International Livestock Research Institute (ILRI) launched a Livestock Weather Index Insurance in Borena Zone, Oromia region in 2012.

Index-based insurance is categorized into three different layers depending on purposes of the insurance; 1) macro level, 2) meso level, and 3) micro level. At the macro level, the insurance mainly targets governments to protect the whole country against natural disasters such as drought. Main targets of the meso level are MFIs (Microfinance Institutions), NGOs, and farmers' associations. On the other hand, micro level covers individual farmers to reduce drought risk at individual farm level.

In Ethiopia, WII has been introduced at both macro and micro levels since 2006. From available literature and documents, the first index-based insurance project was conducted by WFP in 2006 as a macro level drought index-based insurance. In this project, WFP made a contract with Axa Re (French Insurance Company). There were no extreme weather events during the contract period (2006-2007). Hence, the Government of Ethiopia did not receive any payout from the insurance company and they decided not to renew the contract further.

Regarding micro level WII projects, World Bank tried WII in SNNPR (Southern Nations, Nationalities and People's Region) in 2006, and Oxfam America also started WII in Tigray region in 2009. Till year 2014, five micro WIIs were implemented in Ethiopia. Some of the projects just finished only by one year experience, while some other projects still continue providing WII.

1.2.1 Summary of WII Related Projects at Micro level in Ethiopia[3]

Five WII projects at micro level were identified in Ethiopia as shown in Table 1.2.1 at the commencement of this Project. Two projects of them have been still under implementation; HARITA project implemented by Oxfam America in Tigray region, and IFPRI project in Oromia Region. Others than these two projects were implemented only during one season. Since there was not enough available information about the IFPRI project (no.4 in Table 1.2.1), following discussion elaborates the rest of the four WII projects.

Table 1.2.1 WII Projects Implemented in Ethiopia

Particular	1	2	3	4	5
Year	2006	2009-on going	2009	2010	2011-on going
Main Donor	World Bank	Oxfam (HARITA*)	WFP	IFPRI	IFPRI
Insurance Company	EIC*	1. NISCO* 2. AIC*	NISCO	NISCO	OIC*
Re-insurance	None	Swiss Re	None	NA	Africa Re
Region	Southern Region	Tigray	Oromia	Oromia	Oromia
Target Area	Alaba woreda	Starging from Adi Ha (now, other 77villages)	Boset woreda	Liban (East Shewa)	Bako tibe (West Shewa), Dodota (Arsi), Shashamane (West Arsi)
Intermediary	Agri-coop	MFI Agri-coop	Agri-coop	Agri-coop	MFI
Crop	Maize	Maize, Barley,	Haricot Beans	Maize, Barley	Maize, Wheat,

[3] This sub-chapter is summarized based on the information collection during Phase I, therefore, numbers etc. are as of interviewed. Updated and additional information on the WII related project are discussed in Chapter 5.

Particular	1	2	3	4	5
		Sorghum, Teff, Wheat			Haricot bean, Teff
No. of Insured Farmers	28	13,044 (2011)	137	NA	1,283 (2012)
Premium Rate	10 %	5% - 30%	11.5%	NA	15% - 20%
Weather Data	Ground Station	Satellite	Ground Station	Ground Station	Ground Station

Source: JICA RREP Team as of surveyed in 2012
* EIC: Ethiopian Insurance Corporation, NISCO: Nyala Insurance Company S.C, OIC: Oromia Insurance Company S.C, AIC: Africa Insurance Company S.C, Horn of Africa Risk Transfer for Adaptation

1) World Bank and Ethiopian Insurance Corporation (2006)

World Bank and Ethiopia Insurance Corporation (EIC) carried out a pilot WII project in 2006. They introduced the WII in Alaba in Southern Nations, Nationalities, and People's region. The WII covered the risk of rainfall shortage for maize production. Indices were constructed based on historical rainfall data from ground weather stations, and the insurance was designed to cover three critical growing stages for maize. EIC distributed the WII through two agricultural cooperatives.

Maximum payout of the insurance contract was set at 1,000 birr, which was average production cost of maize in the target woreda. They also set minimum premium at 100 birr, so that the premium rate of the insurance was 10%. This WII pilot project resulted in a small transaction; 28 farmers purchased the WII to protect the crop from drought risk. Since the transaction was small, EIC could not find reinsurers in this project. According to EIC, one of the main difficulties for them in this project was to arrange reinsurance for scaling up and continuation of the pilot project.

World Bank and EIC pointed out three major challenges in this pilot project; 1) Lack of weather data, 2) Limited marketing channels, and 3) Limited capacity of local insurer. Since weather data is a key to develop weather index insurance products, lack of sufficient data could be a main constraint for further development of WII in Ethiopia. In addition, lack of strong distribution channels was also one of the constraints to make the project scalable. Also, reinsurance should be arranged when trying out the scaling up of the WII because risk taking capacity of local insurer is limited.

2) The Horn of Africa Risk Transfer for Adaptation (HARITA) Project (2009-)

HARITA launched a WII project in Tigray in 2009. Oxfam America coordinates wide range of stakeholders from local NGOs to an international reinsurer. The main target of the project is vulnerable farmers under PSNP (Productive Safety Net Programme). NISCO has played as a national insurer from the beginning and AIC has also participated in this project since 2011.

The premiums range from around 5% to 30% depending on the frequency of drought. One of the characteristics of this project is "Insurance for Work (IFW)" scheme. Farmers can purchase the insurance through labor instead of paying cash for the premium. The project started from one kebele with 200 singed-up farmers in 2009. The project expanded to five febeles and 1,283 farmers purchased the insurance in 2010. The project sites scaled-up to 43 kebeles with 13,044 farmers in 2011 and 81 kebeles with approximately 23,000 farmers in 2014.

Another characteristic of the HARITA project is that they developed the WII based on satellite weather data and not based on ground weather station data. One of the advantages of the satellite weather data is its scalability since such satellite data can be available covering quite wider areas e.g. over African continent. It is in fact possible to introduce the WII in the areas where there are no ground weather stations. This new technology seems to have contributed to the rapid expansion of the project coverage areas.

3) WFP and Nyala Insurance Company S.C. (NISCO), 2009

NISCO launched a WII project in Boset woreda, Oromia region with support of WFP in 2009. The insurance covered drought risk on haricot beans. The insurance contract was designed to target three growing stages of haricot beans; namely, 1) initial stage (1 July to 20 August), 2) the mid-flowering phase (20 August to 10 September), and 3) the final ripening stage (11 to 30 September). NISCO sold the insurance through the Lume Adama Famers' Cooperative Union (LAFCU).

The premium rate was set at 11.5% and 137 farmers were insured with the premium of 73,490 birr (US$ 4,100) collected in 2009 season. In this project, the LAFCU paid all the premium amounts on behalf of the individual member farmers. The rainfall amount during the contract period in 2009 was below the triggering point, so that NISCO made the payout 309,160 birr (US$17,000).

The main lessons learnt in this pilot project are institutional arrangement and insurance education for the farmers. The institutional arrangement caused mainly two problems. One is reinsurance arrangement. NISCO could not find any reinsurers in this project, and accordingly they had to take all the risks. Another problem was the institutional arrangement between LFACU and NICSO. As mentioned, there was payout during the contract period. According to the insured farmers, they had to wait for two months after the end of the contract to get the payout. They said that payout process should be improved to become more transparent and efficient.

Farmers' education is one of the critical aspects for WII project implementation. NISCO did not conduct effective farmers' awareness creation on the WII. In fact, some of the farmers who purchased the insurance mentioned that they did not understand why they could get the payout from NISCO. NISCO did not add the costs for marketing and for the farmers' education on the premium and payout. Besides, the farmers did not spend their own money on the insurance, rather LFACU paid all the premiums on behalf of the farmers. Therefore, the impact of WII on individual farming seemed to be limited.

4) International Food Policy Research Institution (IFPRI) and Busa Gonnafa MFI (2011-)

International Food Policy Research Institution (IFPRI) has been implementing a WII project in Oromia region since 2011. IFPRI has provided technical and financial support to Buusaa Gonofaa Microfinance Institution to implement the project. Oromia Insurance Company S.C. (OIC) has also participated in this project; however, main role of OIC is limited to share the risk with Buusaa Gonofaa. All the groundwork of the project such as farmers' education, marketing of the WII, collecting premiums and distributing the payout has been done by Buusaa Gonofaa.

They have introduced the WII in three woredas in Oromia region; Shashamane, Adama/Dodota, and Bako/Tibe. The main target crops of this project are maize, teff, haricot beans, and wheat. IFPRI designed the indices by each month from May to September. Also, there are two types of indices, "Severe" and "Moderate", in each month. Farmers can purchase the insurance in any months and they will get the payout at the end of the month if the monthly rainfall amount is below the pre-determined level.

The premiums are 75 birr for the severe index and 125 birr for the moderate index. Maximum payout is 500 birr for both the severe and the moderate. Hence, the premium rates are 15% and 25% respectively. IFPRI has given a premium discount to the farmers. The discount rates vary from 10% to 60% of the premiums. Around 500 farmers purchased the WII in the initial year of the project (2011). In 2012, the number of signed up farmers increased to 1,283 farmers. Total premium amount was 115,175 birr in 2012, and 65,311 birr of the total premiums were actually collected from the farmers. Therefore, IFPRI provided around 43% of the total premiums as subsidiary.

According to IFPRI and OIC, they have practiced Crop Cutting Experiment (CCE) to avoid basis risk. One of the constraints for insurance companies to start WII is reputational risk. If weather index insurance is not well reflected to the actual damage on the ground, farmers will no longer believe the insurance companies. This situation would have negative impact on the reputation of the insurance company itself who deals with such insurance. Therefore, IFPRI and OIC have decided to conduct the CCE in this Project.

1.2.2 Regulatory Situation

An appropriate regulatory framework is necessary for further development of Weather Index Insurance in Ethiopia. World Bank has started support for the Government of Ethiopia to develop Microinsurance Regulatory Framework since July 2012. In February, 2013, World Bank and the National Bank of Ethiopia held a workshop to finalize a draft microinsurance regulatory framework. The regulatory framework covers different types of microinsurance products including index-based insurance.

According to the National Bank of Ethiopia, this new regulatory framework may include specific regulations for Weather Index Insurance such as product approval, appropriate premium setting, and reinsurance arrangements. This situation may imply rapid growth of index-based insurance in Ethiopia. The licensing directives have already been delivered to the board for approval and the rest of the directives are reviewed, and discussions with stakeholders are planned to be carried out in last week of December 2014.

1.2.3 Activity Areas Intervened by Donors

Three main areas for donor support for WII introduction have been identified as: 1) technical support for WII product construction, 2) groundworks/ field operation such as conducting trainings for awareness creation on the farmers, collecting premium, etc., and 3) infrastructural support such as establishment of weather stations. Table 1.2.2 shows how each of the donors has supported by area. Donors utilized technical supports from research centers of universities for WII index construction. In addition, it was pointed out by donors interviewed that ground work requires much time and budget during the project implementation because the concept of WII is still new and thus training and marketing activities shall be the core activities of and WII project.

Table 1.2.2 Donor Support Areas in Five WII Projects in Ethiopia

Donor	Technical Support	Ground Work	Infrastructural Support
World Bank	・ Index construction ・ WII Product Design	・ Support for selling product through agricultural cooperative	—
Oxfam America	・ Index construction and WII product design through Columbia university ・ Re-insurance arrangement	・ Support for selling product through local NGO	・ Establishment of weather station ・ Distribution of plastic rain gage
IFPRI	・ Index construction and WII product design through Oxford university ・ Re-insurance arrangement (under process)	・ Support for selling product through MFI	—
WFP	・ Index construction and WII product design through WFP Headquarter	・ Support for selling product through agricultural cooperative	・ Establishment of automatic weather station

Source: RREP Based on Interviews

1.2.4 Lessons Learned from Other WII Related Projects in Ethiopia

As earlier mentioned, WII related projects implemented in Ethiopia are quite limited to date, and accordingly experiences and lessons learned so far are also limited, yet the following points were observed through the interviews with the donors, MFIs, and local NGOs involved in those WII projects.

1) Premium Collection

In HARITA project, a unique scheme called "Insurance for Work (IFW)" was introduced, under which farmers can pay the premium by labor instead of cash. Most of the target farmers are PSNP beneficiaries and this idea was proposed by the farmer themselves. Amount of the "Insurance for Work" is set as same standard with PSNP, 14 birr/day and the cash for work is planned during July to September when there is no PSNP work based on the interviews to the Relief Society of Tigray (REST) Head office, the national NGO in charge of the program in the region. About 11,000 farmers among approximate 13,000 paid premium by labor in 2011.

REST provides the work for the "Insurance for Work" arrangement to the beneficiary farmers and pay the premium on behalf of them. In short, financial support from Oxfam America for premium payment enabled the project to increase the insurance holders from 200 farmers in 2009 to as many as 23,000 farmers in 2014. REST has also started to request the beneficiary farmers to pay 10 % of the premium in cash in order to assure sustainability in 2012, and also has a plan to increase the farmers' burden gradually in future[4].

On the other hand, under IFPRI's on-going pilot project in Oromia region, IFPRI supports premium payment partly by a form of subsidy. Under WFP project, agricultural cooperative paid whole amount of the premium and farmers did not pay any part of it at all. These examples show that if the farmers themselves cannot pay for premium, continuation or expansion of the pilot project may be difficult after the termination of projects.

2) Utilization of Satellite Date

HARITA project has been utilizing satellite data for WII index construction and also payout assessment. Advantages of utilizing the satellite data are; 1) it enables the project to construct the index even where weather data from ground station is not available, 2) it is easy to expand the area, and 3) there are little chances that the data is manipulated. Of course, there are also disadvantages in utilizing the satellite data. The Team was given information from NMA (National Meteorological Agency) that weather data collected by ground weather station rather matches what farmers perceive by their own than satellite data, and also satellite date may be different under the condition when there are much clouds.

Nevertheless, since what the RREP is to conduct is a sort of pilot project and final target will be the expansion of the areas based on the experiences through the implementation of the pilot project, it may be preferable to use satellite data. In fact, HARITA project could expand the area for WII index construction from one kebele in Tigray region to 84 kebeles in Tigray and Amhara regions in 2014 by utilizing the satellite data.

On the other hand, other projects utilized weather data from NMA for WII index construction and for monitoring and assessment of the rainfall as well. One of important criteria for selection of the target areas is therefore whether the area has ground weather station or not in these cases. For this reason, the project target area is usually very limited and such project utilizing ground weather station cannot expand the coverage areas easily.

3) Existence of Active National Partners

In HARITA project, REST has been playing a key role as the window to the farmers and for the project. Since this Ethiopian NOG has been operating within the area, it is well known by farmers

[4] In 2013, 43 kebeles among 79 kebeles offered IFW option, namely, 36 kebeles were offered the option to purchase insurance with cash only ("*R4 Quarterly Report April to June 2013*", WFP / Oxfam America)

even before having started the project. This makes them easy to introduce new concept of WII to farmers who normally show hesitation to adapt or start new practice, resulting in expansion of the coverage area together with other reasons afore-mentioned.

As for other projects, there are no such cases HARITA deployed, but agricultural cooperative unions played the REST role as intermediaries and the window. For example, under the WFP and IFPRI project, insurance company and cooperative unions had explained the WII concept to the farmers. According to the interviews with IFPRI, it was difficult for the project to build up the strong relationship with cooperative unions and farmers because insurance companies have not had any experience for selling the product in the area before the project intervention.

Therefore, IFPRI has decided to engage a MFI named Busa Gonnafa which has been operating in the area. The Busa Gonnafa has played a role of intermediary on behalf of IFPRI. With this arrangement wherein the MFI was engaged in delivering the WII product, collecting the premium and disbursing the payout, number of policy holder has reached to 1,537 in 2012.

4) Capacity of National Insurers

Looking at the past WII related projects, some of insurance companies could not arrange reinsurance. It may not be a big problem when insurance companies implement a small scale pilot project without reinsurance arrangements. However, it will be a certain problem for the national insurance companies, when the pilot project becomes larger in scale. In fact, some of the insurance companies asked the JICA team to arrange reinsurance. Most of the national insurance companies do not have any connections with reinsurance companies, which are also able to take weather index insurance risks.

In this regards, donors and international organizations are necessary to support national insurers to connect international reinsurance market. The regulatory framework will also help national insurance companies to promote reinsurance arrangements. In addition, technical capacity of national insurance companies should be enhanced in order able to develop their own weather index insurance products. From this point of view, both risk taking capacity and technical capacity should be strengthened for the further development of index-based insurance in Ethiopia.

CHAPTER 2 TARGET AREAS FOR THE WII INTRODUCTION

Oromia region is made up of 11 zones, in which the capital Addis Ababa is located. This region covers the biggest area in Ethiopia geographically as well as the most prosperous area in term of agricultural production, called "bread basket" in the Country. The altitude of the region varies from 400m to above 4,000m over the huge geographical area, and therefore the rainfall also shows a big variation ranging from 500 mm to as much as 2,000 mm (see Figure 2.1.1 for annual rainfall variation). The region is classified into 4 categories according to the agricultural production; 1) cereal (surplus) production area, 2) coffee production area, 3) agricultural & food deficit area, and 4) pastoral & food deficit area as shown in Table 2.1.1.

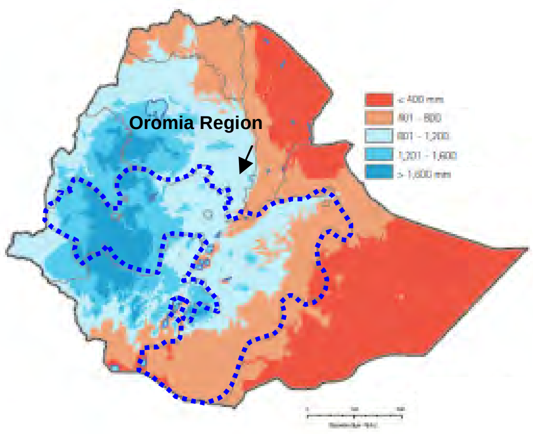


Figure 2.1.1 Annual Rainfalls
Source: "Atlas of the Ethiopian Rural Economy", CSA, EDRI and IFPRI

Table 2.1.1 Agricultural Classification of Oromia Region

Classification	Zone	Natural condition	Main crops
Cereal (surplus) production area	North Shewa, West Shewa, (South-West Shewa), East Shewa, Arsi, West Arsi.	Variety of Agri-ecological Zone. Soil degradation is critical due to over production and shortage of rainfall	Teff, Wheat, Barley, Maize, Haricot bean, Field pea, Faba bean, Chick peas, Tomatoes, Onions, Irish potatoes
Coffee production area	Horo guduru, West wellega, Eest wellega, Kelem wellega, Illubabor, Jimma	Sufficient rainfall, Agric& fertile soil (Nitosols) dominated area.	Coffee, Maize, Sorghum, Teff, Banana, Neug, Spice seeds(Cumin, Fenel)
Agricultural & food deficit area	West Harerge, East Harerge, part of Bale	50% is lowland. High temperature through year(21-30°C) and low rainfall	Sorghum, Maize, Haricot bean, Groundnuts, Sweet potatoes
Pastoral & food deficit area	Part of Bale, Guji, Borena	Lowland is majority, but temperature is not so high.	Maize, Wheat, Barley, Haricot bean, Enset, Coffee

Source: JICA RREP Team based on information from Oromia Bureau Of Agriculture

2.1 Target Areas Selection for the Phase I WII Introduction

2.1.1 Identification of Potential Zones and Woredas

"WII Introduction" is made to low and erratic rainfall highland areas in Oromia region. Therefore, the Team firstly selected 5 zones of East Shewa, West Shewa, West Arsi, Arsi, and North Shewa for the potential target areas based on the interview results with the counterparts. The areas were selected based on the information of; 1) facing low and erratic rainfall, resulting in fluctuated production, 2) production being important from the point of food security in Ethiopia, and 3) that WII could be one of the solutions for fluctuated agriculture production.

Then, the Team proceeded to the selection of potential woredas from those zones based on the following criteria; 1) agricultural production condition, 2) rainfall condition, 3) environmental potential, 4) capacity of agricultural cooperative unions or primary cooperatives (PC), 5) existence of weather station(s) within or proxy to the target woredas, and also availability of the necessary data, and 6) WII experience.

Based on the information from Oromia Bureau of Agriculture, zonal/woreda agricultural offices, and relevant survey results, 20 woredas were short-listed, and then potentials of each woreda were examined based on the above-mentioned criteria. First ranking result was; 1) Boset (East Shewa)-11, 2) Arsi Negele (West Arsi)-10, Bora (E/Shewa)-10, 3) Adami Tulu (E/Shewa)-9, 3) Ziway Dugda

(Arsi)-9, and 3) Ilfata (West Shewa)-9 (On-going IFPRI project sites were excluded). There are three woredas which scored nine, so that further discussions were conducted.

Among three woredas, Ziway Dugda does not have any WII experience, and score of capacity of unions are lower than those of the rest, and therefore the Team has decided not to include Ziway Dugda woreda. Five woredas in three zones were finalized as the target areas for the Phase I WII introduction as such.

Table 2.1.2 Summary of Evaluation of Potential 20 Woredas

Zone	Woreda	Picked up by	1) Agro production	2) Rainfall	3) Environment Potential	4) Capacity of Union or PC	5) WII	Meteo. Station	Total Score
E/Shewa	Boset	RREP	2	2	1	2	2	2	11
W/Shewa	Bako tibe	OBoA*	2	2	2	1	2	2	11 (IFPRI)
W/Arsi	Arsi Negele	OBoA	2	2	2	2	1	1	10
W/Arsi	Shashemane	RREP	2	2	2	1	2	1	10 (IFPRI)
E/Shewa	Bora	OBoA	2	2	2	1	1	2	10
E/Shewa	Adami Tulu	OBoA	1	1	2	2	2	1	9
Arsi	Ziway Dugda	OBoA	2	2	2	1	0	2	9
W/Shewa	Ilfata	RREP	2	2	0	2	1	2	9
W/Shewa	Dano	RREP	2	2	1	2	1	0	8
E/Shewa	Dugda	OBoA	1	1	1	2	2	1	8
W/Shewa	Nono	RREP	2	2	1	2	0	1	8
Arsi	Dodota	OBoA	2	2	0	1	2	1	8
W/Arsi	Siraro	OBoA	2	2	2	1	0	1	8
W/Arsi	Shalla	OBoA	2	2	2	1	0	0	7
N/Shewa	Degen	OBoA	1	2	1	2	0	1	7
Arsi	Sire	OBoA	2	2	1	1	0	1	7
Arsi	Shirka	OBoA	2	0	2	1	0	1	6 (IFPRI)
N/Shewa	Kuyu	OBoA	1	0	1	2	0	2	6
N/Shewa	Hidabu Abote	OBoA	0	2	0	2	0	0	4

Source: JICA RREP Team
*OBoA: Oromia Bureau of Agriculture

2.1.2 Identification of Target Kebeles

The Team then contracted out a "Situation Assessment" for these pre-selected five woredas to identify potential kebeles for WII pilot trial. A series of "woreda level situation analysis workshop" were conducted from September to October 2012. These workshops were basically meant to select target kebeles, but also were conducted to create awareness for zonal/woreda officers, the Development Agents (DAs), and kebele representatives about WII and to provide the platform for the participants to discuss which kebeles have higher potential for introducing the WII. Table 2.1.3 summarizes the participants for each woreda level situation analysis workshop. In total, 400 persons from different organizations joined the workshops.

Table 2.1.3 Summary of the Participants of Woreda Level Situation Analysis Workshops

Woreda	Total Number of Participants			DAs	Kebele Chair-person	Woreda Admin. Office	Woreda Agri. Office	Zonal Agri. Office	PC.	Oth-ers	Date	Nr. of Kebeles in woreda
	M	F	Total									
A/ Tulu (A)	57	3	60	33	22	1	2	1	1	0	28 Sep	43
A/Tulu (B)	58	1	59	32	21	1	3	1	1	0	29 Sep	
Bora	52	3	55	31	17	2	2	1	2	0	1 Oct	20
Boset	73	3	76	38	29	3	4	1	1	0	2 Oct	33
Ilfata	45	0	45	15	14	3	6	0	2	5	2 Oct	15
A/ Negele (A)	62	2	64	26	27	3	3	3	2	0	28 Sep	49
A/Negele (B)	41	0	41	19	16	0	2	2	2	0	29 Sep	
Total	388	12	400	194	146	13	22	9	11	5	-	-

Source: JICA RREP Team

After the presentation on the RREP project introduction and WII basics by resource persons, the participants shared major weather related agricultural problems in their own kebeles. Then, the participants were requested to sit together by kebele (kebele chairperson and the concerned DA), and scored their own kebeles based on the given attributes.

Common attributes employed in each workshop were; 1) shortage of rainfall, 2) fluctuation of rainfall, 3) occurrence of drought, 4) occurrence of frost, 5) occurrence of hailstone, 6) occurrence of heavy rain, 7) occurrence of flood, 8) lack of coping mechanism against drought, 9) lack of coping mechanism against hailstone and frost, 10) lack of coping mechanism against heavy rains/flood, 11) lack of insurance scheme in/around a kebele, and 12) availability of potential insurance delivery channels such as MFIs, Cooperative Unions, local NGOs etc..

Then, the participants were asked to form a group with adjacent kebeles based on existing "cluster". Each group evaluated and ranked each other among the clusters. The participants were asked to rank each kebele by four attributes which are regarded as the most important ones for the selection of higher potential kebeles in introducing WII; namely 1) shortage of rainfall, 2) fluctuation of rainfall, 3) occurrence of drought, and 4) availability of potential insurance delivery channels. The clusters were then divided into two groups of clusters, which did the same evaluation for selecting three higher potential kebeles among each group. Hence, six potential kebeles were selected in total.

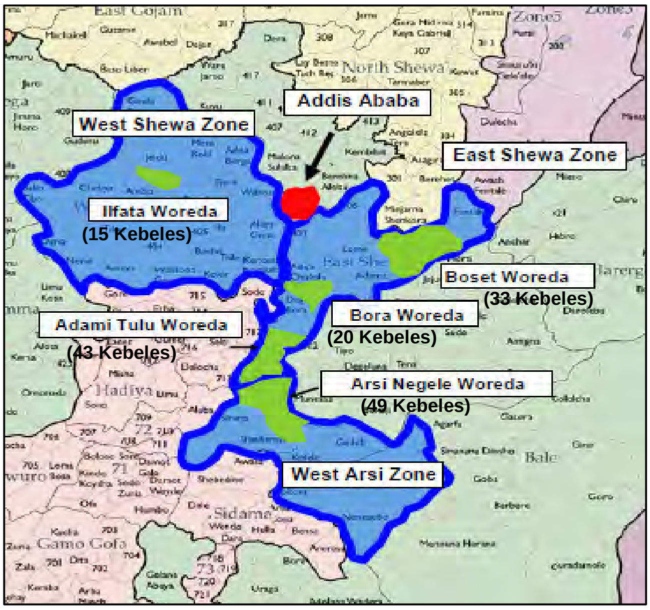


Figure 2.1.2 Location Map of 5 Woredas for Situation Assessment

An insurance expert raises the card to show the participants during the game session for WII introduction (Bora Woreda, 1 October, 2012)

Finally, the participants evaluated these six potential kebeles to narrow down into three kebeles per each woreda. Since the discussion was conducted seriously, the participants from woreda/ zonal agricultural offices, woreda administration offices, and cooperative officers were actively involved to facilitate the participants to evaluate and select the kebeles, which have potential for the WII introduction. As a result, 15 kebeles in 5 woredas were identified as the Phase I pilot kebeles through the series of workshop.

2.1.3 Agriculture in Target Areas[1]

Target three zones located at the periphery of Addis Ababa belong to cereal (surplus) production area. However, the productivity has started decreasing because of soil degradation, due to erratic rainfall

1 This sub-chapter is summarized based on RREP field interview results with Zonal Agricultural offices, Woreda Agricultural Offices, DAs and farmers in the three zones. All information in this section is as of interviewed in 2012.

pattern, water logging, over-production exploiting soil nutrient, and insufficient quantity of fertilizer and mature etc. according to the interviews with zonal agricultural officers.

Main crops in these areas are cereals and pulses, which are mostly cultivated depending on rainfall. Teff, maize and wheat among them are cultivated both for self-consumption and for cash income source. On the other hand, pulse crops such as haricot beans, faba beans and chick peas are cultivated mostly as a cash income source.


Traditional Plowing (in East Shewa, end of June, 2012)

Meher (main rainy season) starts from June to October and *Belg* (relatively short rainy season) does from March to May though the cultivation season is of great variety depending on weather and topographical condition. Meher is a main cropping season in the areas and *Belg* is a kind of "complementary" agricultural season, though most of the farmers in West Arsi produce crops mainly in *Belg* season because of erratic rain and its short season in Meher.

Agriculture is practiced in a traditional way relying on animal drafting power for plowing, tillage, harvest and transport, etc. Agriculture machineries such as tractors are rarely used especially in West Arsi. Provision of dung (mature) is one of the most important roles played by animal. Chemical fertilizers are also used but not sufficient or crops are grown only with soil natural capacity without applying any manure or chemical fertilizers, resulting in an accelerated soil degradation.

As for seeds, most farmers are still using local seeds that they produced previous year by themselves. Few farmers have started to use improved seeds, which can adapt to actual weather condition. Some farmers have started purchasing those agricultural inputs of fertilizer and pesticide in order to get good harvest with minimum effort, but such attitudes have yet to spread due to high cost and lack of information of inputs and related technologies. In fact, agricultural related problems identified during the field interviews are summarized as shortage of rainfall, erratic rainfall, pest and disease infestation, and soil degradation, low application of chemical fertilizer and improved seeds etc.

1) West Shewa Zone & Ilfata Woreda

Since there is no enough rainfall in *Belg* and the temperature is comparatively low, farmers practice rain-fed cultivation once a year during *Belg* season in this West Shewa zone and Ilfata woreda. Sometimes, late maturing varieties are grown through both rainy seasons from February to November. Despite the lack of rainfall in *Belg* season, there is surface water potential in the zone. Some of them have already been exploited; yet there are still rooms for developing agricultural irrigation system according to experts of agricultural offices.

The main crops are cereals such as teff, wheat and barley in intermediate and high lands areas, and maize and sorghum in lowland area. In addition, there are many kinds of cash crops; Irish potatoes, pepper (green and red), oil seeds (linseed, noug), spice crops (fennel, cumin seeds), etc. As above mentioned, as for cereal production, late maturing varieties with 6 to 8 months are preferred due to the temperature and rainfall conditions.

In general, farmers start cultivating teff, wheat and barley from the beginning of *Meher*, and harvest them in December to January of the following year. Maize and sorghum are sown during *Belg* season from February to April, and grown using *Meher* rain until November. Pulse crops, like haricot bean, faba bean, field pea and lentil, and the oil crops are cultivated from beginning of *Meher*, from

June/July, until November.

Table 2.1.4 summarizes area planted and production in *Meher* season of the last 5 years for Ilfata In this woreda, barley and wheat have been the main crops, which were planted in the largest area for these 5 years.

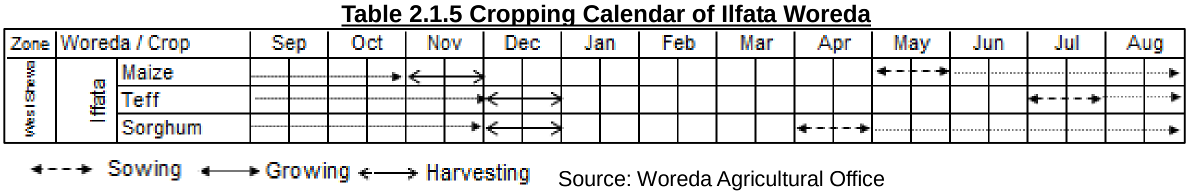
Table 2.1.4 Planted Area, Production and Yield of Major Crops (Ilfata Woreda)

Major Crops	2007/08			2008/09			2009/10			2010/11			2011/2012		
	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield
	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton
Barley	4,092	11,340	2.77	5,062	14,427	2.85	4,062	11,368	2.80	3,745	11,235	3.00	3,776	10,950	2.90
Wheat	4,110	9,853	2.40	3,670	10,276	2.80	4,860	11,010	2.27	3,217	10,294	3.20	3,359	12,417	3.70
Maize	3,000	7,696	2.57	2,330	8,155	3.50	2,330	7,921	3.40	2,320	8,594	3.70	2,404	9,135	3.80
Teff	4,000	2,988	0.75	3,250	3,835	1.18	3,050	3,624	1.19	3,018	3,702	1.23	3,087	4,013	1.30
Sorghum	3,092	3,080	1.00	2,772	5,045	1.82	2,774	5,352	1.93	1,810	2,916	1.61	1,851	3,572	1.93

Source: Woreda Agricultural Office

Table 2.1.5 shows cropping calendar of major crops in Ilfata woreda. Major crops picked up by woreda agricultural office were; maize, teff and sorghum in this woreda. Cropping patterns of major crops are almost similar to those of the rest target woredas, except for the longer period for growing teff as compared with other target woredas.

Table 2.1.5 Cropping Calendar of Ilfata Woreda



Source: Woreda Agricultural Office

Weather related problems that Ilfata woreda has experienced in the last 5 years are summarized in Table 2.1.6. Ilfata woreda has been facing all weather related problems through the last 5 years as compared with other 4 woredas. Even droughts have been happening for the two consecutive years of 2010 and 2011.

Table 2.1.6 Year of Weather Related Problems Occurred (Ilfata)

Problems	2007 (1999 EC)	2008 (2000 EC)	2009 (2001 EC)	2010 (2002 EC)	2011 (2003 EC)
Smallness of rain	✓	✓	✓	✓	✓
Heavy rain	–	✓	–	✓	✓
Fluctuation of rain	✓	✓	✓	✓	✓
Drought	✓	-	-	✓	✓

Source: Woreda Agricultural Office

2) East Shewa Zone & Adami Tulu, Boset and Bore Woredas

East Shewa Zone consists of 11 woredas. This Zone is characterized by great diversity of environment both at woreda and kebele levels in terms of temperature, precipitation, soil condition, and water resources. This zone is famous as a "Bread basket" of Addis Ababa in particular, as well as the vegetable production area by using irrigation from lakes and rivers without restriction by seasons.

Temperature is relatively high as a whole, though 70% of agricultural area is located in middle-highland area with around 1,800m elevation. Precipitation shows a great range between 400 mm and 2,000 mm depending on the altitude and the location. In general, northern parts of the zone such as Fantale, Boset and Adama woreda accompany dry weather and can hardly get sufficient rainfall for agricultural production.

Meher season in this zone starts from June and ends in August (3 months), and *Belg* is from March to April (2 months). As rainfall of the *Belg* is not sufficient for cultivation, one cropping is common in this zone except for irrigated areas. The main rain-fed crops are teff, wheat and chick pea in intermediate or high lands while maize and haricot beans are common in lowland.

Major problems of the zone are loss of agricultural production caused by erratic rainfall pattern and soil degradation. In dry woredas here, weather index insurance has been once tried to guarantee risky agriculture production being practiced under erratic and small rainfall. In terms of soil degradation, overproduction may be the major cause, which is supported by rich water resources but without application of manures and fertilizer due to lack of financial capacities.

Floods sometimes take place in certain places and also water logging damages crops and leads to less productivity. In order to respond those problems, appropriate input and relevant agronomic techniques should be diffused and expanded. Yield increase is still feasible with an introduction of improved seeds and relevant appropriate techniques.

Table 2.1.7 summarizes the area planted and production in *Meher* season of 5 years for the target three woredas of East Shewa Zone based on the data collected. In Adami Tulu, maize has been planted and produced the largest for the last 5 years, followed by haricot bean (wheat was produced more in 2011/2012, though). In Boset, teff and maize have been planted almost same area (2011/2012 showed different result, though) in terms of area planted. As for production, maize has been produced far largest than other crops.

Table 2.1.7 Planted Area, Production and Yield of Major Crops in Target Woreda in East Shewa (A/Tulu, Boset and Bora)

Major Crops	2007/08			2008/09			2009/10			2010/11			2011/2012		
	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield
	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton
Maize	32,234	141,730	4.40	25,889	115,230	4.45	28,304	71,302	2.52	37,026	95,092	2.57	32,091	115,041	3.58
H/Bean	17,459	23,386	1.34	21,965	29,141	1.33	10,674	29,138	2.73	12,645	18,968	1.50	13,638	17,560	1.29
Wheat	5,841	21,166	3.62	6,574	24,393	3.71	11,814	19,900	1.68	7,217	17,741	2.46	8,178	21,173	2.59
Barley	1,896	5,688	3.00	2,012	4,373	2.17	3,895	5,211	1.34	2,509	4,310	1.72	2,101	5,208	2.48
Teff	4,509	4,509	1.00	4,697	4,229	0.90	4,267	1,424	0.33	2,383	2,726	1.14	2,256	3,354	1.49
Sorghum	219	956	4.37	1,433	3,290	2.30	451	489	1.08	794	1,233	1.55	1,781	4,127	2.32

Major Crops	2007/08			2008/09			2009/10			2010/11			2011/2012		
	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield
	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton
Teff	11,598	17,433	1.50	12,765	17,871	1.40	16,571	4,081	0.25	11,537	23,074	2.00	15,255	20,594	1.35
Maize	12,283	50,011	4.07	12,125	48,504	4.00	9,002	1,478	0.16	11,710	65,576	5.60	9,614	33,649	3.50
H/Bean	7,818	16,379	2.09	8,550	16,245	1.90	8,778	2,580	0.29	6,567	15,104	2.30	8,337	13,756	1.65
Sorghum	3,980	14,459	3.63	2,027	7,165	3.53	611	166	0.27	5,941	31,487	5.30	2,185	3,496	1.60
Wheat	1,572	3,434	2.18	1,580	4,266	2.70	1,646	177	0.11	1,610	5,635	3.50	1,662	3,324	2.00

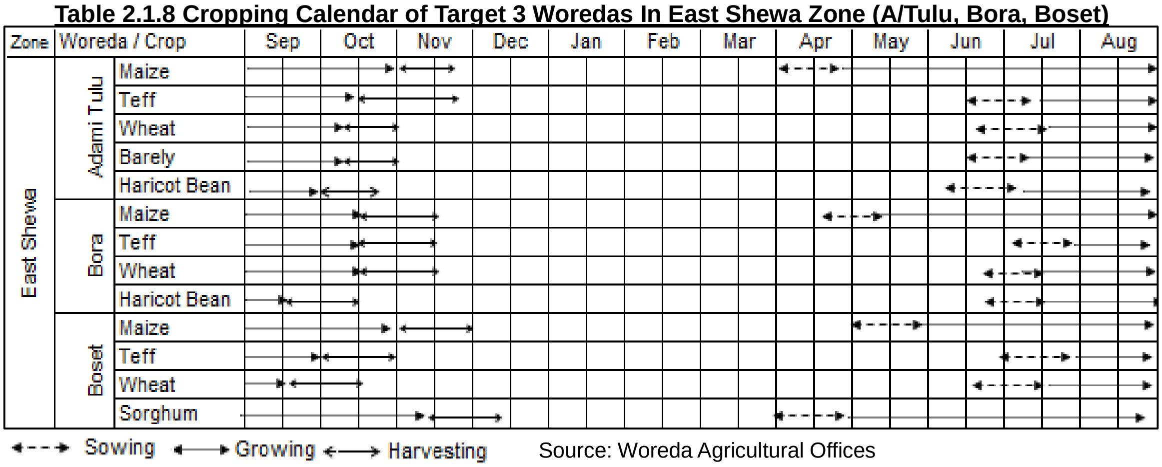
Major Crops	2007/08			2008/09			2009/10			2010/11			2011/2012		
	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield
	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton
H/Bean	6,685	10,395	1.56	5,742	8,806	1.53	4,428	7,562	1.71	3,686	5,275	1.43	7,261	12,292	1.69
Wheat	5,920	16,659	2.81	5,540	18,456	3.33	5,747	19,359	3.37	5,829	14,232	2.44	7,424	23,287	3.14
Maize	3,248	14,291	4.40	2,982	13,035	4.37	6,289	29,270	4.65	5,278	16,977	3.22	3,275	12,746	3.89
Teff	5,130	6,659	1.30	4,953	6,161	1.24	5,100	6,939	1.36	5,351	7,108	1.33	6,620	10,798	1.63

Source: Woreda Agricultural Office

Table 2.1.8 summarizes cropping calendar of major crops in the three target woredas; Adami Tulu, Bora and Boset. Major crops picked up by the woreda agricultural office are almost similar; maize, teff, wheat, and haricot bean for Adami Tulu and Bora. Boset Woreda, however, picked up sorghum as major crop instead of haricot beans.

With respect to weather related problems for the last 5 years, Table 2.1.9 summarizes the information collected from the woreda agricultural offices. Heavy rainfall has not been troublesome during these 5 years compared with other weather related problems (only one kebele in Adami Tulu woreda faced heavy rainfall among three woredas during the last 5 years). On the other hand, small and fluctuating rainfall has been serious problem for these woredas and the situation was worse in 2009 and 2010. Note that only Bora has not experienced drought in 2009, but two remaining woredas have experienced drought in both years.

Table 2.1.8 Cropping Calendar of Target 3 Woredas In East Shewa Zone (A/Tulu, Bora, Boset)



Source: Woreda Agricultural Offices

Table 2.1.9 Year of Weather Related Problems Occurred (A/Tulu, Boset and Bora)

Problem	2007(1999 EC)			2008 (2000 EC)			2009 (2001 EC)			2010(2002 EC)			2011 (2003 EC)		
	AT*	BS*	BR*	AT	BS	BR	AT	BS	BR	AT	BS	BR	AT	BS	BR
Smallness	✓	-	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓	-	✓
Heavy	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-
Fluctuation	-	-	✓	-	✓	✓	✓	-	✓	✓	-	✓	✓	✓	✓
Drought	-	-	-	-	-	-	✓	✓	-	✓	✓	✓	-	-	-

* AT=Adami Tulu, BS=Boset and BR=Bora Woreda. .Source: Woreda Agricultural Offices

3) West Arsi Zone & Arsi Negele Woreda

West Arsi zone covers 12 woredas and is characterized by high-middle highland and by water deficit because of rainfall shortage since long time ago. Rain-fed agriculture is mainly practiced and the production is restricted by erratic raining pattern and its shortage. The altitude of the zone varies from 1,500 to 3,800m and the partitions of agro-ecologies are 45.5% of highland, 39.6% of mid-highland and 14.9% of lowland. Main crops are wheat, barley and maize, and other major crops like teff are less cultivated due to small rainfall amount.

Meher starts from June and ends in September while *Belg* starts from March and ends in May. Because of erratic rain and its shortage during *Meher*, most farmers produce crops once a year mostly during *Meher* season. Double cultivation in a year is practiced in Arsi Negere, Qore (Kore) and Sheshemane woredas only. Some farmers grow crops from *Belg* to *Meher* throughout the period of 6 months in order to capture the limited rainfall and make efficient use of it as much as possible. The yields of main crops have been increasing and can stand with those yields of other Zones.

Table 2.1.10 summarizes area planted and production in *Meher* season of 5 years for Arsi Negele woreda based on the data collected. Either maize or wheat has been planted in the largest area for these 5 years, and far larger than those of rest crops. Same trend is observed for production of 5 years. Some kebeles (14 among 43) also grow crops such as barley, teff and haricot beans in *Belg* season.

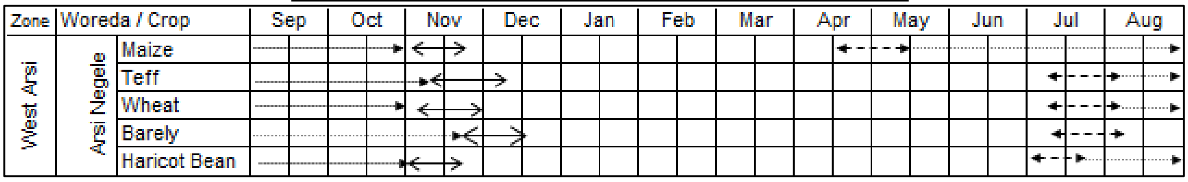
Table 2.1.10 Planted Area, Production and Yield of Major Crops (Arsi Negele Woreda)

Major Crops	2007/08			2008/09			2009/10			2010/11			2011/2012		
	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield	Area	Produ.	Yield
	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton	ha	ton	ha/ton
Maize	23,978	122,288	5.10	19,223	80,737	4.20	12,129	25,961	2.14	22,448	67,343	3.00	22,448	67,343	3.0
Wheat	23,175	88,065	3.80	26,279	84,091	3.20	24,335	38,669	1.59	17,678	38,892	2.20	17,678	38,892	2.2
Barley	2,305	4,149	1.80	9,690	17,352	1.79	5,090	5,090	1.00	5,220	15,660	3.00	5,220	15,660	3.0
H/Bean	2,250	1,174	0.52	4,595	5,513	1.20	4,440	444	0.10	4,879	3,903	0.80	4,879	3,903	0.8
Teff	3,249	3,411	1.05	12,513	10,010	0.80	8,642	6,049	0.70	4,718	3,303	0.70	4,718	2,831	0.6
Sorghum	3,141	2,513	0.80	942	2,072	2.20	3,180	3,415	1.07	2,890	6,647	2.30	2,890	6,358	2.2

Source: Woreda Agricultural Office

Table 2.1.11 summarizes cropping calendar of major crops in Arsi Negele woreda. Major crops picked up by the woreda agricultural office were; maize, teff, wheat, barley and haricot Beans in this woreda. *Meher* season in this woreda starts from early June, and harvesting of the major crops starts in early to mid November for almost a period of one month.

Table 2.1.11 Cropping Calendar of Arsi Negele Woreda



Sowing Growing Harvesting

Source: Woreda Agricultural Office

In addition, general situation of weather related problems for the 5 years were reviewed by woreda agricultural office. Following table is the summary of this woreda, showing the years the woreda has faced problem. Except for drought, this woreda has not experienced severe weather related problems with reference to the following table for the recent 2 years, but before that, the woreda has faced several weather related problems.

Table 2.1.12 Year of Weather Related Problems (Arsi Negele)

Problems	2007 (1999 EC)	2008 (2000 EC)	2009 (2001 EC)	2010 (2002 EC)	2011 (2003 EC)
Smallness of rain	✓	✓	✓	-	-
Heavy rain	-	✓	✓	-	-
Fluctuation of rain	✓	✓	-	-	-
Drought	-	✓	-	-	✓

Source: Woreda Agricultural Office

2.1.4 Agriculture Cooperatives Unions /Primary Cooperative and Crop Insurance

Basic cooperative in Ethiopia is called "Primary Cooperative (PC). PC is grouped by more than five farmers according to only individual interest. Most PCs are formed by neighbor farmers. Agricultural Cooperative Union (Union) is then organized by more than five PCs. The Union generally functions with the Woreda Cooperative Promotion Agency which supervises the Union.

Main functions of PC are: 1) purchasing the agricultural inputs and distributing them to the members, and 2) collection of agricultural produces from members and sending them to markets. In order to support these PCs' activities, Unions do; 1) the distribution of agricultural inputs, 2) renting of agricultural equipment/ tractor, 3) renting of warehouse, 4) marketing of grains, 5) credit services, etc. Examples of unions and PCs that have experience of crop insurance promotion are summarized below based on the interviews during Phase I[2];

1) Bofa Primary Cooperative (East Shewa)

Bofa PC was established in 1982 and it has become a member of Lume Adama Farmers Cooperative Union (LAFCU) in 2002. 137 PC members purchased the WII policy in 2008 which was sold by Nyala Insurance Company S.C. (NISCO). Premium was shouldered by the Union. Crop insured was haricot beans only and all the farmers who purchased policy received payout.

The Team interviewed with Chairperson (Left) and Cashier of Bofa PC in Boset Woreda, East Shewa (26 July 2012)

Since there was payout, other PC members also

[2] All information in this section is as of interviewed in 2012.

showed interest to purchase the policy in the following year, and additional 200 members were registered for the policy purchase. Nevertheless, all of them hesitated to pay the premium. In fact, the farmers were requested to pay the premium for the 2nd season in lieu of the Union which had paid it in the first year. After having known the premium amount which were 500 birr/ha for haricot beans and 800 birr/ha for teff, they just withheld the payment, according to the interviews with committee members of Bofa PC made in July 2012.

In another interview, PC members who did not have chance to know WII at that time shared with the JICA Team that some farmers showed interest to join the training on WII if they would have been given the chance even though they needed to pay the premium by themselves. Only selected farmers were invited for the training in the starting year and thus information on WII was not informed to all the farmers.

2) Lume Adama Farmers Cooperative Union (East Shewa)

Lume Adama Farmers Cooperative Union (LAFCU) was founded in 1997 as the first union in Ethiopia. LAFCU has introduced crop insurance for the first time in 2008. Lume woreda was selected for the introduction of crop insurance because this woreda was recognized as high potential area of agricultural production, especially for wheat. 98 farmers who were well recognized as “model farmers” were selected by the PC for this insurance program. Since it was the first attempt, Union shouldered full amount of premium (91,466 birr) on behalf of the insured farmers. There was heavy rain damage and farmers received payout based on the actual damage level, and total payout was 93,368 birr.

In the following year, 2009, WII was introduced to Boset woreda which is known as drought prone area. Also the area was covered by a weather station. Crop insured was haricot beans and 137 farmers were insured. All premiums were again covered by the Union. There was drought and payout was made to the farmers, total of which reached 309,160 birr. Then, in 2010, the Union has started Multi-Peril Crop Insurance (MPCI) in Lume and Adama woreda with OIC. General Manager of the Union explained that they preferred to dealing with both MPCI by OIC and WII by NISCO because Adama and Lume (for MPCI) woreda suffer from heavy rain, while Boset (for WII) is drought prone area. Since both companies wanted to cover the area at the same year, Union chose OIC due to the strong relationship with OIC.

Union and OIC jointly gave the training to the farmers when they introduced the insurance. 203 farmers were insured on the crops of wheat, teff and chick peas. Farmers were asked to pay 50% of the total premium at the beginning and another 50% after the harvest. There was no payout and nobody got returned money according to the interviews. Table 2.1.13 summarizes the experience of crop insurance in which LAFCU was involved so far.

Table 2.1.13 Crop Insurance LACFU Involved

Year	2008	2009	2010
Type	MPCI	WII	MPCI
Insurance Company	NISCO	NISCO	OIC
Crop Insured	Wheat, C/pea	H/beans	Wheat, Teff and, C/Peas
Woreda	Lume	Boset	Lume and Adama
No. insured farmers	98	137	203
Total Premium (Birr)	91,466	639,000	251,500
Total Payout (Birr)	93,368	309,160	No Payout

Source: Interview with General Manager of the LACFU on 24 July, 2012

3) Maki Batu Vegetable & Fruit Growers Cooperative Union

Maki Batu Vegetable & Fruit Growers Cooperative Union was established in 2002 in order to improve the production and marketing of vegetables and fruits specialized in the irrigated areas of Bora, Dugda and Ziway Dugda. The Union currently deals with seed production for vegetables and maize with irrigation. The Union also exports tomato, onion, cabbage, green peas and papayas to neighboring countries such as Djibouti, Saudi Arabia, Italy, etc. The Union holds Euro GAP certificate and members cultivate crops in conformity with the proper techniques based on the guidelines.

Union introduced the crop insurance administered by OIC in 4 woredas where farmers were involved in seed multiplication. Those woredas are also known by excess rainfall damage. Premium was shared 50% by farmers and 50% by the Union for the first year. There were some crop damages caused by heavy rainfall and some farmers received payout, total of which arrived at 580,000 birr. In the second year, 2011, all premiums were paid by the farmers. Although there was no payout, there were no complaints from the farmers because they could get good harvest and cash income out of the harvest than premium they paid.

One farmer in Dugda woreda, who did not receive payout, mentioned that he was still satisfied with WII because it made him feel secured even if he could not get payout. On the other hand, famer in Dugda woreda, who received a payout, mentioned that he was not satisfied with the payout amount in comparison with the actual damage. However, he at least told that situation could have been worst if there had been no insurance.

Union and PC have played an important role as intermediaries for both MPCI / WII introduction because they have strong relationship with farmers there. Identification of proper intermediary in delivering the insurance product is therefore one of the key success factors, and especially where there are no other strong alternatives such as micro finance institution or local NGOs which operate and support the farmers in the area, Union and PC could be the best to be intermediary.

2.2 Target Areas Selection for the Phase II WII Introduction

Figure 2.2.1 shows the target areas for the Phase II WII implementation, namely 45 kebeles in 8 woredas (dark green colored parts inside the light green parts show the rough location of the target kebeles) have been covered. These 45 kebeles include the 15 kebeles undertaken in Phase I. Expansion of the target area is a key factor for ensuring the sustainability of the WII program. Since the target of selling WII policy is "individual" farmers, not an organization or a group, benefit that the insurance company can get from each individual farmers is very limited. In addition, risk hedge for the insurance company becomes difficult if the activity area remains limited, and therefore insurance companies which sell WII product intend to expand the area for their own business risk hedge.

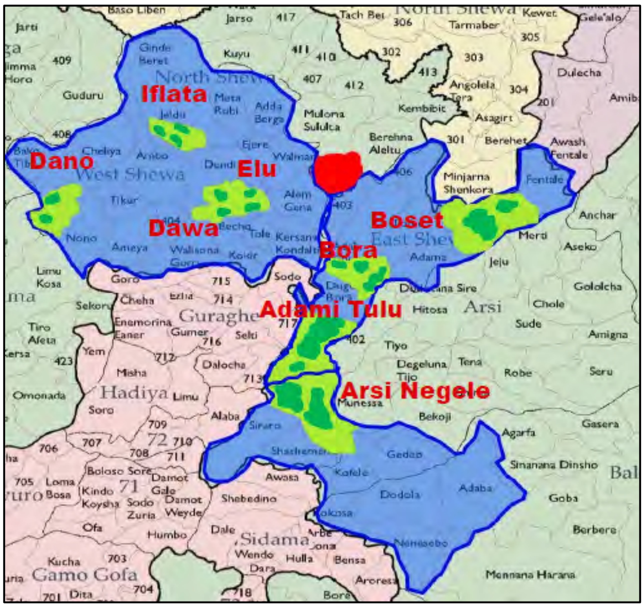


Figure 2.2.1 Target Areas for Phase2

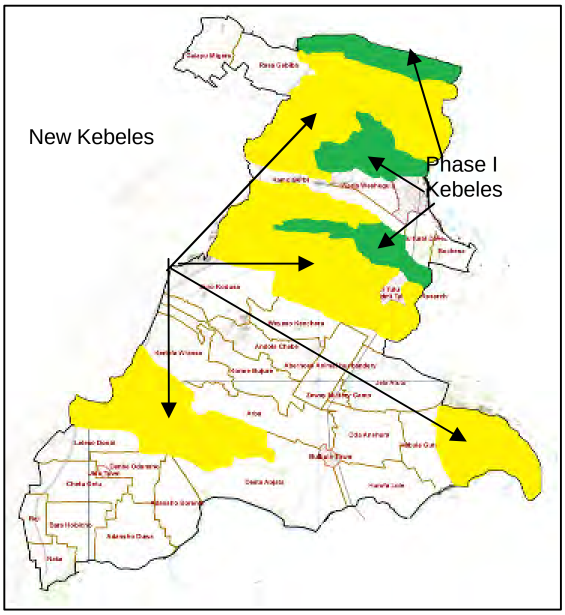


Figure 2.2.2 Image of Clustering (Adami Tulu Woreda)

RREP, therefore, has expanded target areas firstly by clustering kebeles adjacent to the Phase I target kebeles for ensuring the sustainability of WII promotion activities in Phase II. Clustering approach has the following advantages:

- ✓ There is high possibility that the farmers in newly added kebeles have already heard about WII, which may encourage the farmers to join the WII program,
- ✓ Since the area is close to the existing kebeles where there are already indexes established, it may be rather easy to develop the new indexes with reference to the already established indexes as compared to the case of establishing the indexes in a kebele in a totally new area,
- ✓ Agricultural Cooperative Unions have already known the farmers in the area and no need to build the relationship from the very beginning, and
- ✓ Cost for the promotion of WII for the new kebeles can be saved by above mentioned reasons.

Figure 2.2.2 shows Phase I target kebeles and newly added kebeles for the Phase II. Green colored parts are kebeles selected for Phase I pilot project, and yellow colored parts are the kebeles newly added for the Phase II. New kebeles were selected not only by the proximity to the Phase I kebeles but also based on the result of "Situation Assessment" workshop which was conducted for the selection of the 1st year's target kebeles. In addition, Dano woreda in West Shewa zone, and Dawo and Elu woredas in South West Shewa zone were newly added based on the discussion with OIC taking into account the Unions' strong activities.

In the Phase I, 3 kebeles were selected per each woreda equally, but number of the kebele in each target woreda for the Phase II was decided through the discussions with the OIC based on the result of the 1st year achievement. For example, take-up rate of the target kebeles in Adami Tulu exceeded 30% of the total farmer households in the Phase I pilot WII promotion, showing higher possibility for further sales. Accordingly, twelve new kebeles were thus identified as higher potential kebeles for the Phase II in addition to the existing target kebeles.

On the other hand, it was observed that further promotion of WII in Ilfata woreda might be difficult because the woreda is located in remote area having poor road condition and hilly topographic characteristics; therefore, in the Ilfata woreda, the emphasis was put on the deepening of the activities, e.g. increase of the number of premium purchased per household, instead of adding new kebeles.

Activeness of intermediary also reflected the result of the 1st year sales of WII product. As presented earlier, take up rate of kebeles in Adami Tulu exceeded 30% and groundwork of this woreda was facilitated by Meki Batu Union which has strong activeness and financial resources in the area. Therefore, selection of new kebeles was examined from the point of view of existence of active Union too. Dawo and Elu woredas were selected for the Phase II WII promotion taking into account the activeness and large financial resources of the Becho Waliso Union which operates in these woredas.

Table 2.2.1 and Table 2.2.2 show the basic information on demographic and agricultural production of the newly added three woredas, Dano, Elu and Dawo woredas. Number of kebele, household and population are almost of similar sizes, but major crops grown show difference. Teff is dominant in Dawo and Elu woredas, whereas maize and sorghum are grown more than teff in Dano Woreda.

Table 2.2.1 Basic Information of Newly Added Woreda (Demographic Date)

Zone	Woreda	No. of Kebele	No. of HH	Population	Major Crops	Total Farm Land (ha)
West Shewa	Dano	22	14,911	74,379	Maize, Sorghum, and Teff	40,085
South West Shewa	Elu	18	12,569	77,273	Teff,Wheat, and Chickpea	29,101
	Dawo	22	13,569	87,264	Teff,Wheat, and Chickpea	32,872

Source: Woreda Agricultural Office

Table 2.2.2 Basic Information of Newly Added Woreda (Agricultural Production)

Dano	Area Cultivated (ha)	Production (q)	Yield (q/ha)	Area Cultivated (ha)	Production (q)	Yield (q/ha)	Area Cultivated (ha)	Production (q)	Yield (q/ha)
Maize	8,918	503,517	56.5	11,259	524,000	46.5	11,160	435,604	39.0
Sorghum	8,608	239,908	27.9	9,784	344,602	35.2	9,699	343,139	35.4
Teff	6,699	111,505	16.6	5,989	102,918	17.2	5,936	145,182	24.5
Elu	Area Cultivated (ha)	Production (q)	Yield (q/ha)	Area Cultivated (ha)	Production (q)	Yield (q/ha)	Area Cultivated (ha)	Production (q)	Yield (q/ha)
Teff	15,657	324,079	20.7	13,496	328,184	24.3	13,157	348,660	26.5
Wheat	3,471	142,354	41.0	3,225	174,864	54.2	3,411	168,845	49.5
Chickpea	2,328	53,383	22.9	4,675	110,880	23.7	6,362	159,050	25.0
Dawo	Area Cultivated (ha)	Production (q)	Yield (q/ha)	Area Cultivated (ha)	Production (q)	Yield (q/ha)	Area Cultivated (ha)	Production (q)	Yield (q/ha)
Teff	9,780	229,732	23.5	12,051	227,028	18.8	19,004	305,312	16.1
Wheat	7,650	244,806	30.0	7,882	299,516	38.0	8,472	321,078	37.9
Chickpea	2,050	43,640	21.3	2,278	41,004	18.0	2,870	54,400	19.0

Source: Woreda Agricultural Office

Table 2.2.3 shows the major crops and household numbers of newly added target kebeles. Maize is the main crop for most of the kebeles and there are also kebeles of which main crop is sorghum (Buta Denqore in Boset woreda) and teff (all four target kebeles in Dawa and Elu woreda). Household number differs from 194 of Buta Denqore kebele in Boset woreda to 1,200 of Nano Gebriel kebele in Dawa Woreda.

Table 2.2.3 List of Newly Added Kebeles (Name, Major Crops and Household Number)

Woreda	Kebele	Major Crop	HH	Woreda	Kebele	Major Crop	HH
Adami Tulu	Abeyi Deneba	MZ, WT, TF	800	Arsi Negele	Gale fi Kelo	MZ, HB, BL	392
	Negalgne	MZ, HB, TF	420		Rafu Haragesa	MZ, WT, HP	870
	Ilika Chelemo	MZ, WT, TF	748		Gubata Arjo	MZ, WT, BL	441
	Edo Gojola	MZ, WT, HB	556		Hada Bossa	MZ, HB, BL	630
	Galo Hirape	MZ, WT, BL	810		Boku Walda	MZ, WT, TF	876
	Wolicho Boremo	MZ, WT, BL	513		Tufa	MZ, WT, SG	486
	Gobejocho Asebo	MZ, WT, HB	699		Dawe	MZ, WT, TF	250
	Haleku Gulanta Boke	MZ, HB, WT	534	Dano	Direhareyu	MZ, SG, TF	507
	Aneno Shisho	MZ, WT, HB	735		Direhujuba	MZ, SG, TF	904
	Hurgo Mechafera	MZ, HB, WT	602		Seyu Gambela	MZ, SG, NS	507
	Elelan Ababo	MZ, WT, HB	581	Dawa	Ulima Busa	TF, CP, WT	479
	Oetu Basuma	MZ, WT, HB	748		Nano Gebriel	TF, CP, WT	1,200
Bora	Doyo Leman	MZ, WT, TF	320	Elu	Keta	TF, CP, WT	455
	Tuchi Deko	MZ, WT, TF	386		Kule Gefersa	TF, CP, WT	776
Boset	Buta Denqore	SG, TF, HB	194				
	Tedecha	MZ, SG, TF	436				

Source: Woreda Agricultural Offices and DAs

MZ: Maize, WT: Wheat, TF:Teff, HB:Haricot Bean, BL: Barely, SG: Sorghum, CP: Chick pea, HP: Hot pepper, Ns: Nigerseed

2.3 Target Areas Selection for the Follow-up Phase

JICA and the Project Team decided to continue the WII promotion in the 3rd year of the Project as the follow-up phase. Target areas of the follow-up phase were exactly the same areas as the phase II; namely, 45 kebeles in 8 woredas. One of the main reasons of this selection is that many DAs, woreda officers, and key farmers in these target areas already learned about the WII product and experienced in a WII promotion activity from the phase II. It was easier for the insurance company to promote the WII product in such areas.

In addition, there was no time to develop new indices of the WII product in new areas between completion period of the phase II and starting period of the follow-up phase. This is because the

Project Team decided to expand the WII introduction phase just after the phase II activities completed. Therefore, the Project Team and the insurance company decided to focus on the existing 45 kebeles in the follow-up phase.

CHAPTER 3 WEATHER INDEX INSURANCE (WII) INTRODUCTION (PHASE 1)

Weather Index Insurance (WII) introduction was conducted in 15 kebeles of 5 woredas in 3 zones under Phase I pilot project after having gone through necessary preparatory works. In total, 6,637 farmers attended the awareness creation meetings and nearly 1,300 farmers purchased the WII policies. Take-up rate reached almost 20% of the total training participants and take-up rate of the total farm households in the target areas came to around 12%. This chapter summarizes activities conducted after selection of the target areas, namely, 1) institutional set up, 2) weather index product design, 3) capacity building trainings, 4) groundwork achievements, and 5) issues arisen and lessons learnt.

3.1 Implementation Arrangement and Institutional Set-up

In the Phase I pilot project, the JICA Team made institutional arrangement as shown in Figure 3.1.1. Main key players for the pilot project implementation were; 1) an insurance company, 2) intermediaries, and 3) DAs (Development Agents).

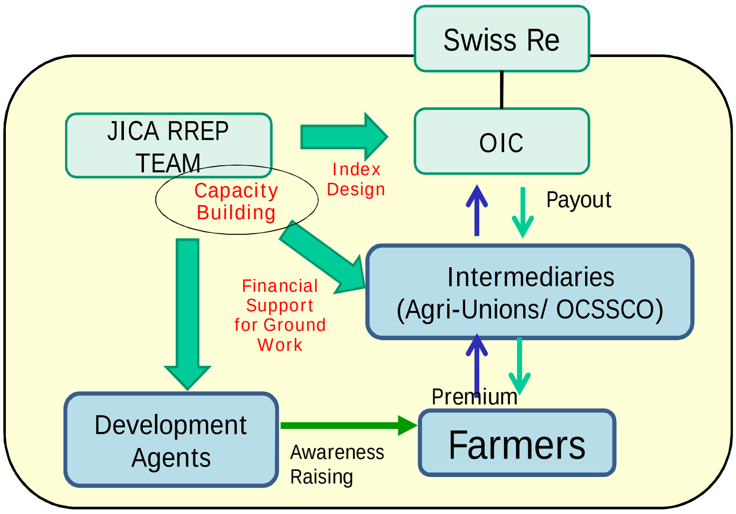


Figure 3.1.1 Institutional Set-up under Phase 1

The insurance company plays the role of risk taker and designs insurance products, while intermediaries such as Agricultural Cooperative Unions (Unions) and Microfinance Institutions (MFIs) collect premium and distribute payout to the farmers who purchased the policies. DAs are to raise farmers' awareness on the agricultural risk management and explain them basic concept of the WII.

3.1.1 Insurance Company

OIC (Oromia Insurance Company S.C.) was selected as the local risk taker for the RREP pilot project implementation. In Ethiopia, there are around 15 insurance companies, and only 4 of them have experience in the area of WII delivery services; namely, Nyala Insurance Company S.C., Ethiopia Insurance Corporation, Africa Insurance Company S.C., and Oromia Insurance Company S.C.(refer to Table 3.1.1).

Table 3.1.1 Summary of Insurance Companies with Experience of WII Services

Particular	Oromia Insurance Company S.C.	Africa Insurance S.C.	Ethiopia Insurance Corporation	Nyala Insurance Company S.C.
Establishment	2009	1994	1976	1994
Capital	85 million ETB	60 million ETB	1.6 billion ETB	30 million ETB
Gross Premium*	157 million ETB	314 million ETB	833 million ETB	NA
No. of Staff	156	210	1,250	NA
No. of Branch	22	15	59	17
Experience in WII	With IFPRI since 2011 With ILRI since 2012	With Oxfam America since 2011	With World Bank in 2009	With Oxfam America since 2009

Source: JICA RREP Team

The main reason of selecting OIC as the local risk taker was that OIC is one of the most experienced insurance companies with regard to index based insurance products. They have participated in the WII related project funded by IFPRI (International Food Policy Research Institute) since 2011. Also, OIC launched a "Livestock Weather Index Insurance" with ILRI (International Livestock Research Institute) in 2012. These experiences seemed to be helpful to implement the RREP WII pilot project.

Furthermore, their main shareholders are Unions, and therefore they have a strong relationship with agriculture sector. In fact, they have launched multi-peril crop insurance (MPCI) by themselves. According to OIC, more than 3,000 farmers signed up for this insurance through the Agricultural Cooperative Unions in 2012, suggesting a great potential for OIC to deliver micro-insurance products to rural areas through the agricultural unions.

OIC is a regional specific insurance company; they have their branches in Oromia region. This was also preferable for the RREP WII promotion because the RREP is implemented in Oromia region. OIC has a strong relationship with agriculture sector, particularly in Oromia region. With these reasons, the Team selected OIC as the partner insurance company for the RREP WII pilot project implementation.

Reinsurance was also an important arrangement for the local insurance company. OIC decided to deal with Swiss Re. They have been engaged in a large number of WII related projects in Africa. According to OIC, they wanted to deal with Swiss Re as they are an internationally well-known reinsurance company.

3.1.2 Intermediaries

Main role of the intermediaries is to directly deliver the WII products to farmers. They collect premiums from the farmers and disburse payout to the insured farmers on behalf of the insurance company, OIC. When it comes to the marketing in rural area, the role of the intermediaries is significant. OIC has around 20 branches in Oromia region; however, it is still difficult for them to deliver insurance service deep into rural areas.

As far as the WII targets individual farmers live in rural areas, there is always someone needed who can distribute insurance products to them. Therefore, the intermediaries are important player to conduct marketing of the products. In order to implement groundwork properly, the Team made an agreement with the intermediaries and provided training to them.

Table 3.1.2 shows three Unions and one MFI selected as the intermediaries for the Phase I pilot project. The MFI provides loans to rural farmers, while the Unions usually closely work with the farmers and provide agricultural input and credit services. As pointed out, these intermediaries play a role of the front door in the field so that they should be well-known by local farmers. OIC and the Team carefully selected these community based organizations through the situation analysis and series of discussions, and then OIC made an agreement with them to deliver the WII products.

Table 3.1.2 Intermediaries and Their Coverage Areas under Phase 1 Pilot Project

Zone	Woreda	Kebele	Intermediary
East Shewa	Boset	Borchota	Oromia Credit and Saving Share Company (MFI)
		Buta Wagare	
		Gari	
	Bora	Dalota Mati	Bora Denbel Farmers' Cooperative Unin
		Tube Suti	
		Bite Daba	
	Adami Tulu	Walin Bula	Meki Butu Vegetable and Fruit Growers Cooperative Union
		A/Germama	
		G/W/Boramo	
West Arsi	Arsi Negele	Alge	Uta Wayu Multi-Purpose Farmers' Cooperative Union
		Mudi Arjo	
		Shala Bila	
West Shewa	Ilfata	Sato Luku	Oromia Credit and Saving Share Company (MFI)
		A/Godeti	
		H./Sendi	

Source: JICA RREP Team

Regarding Boset woreda and Ilfata woreda, there are no farmers' cooperative unions which have a strong relationship with OIC; however, OCSSCO (Oromia Credit and Saving Share Company), the biggest microfinance institution in Ethiopia, operates in these woredas. Thus, OIC and the Team decided to work with OCSSCO instead of farmers' cooperative unions in those woredas.

To deliver the WII product, these intermediaries worked closely with DAs in each target kebele. This arrangement was one of the major features of promoting RREP WII pilot project. The intermediaries gave logistical support to the DAs in order to conduct awareness creation meetings on the WII promotion efficiently. After the DAs have raised farmers' awareness, the intermediaries started collecting premium from the farmers who purchased the policy and signed up the WII.

3.1.3 Development Agents (DAs)

The DAs are one of the farmers' closest government officers in their rural communities, and therefore the DAs appeared to be the best player to introduce WII into their farming communities. The main role of the DAs is to increase farmers' awareness for the importance of agricultural risk management. Although the basic concept of the WII is simple as compared to traditional crop insurance products, such as MPCI etc., it still takes time to make farmers understand how the WII works.

The Team has thus decided to have the DAs involved in promoting the WII as much as possible. The Team also conducted a series of trainings for the DAs before they have actually started farmers' awareness creation about the WII. There are usually three DAs in each kebele[1]. Total 45 DAs covering the target 15 kebeles were therefore assigned to conduct the farmers' awareness creation meetings during the Phase I pilot project implementation.

3.2 Design of Weather Index Insurance Product

Since it was first year of the pilot project and the WII itself was still quite new to not only for the farmers but also for other concerned officers such as zonal / woreda officers and DAs, RREP index design was so made as to create a "simple" and "cost effective" insurance product, but yet "corresponding to famers' need" at the kebele level. It was also important that the index design could be easily scaled up in future with no external premium subsidy. The followings explain how this strategy was achieved and what steps were taken for designing the indices.

3.2.1 Strategies of Index Design

1) Kebele-based Design

Since agriculture and rainfall are inherently local, the most effective WII must also be locally oriented and designed with the participation of the farmers themselves who are to purchase the policies. Intensive focus group interviews with selected farmers held in all the target 15 kebeles framed the design stage of the weather indices under the Phase I. Local crop calendar, historical weather risks, and demands for WII design such as payout frequency, etc. were thus incorporated in the early stages of the WII pilot project implementation.

2) Satellite-based Source Data

Past WII related projects have been severely limited in their sizes and extent due to the limited availability of ground-based weather station data. WII related projects frequently remained stuck in their pilot stages due to the high cost (and technical impossibility) of acquiring additional ground-based weather station data with sufficient quality and historical longevity to be useful for designing insurance index. Typically, reinsurance arrangement requires 30 years of data, which is seldom available in African rural areas.

[1] In case there is vacant seat for DA because of transfer etc., expert of Woreda Agricultural Office played a role as DA for awareness creation meetings.

The RREP WII products were therefore developed with a satellite-only strategy from the very beginning. The innovative use of freely available ARC2 satellite rainfall data (with 30 years data history, adjusted using ground weather stations for improved accuracy) allowed the weather indices to be tailored to each of the 15 kebeles without the need for expensive or tamper-prone ground-based weather stations. Further, with this ARC2 date the Team could manage expansion of the target areas from 15 to 45 kebeles for Phase II WII implementation.

3) Appropriateness

Focus group interviews were used for identification of local needs for WII design. Among the results of these focus group interviews, an overwhelming demand for insurance that makes payments approximately once every three or four years were observed. Drought, or lack of rainfall, was unanimously the biggest risk farmers have been facing. The RREP WII products were therefore created basically to match this demand.

4) Affordability

Insurance company, OIC, on the other hand was concerned that offering WII products paying out too frequently would drive down sales. As a result, although there was ample evidence from the focus group interviews and from other past projects, like HARITA, that smallholder farmers prefer frequent payouts even if that means they have to pay more out-of-pocket in premium, the partner insurance company, OIC, felt that during the pilot year it would be the best to limit the rate-on-line to 20%, the fraction of the sum insured that the farmers must pay in premium.

3.2.2 Basic Procedure for the WII Products Design

There are five main steps taken to develop WII products; 1) data gathering, 2) focus group interviews, 3) analyzing historical drought year, 4) quality checking and product development, and 5) pricing and marketing. The following describe the details of these steps to design the weather index indices:

1) Data Gathering

To understand drought and rainfall patterns in each kebele, the JICA Team assembled historical agricultural yield data from the Ministry of Agriculture (MOA), rainfall data from the National Meteorological Agency (NMA), as well as satellite estimated rainfall data and vegetation health data from the US government.

The satellite estimated rainfall amount was modified by capping the daily rainfall at 10mm per day (Cap). This is a rough approximation of the daily soil water holding capacity, and the rest of the rain is thus discarded. The 10mm number was chosen on the basis of research into “effective rainfall” in semi-arid regions[2]. That research found that approximately 70% of all rainfall that falls in semi-arid regions is retained by the soil for use by agriculture. The remainder is runoff or evaporated. By doing a distribution analysis of the raw rainfall data from each kebele, it was determined that the 70% percentile rainfall event for the project area was approximately 10mm.

There are 340 missing days of rainfall data over the 30-year history of the ARC2 dataset (about 3% of total days), whereas NMA station rainfall data had 20-100% missing data over the same period. The amount of missing data was unacceptably high for the NMA station data, and therefore it was discarded. This was one of the main advantages of using satellite rainfall as the basis for the RREP indices – the data collection process is completely automated and freely available from anywhere in the world with an internet connection.

[2] Araya, A., and Leo Stroosnijder. “Assessing drought risk and irrigation need in northern Ethiopia.”*Agricultural and Fores meteorology 151.4 (2011): 425-436.*

2) Focus Group Interviews (FGIs)

To clarify which parts of the rainy season and crop calendar are the most critical for crop growth, the Team conducted a series of focus group interviews with farmers in each kebele. The Team also asked them to identify the worst drought years within the last 10-30 years. This data provided an accurate source to cross-check with satellite rainfall estimation data and allowed the farmers to give their preference on the most critical times where reliable rainfall is necessary to achieve good crop yields.

Table 3.2.1 shows the summary of the focus group interviews, difference in critical periods among woredas were identified, so it is not surprising to see the preferred dates of insurance range widely differed among woredas. The overwhelming consensus among all 15 kebeles was that drought was the biggest weather risk to stable agricultural production. All 15 kebeles also preferred frequent payouts, even if that meant they would pay a higher out-of-pocket premium each year.

Table 3.2.1 Summary of the Focus Group Interviews

Woreda	Kebele	Crops suffered the most during drought	Severe Drought Years of the last 10 years	Severe Drought Years in the last 30 years	Most important crop periods
Boset	Borchota	Maize	2002, 2004, 2009	1984	Aug 20- Sep 25
	Buta Wagare	Sorghum	2002, 2004, 2009	1984	Aug 22- Sep 20
	Gari	Maize & Sorghum	2002, 2004, 2009, 2012	1984	Aug 22- Sep 11
Bora	Dalota Mati	Maize	2002, 2009, 2012	1984	May 18- June 25
	Tube Suti	Maize	2002, 2004, 2010	1984	May 22- July 8, Sep 11- 27
	Bite Daba	Maize	2002, 2007	1984	April 23- June 8, Aug 20- Oct 10
Adami Tulu	Walin Bula	Maize	2002, 2005, 2012	1984	Aug 22- Sep 28
	Abine Germama	Maize	2008	1984	Apr 22- May 25, Aug 20- Sep 27
	G/W Boramo	Maize	2002, 2004,2011,	1984	Aug 18- Sep 27
Arsi Negele	Alge	Maize	2007, 2009, 2012	1984	Apr 20- June 7, Aug 22- Sep 27
	Mudi Arjo	Maize	2007, 2009, 2012	1984	July 22 - Sep10
	Shala Bila	Maize	2007, 2012	1984	July 8- Sep 10
Ilfata	Sato Luku	Maize & Sorghum	2007, 2010	1984	Mar and April, Sep 9- Oct 21
	Ambelta Godeti	Sorghum	2003, 2010, 2011, 2012	1984	Mar 13- May 7
	Hidabu Sendi	Maize & Sorghum	2005, 2006	1984	Early April, first week of May

Source: JICA RREP Team

3) Analyzing Historical Drought Years

After narrowing down the most critical periods of rainfall and worst drought years in discussions with farmers, the Team cross-checked this data with the satellite rainfall estimates and attempted to match as many historical drought years as possible. Weather index triggers were designed to provide a partial payout based on the FGI results, and the maximum payouts were designed to match the worst drought experienced at each kebele in the last 30 years.

To make the index, the ARC2 rainfall (with 10mm daily cap applied) was simply summed during the farmer-specified risk periods. The most accurate rainfall indices have the strongest relationship between the index values and historical farmer losses. A key part of this process was to choose the exact risk period. As a first step of choosing the most appropriate risk period that should be transacted, multiple different rainfall indices were created by varying the farmer-supplied critical planting and flowering dates by +/-30 days in five-day increments. This also performed the function of conducting a sensitivity analysis to determine how different planting dates affected the quality of the weather index.

4) Quality Checking and Product Development

Once indices were created for both risk phases, i.e, planting and flowering, in each kebele, the indices were compared to three different historical satellite estimates of vegetation health (NDVI from

AVHRR[3] at 8km and from MODIS[4] at 250m and 10km) and the most recent 3-8 years of yield data from the MOA. This comparison took the lowest 15 years of the rainfall index values and performed a simple correlation with the vegetation and yield data.

As a result of the quality checking, there was a good match between the satellite and the farmer's local knowledge (R= 0.4 to 0.8 between rainfall and vegetation health during critical periods, and one-half to three-quarters of the worst drought years were captured accurately by the index). In other words, the RREP WII products will trigger payouts to farmers in future severe drought years.

From above focus group interviews and data analysis, the Team has chosen to offer coverage for these perils in 2013; 1) weak or late onset of rainfall during the main rainy season of planting phase, and 2) weak or late onset of rainfall during the main rainy season of flowering phase. In addition, the RREP WII was designed available to cover all cereal crops (maize, sorghum, wheat, barley, teff) as well as haricot beans in all kebeles.

As shown in Table 3.2.2, the dates of insurance coverage for kebeles were set differently, since each kebele receives different rainfall and has different historical drought patterns. The amount of rainfall needed to trigger a minimum payout is also different for each kebele – depending on the historical rainfall patterns of each kebele.

Table 3.2.2 Final Indices for 15 Kebeles

Woreda	Kebele	Coverage Dates	Trigger (mm)	Exit (mm)
Arsi Negele	Mudi Arjo	Apr30-Jun10	40	17
		Jul25-Sep10	56	33
	Shala Bila	Apr20-Jun10	60	21
		Jul15-Sep15	77	50
	Alge	Apr20-Jun10	72	19
		Aug5-Oct5	54	33
Adami Tulu	Walin Bula	Apr20-Jun30	71	40
		Aug15-Sep25	34	21
	A/Germama	Apr20-Jun20	56	38
		Aug25-Sep25	22	6
	G/W/Boramo	Apr20-Jun20	56	38
		Aug5-Sep30	55	19
Bora	Tubi Suti	May20-Jun30	31	15
		Aug25-Sep30	28	8
	Dalota Mati	May20-Jun30	32	16
		Aug15-Sep15	40	14
	Bite Daba	Apr20-Jun10	32	7
		Aug25-Oct10	34	7
Boset	B/Wagare	Apr20-Jun20	29	11
		Aug5-Sep25	76	44
	Gari	Apr20-Jun10	25	0
		Aug5-Sep10	63	33
	Borchota	Apr30-Jun20	25	1
		Aug15-Sep30	45	20
Ilfata	Sato Luku	Apr10-May15	30	7
		Sep10-Oct30	41	1
	A/Godeti	Apr5-May15	30	9
		Sep20-Oct30	18	0
	H/Sendi	Apr5-May5	25	0
		Sep10-Oct30	43	10

Source: JICA RREP Team

[3] NDVI: Normalized Difference Vegetation Index. AVHRR: Advanced Very High Resolution Radiometer. The NDVI AVHRR satellites take measurements at an 8km spatial resolution and provide globe coverage on an almost daily basis.

[4] MODIS: Moderate Resolution Imaging Spectroradiometer. The MODIS is a vegetation index produced by the National Aeronautical Space Administration (NASA). The MODIS sensor provides almost daily globe coverage at 250m spatial resolution.

Payout triggers were standardized on the basis of farmer-specified payout frequency. The maximum payout (exit) was set to the most severe historical drought event, which has occurred in the last 30 years. During the contract window, the insurance company, OIC, uses satellite measurements to count the rainfall. Each contract window has what is called a "trigger"; if the total rainfall amount is more than the trigger, there is no payment. Any rainfall total below the trigger will result in a payout. Payments will increase for each millimeter (mm) of rainfall below the trigger, until a maximum payment is reached.

The rainfall total is actually an adjusted rainfall total. Every day the rainfall amount is totaled, and a 'Cap' (10 mm) is applied. This cap represents the maximum amount of rainfall that is counted for each day. These adjusted rainfall totals are then added together to calculate the adjusted rainfall total for the full contract window.

5) Pricing and Marketing

The farmers in each of the 15 kebeles told the Team their strong preference for a drought insurance product that has as frequent payouts as possible. During the focus group interviews, the farmers said that they would be willing to pay much money for frequent payouts. With this farmers' request, and for ease of registration and communication to farmers, the Team has made the product the same price in all kebeles. This standardized price is 20% at risk for each product in each kebele, depending on payout frequency. To account for differences in drought frequency and severity and difference in historical rainfall patterns, rainfall triggers are different for each kebele.

Table 3.2.3 Premium and Payout

Premium:	Payout in good rainfall season:	Payout in drought years triggered by index:	
		Minimum payout:	Maximum payout:
100 Birr	0 Birr	100 Birr	500 Birr
200 Birr	0 Birr	200 Birr	1000 Birr
300 Birr	0 Birr	300 Birr	1500 Birr
400 Birr	0 Birr	400 Birr	2000 Birr
500 Birr	0 Birr	500 Birr	2500 Birr

Source: JICA RREP Team

3.3. Training for the DAs, Intermediaries and National Insurance Companies

A 2-day training for the DAs was held on 28th of February and 1st of March, 2013. Also, one day training for the intermediaries was conducted on 5th of March, 2013. Further, technical training on WII design was conducted for national insurance companies from 22nd April to 25th April, 2013. The following are the summary of each program and findings from these trainings:

3.3.1 Training for the DAs

The purpose of the training for the DAs was to equip them with sufficient knowledge on the WII before going to the field. The training helped the DAs in creating farmers' awareness on WII efficiently. All the DAs in the 15 target kebeles were invited to the training. In addition, other organizations which are related to the WII pilot project promotion also participated in the training; Oromia Cooperative Promotion Agency, NMA offices from the target woredas and zones.

There were 78 participants in total. WII is still new concept to most of the participants so that many questions were raised by the participants and lively discussions took place throughout the training. The training was divided into four sessions; namely, 1) microinsurance Overview, 2) major features of WII, 3) introduction of RREP WII, and 4) demonstration of awareness creation and action plan making (see Table 3.3.1).

The training covered wide range of topics from insurance in general to development process of the WII. In fact, the DAs' understanding of the WII was one of the challenges to carry out effective WII promotion. Some of the key findings from the kick-off training are summarized as follows:

- ✓ Main advantage of the WII is its simplicity. Insurance companies are not necessary to conduct field assessment. Payout of WII totally depends on predetermined indices. For this reason, it is clear to everyone if famers can get payout or not. All insurance companies need to do is just monitor the weather data in the target areas.

✓ However, the WII still seemed complicated for the DAs and farmers. One of the most difficult things for the participants in the training was the payout calculation. The participants needed to understand the terms "Trigger Point", "Exit", and "Cap" to calculate the payout amount properly. It took some time for the participants to understand the meaning of these words and calculation of the payout amount. From this point of view, it appears to be more difficult for farmers to well understand these things.

Table 3.3.1 Training Program for the DAs

Day	Time	Activity
28 Feb	8:00- 8:30	Registration
	9:00- 9:40	Introduction and Welcome Speeches/ Introduction of RREP
	9:40- 12:00	**Session 1** "What is Insurance?" "Micro Insurance Overview"
	12:00- 13:00	Lunch break
	13:00- 14:00	"What is WII"
	14:00- 14:30	**Session 2** "Why should you buy WII?"
	14:45- 17:00	"An interactive simulation of WII"
1 March	8:30- 9:00	**Session 3** Summary of the first day
	9:00- 10:00	"How to design WII"
	10:00- 10:45	"How does RREP work?"
	11:00- 12:00	"Release of RREP WII for 2013"
	12:00- 13:00	Lunch break
	13:00- 14:00	**Session 4** "Practice for awareness creation (Q & A)"
	14:15- 17:00	Action plan making

Source: JICA RREP Team

✓ In addition, rainfall measurement was one of the most frequently asked questions during the training. Most of the participants were interested in how to measure the rainfall amount by each kebele. The satellite data is not well-known to the DAs and neither to the farmers. They could not imagine how possible the satellite can estimate the accurate rainfall amount. It is necessary to well explain this cutting-edge technology to the participants in an easily understandable and persuadable manner that the satellite rainfall data can be trusted enough.

✓ It is important to emphasize that the WII is one of the risk management tools. The purpose of the WII is not to get payout from the insurance company. Playing a WII game during the training, some participants who got payout changed their behavior trying to get more payout in the following years. The WII is not a money making tool. Getting payout is a result, but not the purpose of the WII.

3.3.2 Training for the Intermediaries

The purpose of this training was to enhance capacity of the intermediaries to conduct the groundwork effectively. The main role of the intermediaries is to give logistical support to the DAs and collect premium from the farmers. In this sense, effective marketing depends on capacity of the intermediaries. Three cooperative unions and one Microfinance Institution played a role of intermediaries under the Phase I pilot WII implementation. There were 15 participants from the four organizations.

Table 3.3.2 Training Program for the Intermediaries

Day	Time	Activity
9 Mar	8:30- 9:00	Registration
	9:00- 10:30	Introduction of WII
	10:30- 10:45	Tea Break
	10:45- 11:15	Role of Intermediaries & Ground work support
	11:15- 12:00	Main features of WII
	12:00- 13:00	Lunch Break
	14:45- 14:00	Exercise of payout calculation
	14:00- 15:00	How to fill in certificates and application forms
	15:00- 15:15	Tea Break
	15:15- 16:30	Confirmation of DAs' schedule & action plan making
	16:30- 17:00	Questions and Answers

Source: JICA RREP Team

Table 3.3.2 shows the outline of the training program. This one day training covered such topics as;

"Basic concept and major features of WII", "Role of Intermediaries", and "How to fill in an insurance certificate and an application form".

Followings summarize the key findings from the training for the intermediaries. One of the main findings was difference of level of capacity among the intermediaries. Also, necessity of coordination among the stakeholders during training was identified. For example, there was no communication between the intermediaries and the DAs before they actually started the WII promotion activities. These findings were considered important to formulate the activity plan for the Phase II.

- ✓ There is a gap about capacity among the intermediaries. Meki Batu Cooperative Union and OCSSCO have some experiences of providing insurance services already. They also know the role of the intermediaries and the basic concept of microinsurance properly. Hence, they could easily understand what they need to do when they conduct the WII promotion and farmers' registration. It did not take time to train these organizations to implement the WII project.
- ✓ On the other hand, Uta Wayu Cooperative Union and Bora Dembel Cooperative Union have never experienced in the areas of these insurance services. It took time to make them understand the main tasks of the intermediaries. The training needed to cover a wide range of topics from the concept of different types of insurances to the calculation of the WII payout, requiring them to spend much time.
- ✓ It should have brought together the DAs and the intermediaries to a meeting. The trainings were conducted separately for the DAs and for the intermediaries; yet, they needed to work together and coordinate the schedule of the awareness creation sessions. There was no discussion between the DAs and intermediaries before they actually conducted farmers' awareness creation mainly because of time constraint on both of them.

3.3.3 Technical Training on WII Design

A technical training on WII design was conducted from 22nd April to 25th April, 2013. The main objective of this 5-day training was to strengthen and develop capacity of national insurance companies for further development of WII in Ethiopia. Main participants of this training were staff from national insurance companies and NMA. There are around 15 insurance companies in Ethiopia and nine of them participated in the training.

In Ethiopia, there are only few insurance companies which have experience in providing WII services. In fact, all these participated insurance companies do not have any experience of WII services except OIC. Nevertheless, many companies were interested in microinsurance services including index-based insurance, e.g. WII.

The training focused on technical aspects of the WII. The participants were asked to develop their own WII product through the training. The first day was about "theoretical background of microinsurance project and WII". The second day covered the topic of "planning the WII project and site selection". The third day asked the participants to create a draft WII. The fourth day was how to check the quality of the WII. The participants tried to develop their own insurance products in the last day of the training.

Table 3.3.3 Programme of the Technical Training on WII Design

Day	Activity
22 April, 2013	Theoretical background of microinsurance and WII
23 April, 2013	Planning your WII project and site selection
24 April, 2013	Creating a draft weather index
25 April, 2013	How good is your weather index?
26 April, 2013	Creating and marketing an insurance product from your weather index

Source: JICA RREP Team

At the end of the training, each group introduced their own designed products. The participants reviewed each of the WIIs by checking payout frequency, loss expected ratio, pure risk premium, average historical payout, and how many times historical payout matches farmers' reported years. The participants started with the same information as others; however, they rolled out different WII products at the end. This was because payout frequency, administrative cost, and other basic conditions were different by the participants. The following summarize the main findings out of the training:

An insurance company staff explains the procedure of the sign-up.

- ✓ Insurance companies are usually sensitive about the premium rate. This is because they know general non-life insurance premiums such as motor insurance. However, according to focus group interviews, farmers prefer high frequent insurance regarding drought even if they need to pay more premiums. It is important to fill in the gap between farmers' perspective and insurance companies' point of view.
- ✓ Most insurance companies are interested in microinsurance. They are interested in not only drought index based insurance, but also other types of microinsurance such as livestock index based insurance, and multi-peril crop insurance. Their main motivation for microinsurance is; 1) market potential, 2) Corporate Social Responsibility, and 3) diversification of their risk portfolio.
- ✓ One of the most common constraints for the insurance companies to start microinsurance is high administrative cost. Most of them do not have effective delivery channels in rural areas and their administrative cost will be higher than other insurance services. Besides, profit that insurance companies can make per each policy is far smaller than the other insurance products. Therefore, it is necessary for insurance companies to expand their microinsurance service area to get benefit out of the sales, but this imposes higher administrative cost at the initial stage.

3.4 Groundwork of WII Promotion and Product Sales

3.4.1 Result of WII Promotion

Groundwork, the WII promotion and registration in the field, was conducted within March 2013 in all the 15 kebeles under Phase I pilot project. Promotion activities and registration were conducted by the DAs and the intermediaries. Firstly, the DAs gathered farmers and tried to raise their awareness on WII. After that, intermediaries' staff collected money for premium from the farmers who signed up the insurance.

There were around three days for the awareness creation meetings in most of the kebeles, and there were around 60 participants in each meeting. After conducting the awareness creation meetings, some farmers purchased insurance policy right there if they had money to. The intermediaries went back to the field to collect money from the farmers who wanted to purchase the insurance policy but did not have money with them at the meeting.

The groundwork had to be completed by the end of March in Boset, Bora, Adami Tulu, and Arsi Negele woredas. The registration period for Ilfata woreda was even shorter than the rest; by 15th of March. This was because crop season in Ilfata starts much earlier than those of other areas. This situation made OIC complete their WII sales by 15th March 2013. All groundwork needs to be completed before "exposure reporting date" which is 21 days prior to the start date of the insurance contract. Otherwise, the farmers would be able to predict weather conditions before they purchase the

WII.

Table 3.4.1 shows the summary of the WII promotion result of Phase I. The number of registered farmers under the Phase I WII promotion has reached up to 1,286 farmers. Total household number is estimated about 10,000, and therefore, take-up rate was over 10% of the total estimated households in the project area.

Table 3.4.1 Result of WII Promotion Result for Phase I Implementation

Zone	Woreda	Kebele	Total Farm HH	Trained Farmers	Duration for WII promotion	Registered	Take up rate
East Shewa	Boset	Borchota Buta Wagare Gari	2,319	1,481	Mar 20-30	136	9.2%
	Bora	Dalota Mati Tube Suti Bite Daba	1,521	1,164	Mar 11-30	125	10.7%
	Adami Tulu	Walin Bula A/Germama G/W/Boramo	1,650	1,678	Mar 11-30	535	31.7%
West Arsi	Arsi Negele	Alge Mudi Arjo Shala Bila	2,745	795	Mar 23-30	318	40.0%
West Shewa	Ilfata	Sato Luku A/Godeti H./Sendi	2,230	1,536	Mar 13-15	172	11.2%
Total			10,465	6,637		1,286	19.3%

Source: JICA RREP Team

Table 3.4.2 summarizes frequently asked questions during the awareness creation meetings. One of the most frequently asked questions was about a premium. Many farmers asked the DAs and the intermediaries if the insurance company will return the premiums to the farmers in case that there is no drought. Also, some farmers frequently asked if premiums will be transferred to the next year if there is no payout in this year. These questions indicate that most farmers are not familiar with insurance services in general. The DAs and the intermediaries had to emphasize that the insurance company would never pay back their premiums even if there is no drought.

Table 3.4.2 Frequently Asked Questions in the Awareness Creation Meetings (Phase 1)

Category (% of total questions)	Frequently Asked Question	Sample Answer
Index / Product design (28.8%)	If our crops are damaged by flood, insect etc.,, does the insurance company cover those damages too?	No. RREP index covers only shortage of rainfall and not based on the damage level, but based on the index pre-set by each target Kebele.
	Any crops can be covered?	Each index is designed for main crop(s) grown in the Kebele based on the focus group interviews, so farmers who want to buy policy need to check it, but It does not mean other crop(s) is (are) excluded.
	Index is different by land fertility of each farmer?	Index is designed only one for each Kebele and it's not different from land fertility of each farmer.
	Situation is different among Zones even if we are living in same Kebele, why only one index for all Zones?	Rainfall amount is measured by satellite data and it is available by 10km by 10km and therefore, index is designed by Kebele, not by Zone.
Premium (22.4%)	If there is no shortage of rainfall, does the insurance company return the premium?	No, the Insurance Company will not return the money even if there is no shortage of rainfall. However, if there is shortage of rainfall, the Insurance Company will pay the money to insured farmers.
	Is it possible to pay half of the premium amount now, and pay the rest of premium amount after harvest?	No it is not possible. You need to pay all premiums before registration period finishes.
	If there is no drought, is it possible to transfer the premium to the next year?	No it is not possible. The premium will not transfer to the next year. You need to pay premium every year.
	How many years is premium paid valid for?	An insurance policy is valid for only one year (one season). You have to pay it every year if you want to renew your policy.
	How many hectares can one farmer insure?	There is no limitation. It depends on how many hectares he/she wants to insure.

Category (% of total questions)	Frequently Asked Question	Sample Answer
Payout (21.0%)	How does the Insurance Company measure the damage of crops?	The insurance company does not measure the damage. If the rainfall amount is below a certain level, the Insurance company will pay money to insured farmers.
	How does the insurance company measure the rainfall amount in each Kebele?	The insurance company will get the rainfall data from the satellite. The satellite provides daily rainfall data for 10km by 10km area.
	If there is no payout for 10 years, can we get any interest?	The insurance is not same as saving. Even if there is no payout for 10 years, the insurance company will not give you any interest. However, the insurance is designed that there is payout every 4.5 years.
Registration (17.4%)	Can we buy insurance individually or in groups?	This insurance is only for individual farmers.
	Can we get the evidence that we paid the insurance?	The insurance company gives you an insurance policy. Also the intermediaries give you a receipt when you pay premium.
	Is it possible to insure for land which I rent?	Yes, it is possible.
General / Others (14.5%)	Does OIC know that we were cheated many times by someone who said that they provide similar service?	OIC is a formal registered insurance company. They do not cheat you. They are one of the highest reputational insurance companies in Oromia Region.
	Does the Insurance company provide improved variety seeds?	No, they do not. The insurance company provides only insurance products in this project.

Source: JICA RREP Team

Another frequently asked question is how the insurance company measures damage on crops. This question also indicates that farmers did not understand the WII properly. The RREP WII product was designed based on the satellite weather data and OIC monitors the rainfall amount which is estimated only by the satellite. OIC will not measure damage on crops on the ground, but simply monitor the rainfall amount based on the satellite data. The basic concept of WII is simple; however, it turned out to be difficult for the farmers to understand how the insurance company can decide whether they give payout or not without measuring damage.

A bit more complicated question about payout was how the insurance company measures the rainfall amount in each kebele. Even if farmers understand that the insurance company does not measure damage but they only measure the rainfall amount, they may ask this question, and this question reveals the difficulty of explaining how WII is designed. Not many DAs may be able to answer to the question properly. The indices of the RREP WII were constructed based on the satellite rainfall data, and the insurance company will monitor the rainfall data which is estimated by the satellite.

It is easy to imagine how difficult the farmers can understand that the satellite can estimate the rainfall amount on the ground. The DAs and the intermediaries explained that the rainfall data of ground weather stations were also taken into account in estimating the satellite-based rainfall data. In addition, satellite data is already used for index design of another WII project in Ethiopia, and it is accurate enough to use for WII under this pilot project implementation.

3.4.2 Achievement of WII Sales

Table 3.4.3 shows the summary of the WII sales. The number of registered farmers under RREP has reached up to 1,286 farmers with 146,350 birr premiums. The overall average premium amount per farmer household was 114 birr. This means that most farmers purchased the Weather Index Insurance with the minimum premium amount; 100 birr.

The largest number of registration was 535 farmers in Adami Tulu woreda. This was approximately 40% of the total registered numbers. The take-up rate in Adami Tulu reached more than 30% of the total estimation of population in the target kebeles within the woreda. One of the reasons behind this was that Meki Batu Cooperative Union, the intermediary in Adami Tulu woreda, was a very active and large cooperative Union in that area. .

The lowest take-up rate was 5.9% in Boset woreda followed by Ilfata woreda with 7.7%. OCSSCO, the microfinance institution in charge, played a role of the intermediary in both woredas. Although it is too early to judge the result of the pilot project, this result implies that the groundwork performance of the Unions may be higher than that of the MFI. Follow up monitoring is necessary to evaluate performance of the intermediaries.

Table 3.4.3 Summary of the WII Sales

Zone	Woreda	Kebele	Total No. of Farmers	Registered Farmers	Take-up Rate	Total Premium	Ave Premium/HH
East Shewa	Boset	Borchota Buta Wagare Gari	2,319	136	5.9%	20,800	153
	Bora	Dalota Mati Tube Suti Bite Daba	1,521	125	8.2%	14,900	119
	Adami Tulu	Walin Bula A/Germama G/W/Boramo	1,650	535	32.4%	56,900	106
West Arsi	Arsi Negele	Alge Mudi Arjo Shala Bila	2,745	318	11.6%	32,950	104
West Shewa	Ilfata	Sato Luku A/Godeti H./Sendi	2,230	172	7.7%	20,800	121
Total			10,465	1,286	12.3%	146,350	114

Source: JICA RREP Team

One of the reasons for Phase I high achievement of RREP could be the mobilization of DAs. There were around 45 DAs and woreda experts involved in the WII promotion. They mobilized local farmers and distributed the information about the WII at kebele level. Although the DAs' capacity is limited, they surely raised farmers' awareness on the insurance. Therefore, the involvement of the DAs seems to have contributed to the fact that more than 1,000 farmers signed up the insurance even in the first year.

In addition, the site selection process was an important aspect for this high take-up rate. A situation analysis was conducted in the target woredas to select the specific target kebeles. Local people such as the DAs and the kebele chairpersons attended the situation analysis workshop, and they ranked and prioritized the kebeles for the introduction of WII. The Team could therefore identify the most drought prone and thereby high demand areas for WII by utilizing such local knowledge. Thus, the farmers in the pilot project sites responded well to the WII promotion.

Furthermore, the minimum premium amount of the RREP WII was 100 birr, which is in fact not so high. Although the 20% premium is high comparing to other insurance products, the minimum premium rate of the RREP WII was set at 100 birr. For this reason, even subsistence farmers could afford to purchase the WII without any subsidies.

Looking at the premium amount per household as shown in Table 3.4.3, however, average premium per household in Boset woreda and Ilfata woreda is higher than those in other woredas. For instance, the lowest premium amount per household is only 106 birr in Adami Tulu woreda, which recorded the highest take-up rate with 32.4%. By contrast, average premium amount per household in Boset woreda, which recorded the lowest take-up rate with 5.9%, is the largest amount with 153 birr. It might be possible to assume that MFI is suitable intermediary for richer farmers rather than subsistence farmers.

Overall collected premium percentage of the planting phase and the flowering phase was nearly the same (49.4% for planting phase and 50.6% for the flowering phase). However, allocation between these two phases varied from kebele to kebele. Regarding Boset woreda, farmers in Borchota and Buta Wagare kebeles were more likely to allocate their premium to the planting phase, while 70% of farmers in Gari kebele preferred to allocate the premium in the flowering phase. This situation indicates that farmers' perspective on weather related agricultural risk period may be very different even in the same woreda (see Table 3.4.4).

Table 3.4.4 Result of the WII Promotion by Kebele

Zone	Woreda	Kebele	Registered Farmers	Total Premium	Planting	(%)	Flowering	(%)
East Shewa	Boset	Borchota	58	11,800	7,200	61.0%	4,600	39.0%
		Buta Wagare	59	6,900	3,900	56.5%	3,000	43.5%
		Gari	19	2,100	650	31.0%	1,450	69.0%
	Bora	Dalota Mati	17	2,700	1,125	41.7%	1,575	58.3%
		Tube Suti	20	2,700	1,800	66.7%	900	33.3%
		Bite Daba	88	9,500	4,650	48.9%	4,850	51.1%
	Adami Tulu	Walin Bula	119	13,100	6,210	47.4%	6,890	52.6%
		A/Germama	184	19,000	9,500	50.0%	9,500	50.0%
		G/W/Boramo	232	24,800	12,400	50.0%	12,400	50.0%
West Arsi	Arsi Negele	Alge	117	11,950	3,725	31.2%	8,225	68.8%
		Mudi Arjo	41	4,200	1,450	34.5%	2,750	65.5%
		Shala Bila	160	16,800	6,350	37.8%	10,450	62.2%
West Shewa	Ilfata	Sato Luku	86	10,800	8,950	82.9%	1,850	17.1%
		A/Godeti	58	6,200	3,100	50.0%	3,100	50.0%
		H./Sendi	28	3,800	1,300	34.2%	2,500	65.8%
Total			1,286	146,350	72,310	49.4%	74,040	50.6%

Source: JICA RREP Team

3.4.3 Payout Discharged

1) For Planting Phase

In most kebeles, insurance contract period for planting phase covered from April to June. The triggering rainfall millimeters were set ranging from 25mm to 72mm. The rainfall amount is calculated by simply summing up daily rainfall amount during the planting contract period with 10mm Cap per day. In other words, the daily rainfall amount would be capped at 10mm to avoid the situation that one big rainfall passes the triggers. The RREP WII was developed with ARC2 dataset and the payout is calculated based on these dataset.

As shown in Figure 3.4.1, the rainfall amount in the planting contract period was high enough from the triggering amount in all the kebeles. Hence, there was no payout at all in the beginning of the 2013 season. In fact, comparing the actual rainfall amount (with 10mm daily cap) and the trigger millimeters, the actual rainfall amount was more than double in the 8 kebeles out of the target 15 kebeles. This indicates that there was enough rainfall between April and June in most of the target kebeles.

On the other hand, the actual rainfall amount in some kebeles was close to the triggering millimeters. For example, in Bite Daba kebele of Bora woreda and Gari kebele of Boset woreda, there was only 10mm gap between the actual rainfall amount and the triggering amount. In these kebeles, the insurance could have been triggered if there were a few more no rainfall days.

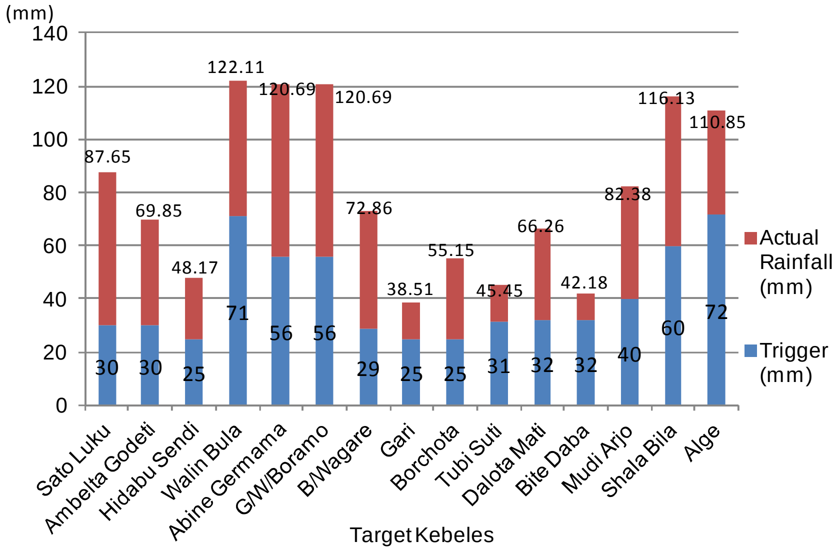


Figure 3.4.1 Rainfall Amount in Planting Period

Note: Actual Rainfall Amount is adjusted with 10mm daily cap.

2) For Flowering Phase.

The insurance contract for flowering phase covered from August to October in most kebeles. The triggers were set between 22mm to 77mm during this flowering phase. The insurance was not triggered in the flowering phase either. As shown in Figure 3.4.2, the actual rainfall amount overtook the triggering millimeters in all the kebeles. However, the actual rainfall amounts in some kebeles were very close to the triggers. For example, in Sato Luku and Hidabu Senti kebeles of Ilfata woreda, and Abine Germama kebele of Adami Tulu woreda, there were only around 10mm gap between the actual rainfall amounts and the triggers. From the results of both planting and flowering phases, there was enough rainfall in the target kebeles in the 2013 season as a whole.

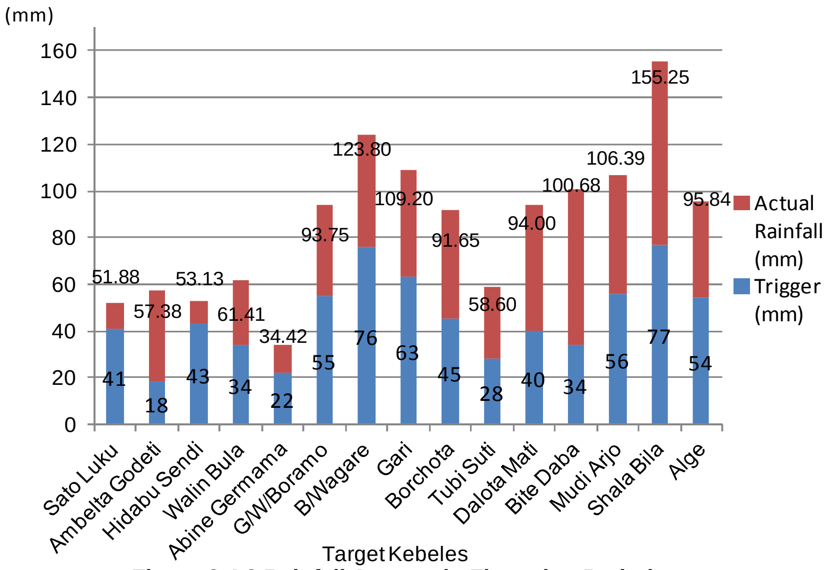


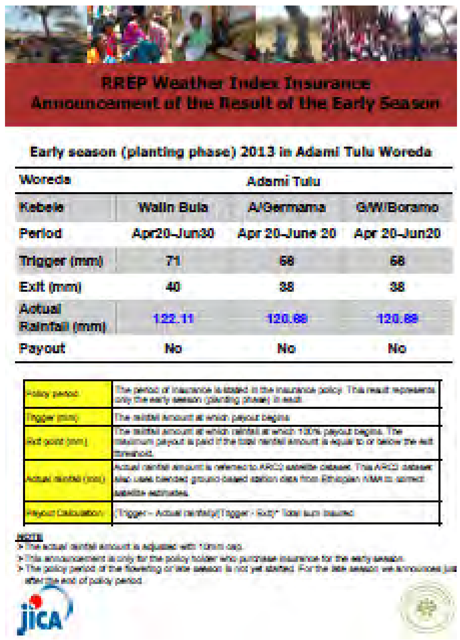
Figure 3.4.2 Rainfall Amount in Flowering Period

Note: Actual Rainfall Amount is adjusted by 10mm daily cap.

3) Announcement

The RREP Team and OIC distributed the announcement poster (see Photo right) for the target woredas after each insurance contract period passed. The actual rainfall millimeters and the trigger millimeters were mentioned in the poster, so that the farmers could know whether there should be payout or not. In fact, it seemed that farmers did not expect able to get the payout when they saw the posters because they already knew well that there was enough rainfall in the 2013 season.

Farmers reported that they did not suffer from shortage of rainfall in this season. However, some of the farmers suggested that the insurance contract period should be adjusted for the next season because some farmers felt the contract period did not fully match their critical time. The JICA Team and OIC therefore carefully reviewed the insurance design and have improved the insurance product in the season 2014.


RREP Weather Index Insurance
Announcement of the Result of the Early Season

Early season (planting phase) 2013 in Adami Tulu Woreda

Woreda	Adami Tulu		
Kebele	Walin Bula	A/Germama	G/W/Boramo
Period	Apr20-Jun30	Apr 20-June 20	Apr 20-Jun20
Trigger (mm)	71	68	68
Exit (mm)	40	38	38
Actual Rainfall (mm)	122.11	120.88	120.88
Payout	No	No	No

Poster for Announcement (Translated version)

Despite no payout event, many insured farmers showed positive response to the RREP WII. The pie chart in Figure 3.4.3 shows that 75% of focus group interview participants answered that they observed change(s) after purchasing the WII policy. Rest of focus group interview participants (25%), on the other hand, answered “No” and they showed opinion that it was very first year and too new to bring any change or they are not well convinced the benefit. In fact, most of the focus group interviewees purchased only one policy this year and they explained it as they were not so confident in buying several policies.

More than 90% of the insured farmers who answered "there is change" showed example as agricultural practice change (97 %) such as application of fertilizer and improved seed, and introduction of line planting (see Figure 3.4.3). For example, some farmers increased or firstly used their fertilizers in their farmland. Also, some farmers bought improved seeds instead of local varieties because they felt less drought risk thanks to the insurance.

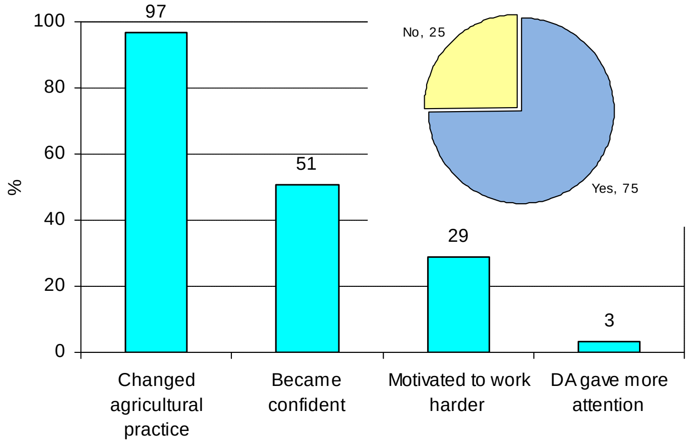


Figure 3.4.3 % of FGIs Answered "Observed Change" After WII Purchase (upper Right) and Kinds of Change

Also, 51% of respondents answered that they have become confident / peace of mind in their agriculture practice, and 29 % of respondents answered that they were motivated to work harder for further improvement of their agricultural practices. Although the awareness creation meeting did not include specific agricultural training session, this result showed that the benefit of using agricultural input together with insurance delivered by DAs during the training was well understood by the participated farmers. These examples indicate that the WII does not only protect farmers from drought, but also gives them confidence in their agriculture practices.

3.5 Issues Arisen and Lessons Learnt Through First Season WII

3.5.1 Findings from Focus Group Interviews After Sales

Focus group interviews (FGIs) were conducted after having closed the sales of WII policy. Each intermediary was assigned for implementing the interview for two groups, 1) insured farmers and 2) non-insured farmers in order to identify farmers' perceptions on WII pilot project and utilize them for the 2nd year pilot project by giving them the platform for the free discussion.

FGIs results showed two main reasons for not having bought insurance policy in the 1st year; namely, 1) farmers were not satisfied with sales arrangement (77%), and 2) they were not so convinced the benefit of WII as to purchase it (75%). Though the percentage was less than those two reasons, there were other reasons also raised such as; they did not like the index design of this year (14%) and they have little confidence in insurance company (14%).

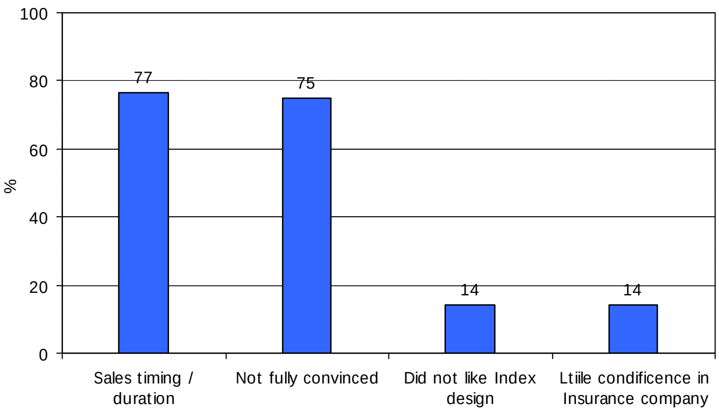


Figure 3.5.1 Reasons not Having Bought WII Policy
Source: FGIs conducted by RREP Team

For the 1st reason; sales management, farmers told that they had already spent their money to buy seeds and grains for home consumption at the time of selling the WII policy in Adami Tulu FGI. Other farmers mentioned that if they heard before, they could have purchased it. In Boset FGI, farmers commented that the time of selling the WII policy was so short that they were unable to purchase. They lamented that they did not have money in their hands to purchase as they were not given sufficient time in advance.

For the 2nd reason; famers in Boset FGI pointed out that the training was insufficient to dispel their fears and inculcate trustworthiness on this WII. Farmers in Adami Tulu said “premium amount itself was not so high for us, but most of us are not innovators to as to adopt new technology promptly, so that we hesitated to take up such new product, WII for the first time.”

In addition, Ilfata farmers raised such concern that “they did not like the index design” because they felt the sales window for planting phase does not match with the actual situation. Boset farmers mentioned that they have doubt how much they can be sure to the data that will be detected by the satellite for claim-payout by the insurance company. Not only this, they also proposed that the sales windows for both periods should be better to be modified. Other farmers in Boset were not satisfied that insurance company takes the diameter of a kebele as 10km because rain varies across even within the same kebele. They also argued that a policy expires every year and this is a very challenging issue for them.

All FGIs participants answered that they will buy the WII policy next year even if there is no payout this year, there were three FGIs which offered condition that “if” above mentioned disadvantages were corrected, though. For example, FGI participants of Ilfata answered that they will buy it in coming year only if the contract window for planting phase were rearranged. Arsi Negele farmers also mentioned that due to different problems they could not purchase it but for the next year without any condition they would purchase because it can cover the crop loss, it can transfer the risk to insurance company and they are to save money up to the next period and buy it.

Based on these findings from FGIs with non-insured farmers, the Team has taken necessary measures for designing the Phase II WII product such as modification of index design, improvement of institutional set up, improvement in schedule of the groundwork, and also improvement on training designs. Details are given in next chapter for the Phase 2 implementation.

3.5.2 Overall Lessons Learned Through Phase I

The groundwork of the WII promotion was one of the most important aspects to the smooth implementation of the WII pilot project. Appropriate groundwork implementation was a key to success of delivering the concept of the WII. More than 1,000 farmers purchased the WII in the 2013 season, yet there are still many challenges the Team faced. The following are major challenges identified by the Team and OIC throughout the experience of the WII pilot project in 2013 season:

1) Time Constraint on the Registration

One of the most fundamental challenges of the groundwork was time constraint as afore-mentioned. The groundwork started in mid-March 2013, and it had to finish by the end of March. Particularly, there were only three days for awareness creation and registration in Ilfata woreda since cultivation starts much earlier than other areas. Also, there were only few days for awareness creation meetings in some other kebeles as well.

This short period of registration caused two main problems; farmers did not have enough time to make a decision if he/she should purchase the WII. One of the most typical reactions of the farmers after they attended the awareness creation meetings was that they wanted to pay the premium later because most of them did not have cash at that time. Thus, the Unions and the MFI staff went back to the field to collect the premiums from the farmers. This tight schedule gave pressure to the farmers to make a decision quickly.

The other problem was that the Unions and the MFI did not have enough time to follow up farmers who wanted to sign up the WII. This is because the registration had to finish by the end of March. The

Unions and the MFI could not accept an application for the insurance after 31st March. In fact, farmers in Ilfata woreda complained that they wanted to purchase the WII that year; yet, they could not buy it because the insurance sale had already been finished. It is assumed that the take-up rate would have been higher if the insurance company could have given a longer registration period.

In addition, it was found that March was not the best timing for the registration. Most farmers did not have enough cash in this period because it was just the beginning of the agriculture season. This seems to be particularly true for subsistence farmers. They usually do not have saved and extra money for a new activity. From this point of view, the WII promotion and registration should have been commenced earlier. Farmers would be able to spend their money on the WII before they use all the money for other purposes as well as they can have more time to consider the benefits of the WII.

To make matter worse, there was rainfall in the mid of the registration period in Boset woreda. This was a big adverse effect on the WII promotion. This made some farmers assume that there would be enough rainfall in the 2013 season. In fact, some farmers requested the Unions to transfer the premiums to the next year because it rained already in the planting phase. This situation also indicates that the promotion and registration should have been conducted before March.

2) Limited Capacity of the Stakeholders

Lack of the DAs' understanding was also one of the main constraints to conduct effective awareness creation. Some of the DAs might have given inaccurate information about the WII. One of the most common misconceptions observed was about the premium amount and payout amount. For example, a DA just told that if farmers pay 100birr, they could get 500birr when their crops were damaged. This kind of explanation may have caused farmers' misunderstandings on the WII. Enhancing capacity of the DAs is a key to achieve effective awareness creation on the ground.

The JICA Team also faced a problem on the DA's availability. It was sometimes difficult to get full engagement of the DAs during this season 2013. They are government officers, so that they have their own jobs such as providing new agricultural techniques and solving local farming problems. In addition, sometimes DAs participate in other projects and they have to attend training programs to get new knowledge. In fact, the DAs in Arsi Negele woreda had a training program in March, so that the groundwork schedule was delayed by few weeks. It is therefore important to confirm DAs' availability, make a flexible plan, and start activities well in advance.

Limited capacity is also a problem for the Unions and the MFI to promote WII successfully. Most intermediaries did not have experience in microinsurance services, and this WII pilot project was the first microinsurance service for most of the intermediaries. Although the DAs have created farmers' awareness on the WII, the intermediaries themselves were required to understand the WII properly. However, most intermediaries have not had enough knowledge about the WII to facilitate the farmers to purchase the insurance.

3) Lack of Coordination between Stakeholders

Coordination between the intermediaries and the DAs was also a difficult part in the Phase I pilot project implementation. The role of the DAs is to raise farmers' awareness, while the intermediaries are to collect premiums and deliver insurance policies. Therefore, it was necessary for both the DAs and the intermediaries to conduct awareness creation meetings together so that farmers could purchase the insurance right after they have attended the meetings. However, sometimes the DAs did not show up in the awareness creation meetings and vice-versa. It should have had a coordination meeting between the DAs and the intermediaries before they actually started awareness creation.

4) Accessibility of the Pilot Project Site

Another difficulty of the groundwork was the accessibility for some project sites. For instance, Ilfata woreda is located in one of the most remote areas among the project sites. Intermediary staff had to walk up for almost 2 hours to reach the target kebeles over hilly topography. Hence, the cost of the groundwork would be much higher than that of other areas because of this hardship accessibility.

Using the satellite rainfall data for designing WII has a big advantage of scaling-up any WII project. The satellite estimated rainfall data enables WII related projects to expand target sites easily even to areas without any ground weather stations. However, it is still necessary to consider accessibility of target sites such as distance from a main road. Otherwise, no one intermediary will be able to deliver WII. Therefore, accessibility of project sites should also be taken into account in the process of selecting the site in future.

CHAPTER 4 WEATHER INDEX INSURANCE (WII) INTRODUCTION (PHASE 2)

More than 1,000 farmers purchased the RREP WII in the Phase I (2013 season), yet there were many challenges the Team faced during the implementation. In order for WII to contribute to the rural resilience enhancement, there are two important essences; one is that WII should work as a risk hedge mechanism effectively when drought happens, and the other is that WII promotion should be sustainable as a business for the insurance company.

Development Agents (DAs) were involved as a core of the groundwork and "all" farmers were invited to join the trainings during Phase I. This arrangement brought the said achievement for the Phase I, of course. Nevertheless, since farmers in the area still have only limited knowledge and experience on WII and also potential farmers live in rural area, marketing and sales require substantial resources (budget, manpower and time). In fact, this would be a big challenge for the continuity of the activities after the termination of the pilot project.

In addition, number of target kebele was increased from 15 in Phase I to 45 for the Phase II pilot project. Therefore, emphasis of the training was put on the utilization of existing regular extension channels such as extension from development team leader[1] and DAs to key famers, then key farmers to other farmers, and also Agricultural Cooperative Unions (Unions) to Primary Cooperative (PC) members, etc. for the Phase II. Mass marketing by utilization of media such as radio, brochures and banners were also introduced in the WII sales of the Phase II. This chapter discusses summary of the activities implemented during the Phase II.

4.1 WII Design

The goal of the RREP weather index design for the Phase I was to create a simple product at the kebele level that is cost effective, accurate, and corresponded to the farmers' needs. Being same as the Phase I, therefore, the following strategies were also applied for the Phase II; namely, 1) kebele-based design for the weather indices, 2) utilization of satellite-based source data, 3) appropriateness, 4) affordability, and 5) scalability (refer to the details mentioned in Chapter 1).

Table 4.1.1 shows the summary of focus group interviews on crops suffered during the drought, severe drought events, and critical periods for the said crops such as maize, sorghum and teff. Weather indices for the 45 kebeles were at first constructed based on the series of satellite basis daily rainfall data through probability analysis, and finalized taking into account the proximity to geographical features (lakes, mountains) that sometimes interfere with satellite rainfall estimates.

Table 4.1.1 Summary of the Focus Group Interview for Newly Added 30 Kebeles

Woreda	Kebele	Crop suffered the most during drought	Severe Drought Years of the last 10 years	Severe Drought Years of the last 30 years	Most Crucial Period For Crop(s)
Adami Tulu	Abeyi Deneba	Maize	2002, 2007, 2011	1979,1984, 1986	Apr 20 to Jun 5 Aug 10 to Sep 25
	Negalgne	Maize	2007, 2009, 2010	1979,1984,1989	Apr 25 to Jun 5 Aug 10 to Sep 25
	Ilika Chelemo	Maize	2002, 2004, 2008	1981,1984	Apr 10 to Jun 5 Aug 10 to Sep 20
	Edo Gojola	Maize	2002, 2008, 2011	1984, 1999	Apr 25 to Jun 10 Aug 22 to Sep 27
	Galo Hirape	Maize	2000, 2002, 2008	1982,1984	Apr 25 to Jun 5 Aug 5 to Sep 10
	Wolicho Boremo	Maize	2002, 2006, 2008, 2011	1984,1987	Apr 20 to Jun 10 Aug 25 to Sep 27
	Gobejocho Asebo	Maize	2002, 2009	1984	Apr 15 to Jun 5 Aug 5 to Sep 20
	Haleku Gulanta	Maize	1999, 2002, 2004	1984, 1988	Apr 15 to May 20

[1] Each kebele is divided into three zones (sub villages) and these zones are composed of development teams. Each development team consists of 1 to 5 extension unit (about 20-30 households belong to one development team) and ach development team has their own team leader. Team leader is responsible to organize and manage all the agricultural activities to be done in his/her respective development team when requested by DA.

	Boke				Aug 20 to Sep 20
	Aneno Shisho	Maize	2002, 2005, 2010	1979, 1984	Apr 20 to May 20
					Jul 20 to Aug 20
	Hurgo Mechafera	Maize	1998, 2002, 2008	1984	Apr 30 to May 20
					Aug 5 to Sep 20
	Elelan Ababo	Maize	2002, 2006, 2008	1984, 1990	Apr 30 to May 30
					Aug 10 to Sep 30
	Oetu Basuma	Maize	2002, 2007, 2011	1980, 1984, 1993	Apr 15 to Jun 5
					Aug 22 to Sep 25
Bora	Doyo laman	Maize	2002, 1997	1984, 1987	April 30- June 5
					Aug 25- Sep 25
	Tuchi deko	Maize	2001, 2008	1984	April 30- June 7
					Aug 25- Sep 25
Boset	Buta Denqore	Sorghum	2002, 2008	1984, 1986	Mar 20 to May 15
					Aug 20 to Sep 10
	Tedecha	Maize,	2002, 2009	1984, 1986	April 20 to Jun 5
					Aug 20-Sept 10
Arsi Negele	Gale fi Kelo	Maize	2008, 2011	1984, 2000	Apr 5 to Jun 5
					Aug 20 to Sep 25
	Rafu Haragesa	Maize	2002, 2005, 2007	1976, 1984	Apr 5 to May 5
					July 15 to Aug 20
	Gubata Arjo	Maize	2002, 2007	1984	Apr 5 to May 20
					Aug 5 to Sep 10
	Hada Bossa	Maize	1997, 2008, 2002	1984	May 5 to Jun 5
					Aug 30 to Sep 25
	Boku Walda	Maize	2003, 2007, 2011	1983, 1992	Apr 10 to Jun 5
					July 20 to Sep 25
	Tufa	Maize	2001, 2007, 2011	1983, 1985	Apr 5 to May 20
					July 30 to Sep 5
	Dawe	Maize	2004, 2007	1997, 1980, 1985	Apr 30 to May 5
					Aug 20 to Sep 25
Dano	Direhareyu	Maize	2009	1984, 1991	May 25 to Jun 10
					Aug 22 to Sep 30
	Direhujuba	Maize	2001, 2007	1984	May 25 to Jun 15
					Aug 22 to Sep 27
	Seyu Gambela	Maize	2007	1984, 1993	May 23 to Jun 10
					Aug 20 to Sep 27
Dawa	Ulima Busa	Teff	1994, 2001, 2010	1984	July 20 to Aug 10
					Aug 20 to Oct 10
	Nano Gebriel	Teff	1997, 2010	1984	July 10 to Aug 10
					Sep 1 to Oct 10
Elu	Keta	Teff	2010	1984	July 10 to Aug 10
					Sep 5 to Oct 10
	Kule Gefersa	Teff	1997, 2010	1984	July 10 to Aug 10
					Sep 5 to Oct 10

Source: JICA RREP Team

Final indices for the 45 kebeles are thus shown in Table 4.1.2. Similar to those of Phase I, dates of insurance coverage designed are different by each kebele since each kebele receives different rainfall and has different historical drought patterns. The amount of rainfall which needs to trigger a minimum payout is also different by kebele, depending on the historical rainfall patterns of the kebeles.

Table 4.1.2 Final Indices for 45 Kebeles Applied for Phase II RREP WII

Woreda	Kebele	Coverage Dates	Trigger (mm)	Exit (mm)
Arsi Negele	Alge	Apr20-Jun10	43	13
		Jul25-Sep25	41	1
	Shala Bila	Apr20-Jun10	35	11
		Jul25-Sep25	36	0
	Mudi Arjo	Apr20-Jun10	40	7
		Jul25-Sep10	43	10
	Boku Walda	Apr10-Jun10	138	90
		Jul30-Sep25	110	85
	Dawe	Apr10-Jun10	142	100
		Jul30-Sep25	104	88
	Rafu Haragesa	Apr5-May10	146	106
		Jul20-Aug30	111	81
	Galefi Kelo	Apr5-Jun5	61	22
		Aug5-Sep25	70	45
	Hada Bossa	Apr5-Jun5	61	22
		Aug5-Sep25	70	45
	Gubata Arjo	Apr5-Jun5	60	18
		Aug5-Sep25	56	32
	Tufa	Apr10-Jun5	67	39
		Aug10-Sep20	70	50
Adami Tulu	Abine Germama	Apr20-Jun05	40	16

Woreda	Kebele	Coverage Dates	Trigger (mm)	Exit (mm)
		Aug20-Sep25	29	10
	Welinbula	Apr20-Jun05	40	16
		Aug20-Sep25	29	10
	Negalgne	Apr20-Jun05	40	16
		Aug20-Sep25	29	10
	Ilika Chelemo	Apr20-Jun05	40	16
		Aug20-Sep25	29	10
	Edo Gojola	Apr20-Jun05	40	16
		Aug20-Sep25	29	10
	Gerbi Wedena Boremo	Apr20-Jun10	46	21
		Aug10-Sep30	50	16
	Wolicho Boremo	Apr20-Jun10	46	21
		Aug10-Sep30	50	16
	Gobejocho Asebo	Apr20-Jun10	46	21
		Aug10-Sep30	50	16
	Haleku Gulanta Boke	Apr20-Jun10	46	21
		Aug10-Sep30	50	16
	Oetu Basuma	Apr10-Jun5	45	25
		Aug10-Sep20	34	17
	Elelan Ababo	Apr25-Jun5	45	20
		Aug10-Sep30	44	14
	Hurgo Mechafera	Apr20-Jun10	50	21
		Aug10-Sep30	43	19
	Aneno Shisho	Apr20-Jun10	44	15
		Aug10-Sep30	37	21
	Galo Hirape	Apr20-Jun10	50	23
		Aug10-Sep30	39	22
	Abeyi Deneba	Apr20-Jun05	40	10
		Aug10-Sep30	46	31
Bora	Bite Daba	Apr20-Jun10	32	10
		Aug25-Sep30	28	11
	Tube Suti	Apr20-Jun15	37	10
		Aug20-Sep20	33	11
	Dalota Mati	Apr20-Jun15	37	10
		Aug20-Sep20	33	11
	Doyo Leman	Apr10-Jun10	40	16
		Aug25-Sep30	26	2
	Tuchi Deko	Apr10-Jun10	39	21
		Aug20-Sep30	37	9
Boset	Gari	Apr20-Jun10	25	1
		Aug5-Sep10	63	32
	Borchota	Apr30-Jun20	26	1
		Aug15-Sep30	45	20
	Buta Wegere	Apr20-Jun20	30	11
		Aug5-Sep25	76	44
	Tedecha	Apr20-Jun20	30	11
		Aug5-Sep25	76	44
	Buta Dengore	Mar25-May30	28	19
		Aug20-Sep20	30	10
Ilfata	Sato Luku	Mar20-May10	43	13
		Sep10-Oct30	41	1
	A/Godeti	Mar15-May10	35	11
		Sep15-Oct30	36	0
	H/Sendi	Mar15-May5	40	7
		Sep10-Oct30	43	10
Dano	Dire Hareyu	Apr10-Jun10	138	90
		Aug20-Sep30	110	85
	Seyu Gambela	Apr10-Jun10	142	100
		Aug20-Sep30	104	88
	Dire Hujuba	Apr20-Jun15	146	106
		Aug20-Sep30	111	81
Dawa	Nano Gebriel	May20-Jul30	199	160
		Aug30-Oct10	34	17
	Ulima Busa	May10-Jul20	169	127
		Sep10-Oct10	17	1
Elu	Keta	May10-Jul10	118	80
		Aug 30-Oct10	32	5
	Kule Gefersa	May10-Jul10	118	80
		Aug 30-Oct10	32	5

Source: JICA RREP Team

4.2 Implementation Arrangement and Institutional Set-up

Groundwork of Phase II has started immediately after the completion of the capacity building training held in January 2014. Awareness creation meetings for the promotion of WII in the Phase I were conducted to invite "all" the farmers in the target kebele. This type of groundwork becomes difficult if the area is expanded. Therefore, the Team has decided to conduct the groundwork tasks through ordinary government extension channel for the Phase II WII promotion activities.

Figure 4.2.1 shows institutional set-up for the Phase II WII promotion. For Phase II, each contracted Union assigned "team leader" from the Union for each target kebele and also assigned "responsible person" from Primary Cooperatives (PCs) for the field level activities.

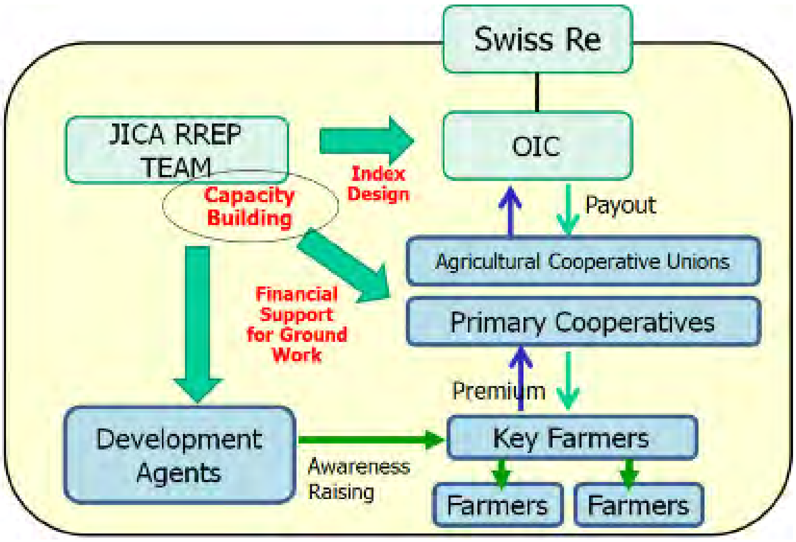


Figure 4.2.1 Institutional Set-up for Phase II

The team leader from Union supervised the groundwork while PC supported DAs for conducting awareness creation meeting with key farmers, and then the PCs have collected the premium. The key farmers were requested to share what they have learned with other farmers in their agricultural extension unit for the Phase II WII promotion.

Table 4.2.1 shows the list of the intermediaries for each target kebele. Three Unions, Ambo, Becho Waliso and Lume Adama Unions had newly joined in the Phase II. OCSSCO, a MFI covered the activities in Ilfata and Boset woredas in Phase I, and Ambo Union took over the activities in Ilfata woreda, and likewise for Boset woreda, Lume Adama Union succeeded the activities there. On the other hand, Becho Waliso Union covered new woredas of Dawo and Elu.

Table 4.2.1 List of Intermediaries for Phase II of RREP WII

Particulars	Meki Batu Vegetable & Fruit Growers Coop. Union	Bora Dembel Farmers Cooperative Union	Lume Adama Farmers Cooperative Union	Uta Wayu Multi-Purpose Farmers Coop. Union	Ambo Farmers Cooperative Union	Becho Waliso Farmers Cooperative Union
Woreda & No. of Kebeles	Adami Tulu	Bora	Boset	Arisi Negele	Ilfata & Dano	Dawo & Elu
	15	5	5	10	6	4
Establishment	2002	1999	1997	2006	2002	1999
Capital	52,000,000	9,200,000	32,000,000	6,973,639	51,000,000	59,800,000
No. of PCs	141	55	37	176	71	58
Membership HH	7,994	19,241	23,066	37,470	60,536	58,712

Source: JICA RREP Team

4.3 Kick-off Training for Unions, Primary Cooperatives and Development Agents (DAs)

Kick-off training for DAs and intermediaries was commenced on 20th January 2014 at Addis Ababa, then on 23rd at Ambo, and ended on 28th to 30th at Adama. Main participants for the training at Addis Ababa were officers from Oromia Bureau of Agriculture, Oromia Cooperative Promotion Agency, target Zonal Agricultural Offices, Agricultural Cooperative Unions. For the Ambo and Adama trainings, officers from target Woreda Agricultural Offices, Woreda Administration Offices, Woreda

Cooperative Promotion PCs, and DAs joined. In total, 241 persons attended the training including observers.

Main objectives of these trainings were to enhance awareness on WII for the participants to promote WII in the target areas. Training consisted of four technical sessions following the opening speech and introduction to RREP; 1) basic principles of insurance, agricultural risk management and introduction to WII, 2) introduction of RREP WII for the 2014 season, 3) simulation and exercise of WII, and 4) implementation of the groundwork as shown in Table 4.3.1

1) Session 1: "Principles of insurance, agricultural risk management, and introduction to WII"

First technical session was started by OIC staff. He discussed 3 themes; ; 1) basic principle of insurance, 2) overview of micro-insurance and agricultural risk management, and then 3) introduction to WII. The main purpose of this session was to have the participants understand different types of insurance. Insurance in general is a social device, in which a group of individuals transfers risk to another party in exchange for payment. In particular, the participants were required to understand the difference between traditional crop insurance and WII by referring to the characteristics, mechanisms, advantages and disadvantage, challenges, and important key terms related to WII such as "Trigger", "Exit" and "Cap"

Table 4.3.1 Training Program

Time	Activity
8:30- 9:00	Registration
9:00 - 9:15	Welcoming / Opening remarks
9:15- 9:45	Introduction to RREP
9:45- 11:00	**Session 1** "Basic principles of insurance, agricultural risk management, & introduction to WII
11:00-11:15	Tea break
11:15- 12:15	**Session 2** "Introduction to RREP WII for the 2014 season"
12:15- 13:15	Lunch break
13:15- 14:15	**Session 3** " Simulation and Exercise of WII -How the WII works-"
14:15- 15:15	**Session 4** "Implementation of the Groundwork
15:15- 15:30	Tea break
14:45- 17:00	**(Con't) Session 4** "Implementation of the Groundwork & Action Plan making (for PC & DA training)

Source: JICA RREP Team

In the second presentation, he firstly introduced three approaches for agricultural risk management; 1) mitigation, 2) transfer, and 3) coping. Then types of weather risks in agriculture sector were explained. He furthered continued introduction of agricultural insurance. He reviewed that insurance is one of the tools that farmers and other stakeholders can use to manage risks that are too large to manage on their own. Part of that risk is transferred to another party, who takes it in return for a fee (or premium). Where available and affordable, agricultural insurance can provide great benefits to farm households as in the following aspects:

a) Insurance can (and should) be used to complement other risk management means. Farmers can rely on informal household and community-level strategies such as crop and labor diversification to manage small to moderate risks. For the event of a major weather shock, insurance can be so designed to protect against revenue or consumption losses. This enables farmer households to avoid selling livelihood assets or drawing on savings.

b) Insurance can assist farmers in accessing new opportunities by improving their ability to borrow either money or in-kind credits. In doing so, farm households may potentially experience safer and possibly higher returns.

Detail of the major features of WII was explained in the last presentation. It is important for the participants to understand that the WII in this pilot project covers only rainfall shortage risk, and no matter how farmers' crops are damaged by other risks such as pests and diseases and also other weather risks such as hailstone, strong wind, frost, payment will not be made if the rainfall amount is over the Trigger. Therefore, it was emphasized that even if farmers have damage on their crops, there is no payout if the rainfall amount is higher than the predetermined amount.

2) Session 2: "Introduction of RREP Weather Index Insurance for 2014"

A list of indices for the 45 target kebeles of 8 woredas was released during this session. The participants learned the basic functions and process of designing weather indices. Although they are not insurance company staff, it is still important for them to understand how the Weather Index Insurance was designed. This is because they are the ones who communicate with farmers directly and are supposed to answer questions to be raised by the farmers in the field.

One of the key features of RREP WII which were explained during this session was that the product was designed to make a minimum payout of the insurance premium plus additional smaller payments when the actual rainfall amount is below the trigger. Hence, once the actual rainfall is below the trigger by only 1mm, the farmer will have already recovered his/her initial premium payment. As a further addition, the participants were informed and taught on the calculation of partial payouts. This was especially highlighted during the following exercise session.

Furthermore, the use of satellite rainfall data was explained including its availability, long history, reliability of data and the importance of being independent and less tamper prone than ground based data. Then, a description of basis risk followed. Basis risk describes the risk that the actual rainfall on the farmer's site may slightly fluctuate from the daily estimated rainfall captured by the satellite (refer to Chapter 1.2.3 for the details of basis risk).

3) Session 3: "Exercise: How the WII works"

All participants were given an exercise sheet in this session of exercise: how the WII works. Aim of this exercise was to have the participants understand in which cases the insurance pays out and in which it does not and how much it pays out in case of a rainfall deficit below trigger. Although the insurance makes automatic payouts, the Team found it to be important for the participants to understand how partial payouts are calculated.

Example: Location: West Shewa, Ilfata, Sato Luku Planting March 20 – May 10, 2014 Trigger: 43mm, Exit: 13 mm Tick/ Payout for the first mm below the Trigger: 500 Birr Tick/ Payout for each further mm below the Trigger: 66.67 Birr Maximum Payout: 2,500 Birr Premium: 500 Birr	**Remember:** As soon as the cumulative rainfall is below the defined Trigger by just one mm, the minimum Payout will automatically equal the premium paid plus one Tick payment. -First Tick always covers the amount of the premium, so: 500 Birr! -The Maximum Payout is always 5 times the premium, so: 5 x 500 Birr = 2,500 Birr Maximum Payout: 2,500 Birr **Premium: 500 Birr**

Table 4.3.2 Payout Calculation and Payout Referring to Example Rainfalls

Cumulative Rainfall	Payout Calculation	Payout
80mm	NO PAYOUT because Rainfall > Trigger	NO PAYOUT
43mm	NO PAYOUT because Rainfall = Trigger	NO PAYOUT
20mm	500 Birr + (43mm – 20mm) * 66.67 Birr = 2,033.41 Birr	2,033.41 Birr
1mm	500 Birr + (43mm – 1mm) * 66.67 Birr = 3,300.14 Birr	2,500 Birr **because Maximum Payout has been reached!**

Source: JICA RREP Team

The above example is one of sample questions given to the participants. Premium paid by this sample farmer was 500 birr and therefore, maximum payout will be 2,500 birr. Trigger is set at 43mm and Exit is at 13mm. Participants were given time for the calculation of the payout amount for the each case of cumulative estimated rainfall, 80mm, 43mm, 20mm, and 1mm. In addition, the participants also learned how to estimate the "Tick", payout for each further mm below the Trigger. Once rainfall amount is below the trigger, the farmer can get 500 birr (the premium amount paid). In addition to the premium amount, farmer is paid based on the calculation using Tick.

In the example above, the Trigger is 43 m and the Exit is 13 mm, therefore the insurance can pay out for 30mm in total (see the graphic image in right). This is the Tick Length or distance between the Trigger and the Exit. We know the first mm below the trigger pays 500 birr and that the maximum payout is 2,500. Therefore, there are 2,000 birr possible payout to be spread equally over the 30mm, whereby each tick per mm comes to 66.67 birr (2,000 birr / 30mm = 66.67 Birr). key leanings from the exercise are as follows;

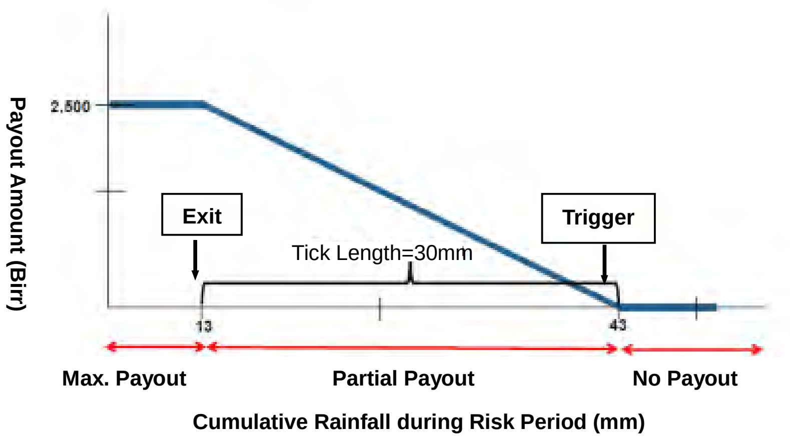


Figure 4.3.1 Graphic Image for "How to Calculate Payout and Tick

- ✓ It needs to be made very clear that payout is only due when the actual rainfall (cumulative estimated rainfall by ARC2 at the end of the risk period) is below the trigger. There will be no payout when the actual rainfall is exactly at the trigger or above the trigger. Some participants calculated payout amount for 43mm as 500 birr (premium amount), but farmers cannot get premium back if the actual rainfall is exactly same as that of trigger.
- ✓ There is no further additional payout when rainfall is below the Exit. The overall payout is limited by the maximum payout. Some participants answered that payout amount is 3,300.14 birr instead of the maximum payout amount of 2,500 birr.

4) Session 4: "Implementation of Groundwork"

In the last session, introduction to groundwork was presented and participants were given a sheet for action plan making for scheduling the groundwork. In the presentation, role of intermediary (Union / PC), role of DAs, principles of effective training and communication, and implementation schedule were explained to the participants. Further, strength, challenges, opportunities, and strategy of Phase II groundwork were shared based on the Phase I lessons and experiences.

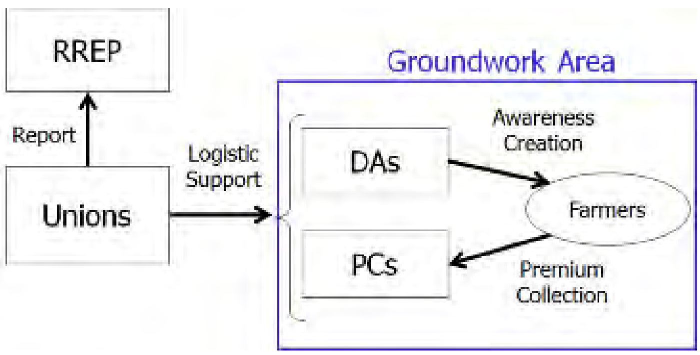


Figure 4.3.2 Groundwork Arrangement
Source: JICA team

The groundwork consists of two main activities; 1) awareness creation, and 2) premium collection. The DAs are to hold an awareness creation meeting with the farmers to raise their awareness on the WII. The Primary Cooperatives (PCs) will collect premium from the farmers in the target kebeles. To implement these groundwork activities, the Unions provide logistic support to the DAs. Each Union has to assign team leader for the supervision of groundwork and Union also assigns responsible PC members. The main role of responsible PC members is to collect premium from the farmers signed up, and follow up the DAs conducting the awareness creation meetings. In the last, DAs and primary cooperative members were advised to decide the date of awareness creation meeting with the farmers through active communication with the team leader assigned from the responsible unions.

5) Summary of Q & A during the trainings

Floor was opened for clarification of the training content after/during each technical session. The following table summarizes major questions/opinions raised during the series of the training from 20th to 30th January 2014. In fact, some questions were repeatedly raised in several trainings such as premium duration (can be carried over if no drought? etc.) and payout (how is damage measured, how rainfall amount is measured etc.). This means that these questions would also be raised by farmers during the awareness creation meetings. Therefore, the Team prepared sample Q & A based on the questions raised so far and delivered it to each DA for their reference after the trainings.

Table 4.3.3 List of Questions Raised During the Trainings

Main Question / Opinion Raised	Typical Answer Made
Why only rainfall deficit is covered / Is it possible to be insured for three perils e.g. Flood, drought and insects because our farmers also face problem by these?	Of course there are other weather related issues for damaging the crops of farmers. However, weather “index” insurance for this area was designed for drought / shortage of rainfall and Kebeles are selected likewise. In addition, payout is made when actual rainfall is below pre-set index regardless of the reasons of damage they got for their crops.
Why “cap” is set 10mm for all Kebeles? The soil type may vary from place to place.	This is rough approximation of the daily soil water holding capacity in semi-arid regions in Ethiopia like our target areas. The 10mm number was chosen on the basis of research into “effective rainfall “ in semi-arid regions.
What measures will be taken in cases of crop failure for consecutive years?	A premium covers only one year and is not cumulative. You can make the decision whether you buy or not every year.
What are the difference between multiple peril crop insurance and weather index crop insurance and which one could be best option for our farmers?	Please refer to the handout of the training for the difference of both insurance, and farmers can choose either of them or both of them based on their problem.
What is the logical justification for the maximum payout limitation? What is your source of evidence for this issue from international insurance company perspective and from customer perspective?	We want farmers to receive their maximum payout before the drought has reached its most extreme point. The maximum payout amount is capped to five times the premium because they are supposed to cover losses arising from drought. If they were uncapped, farmers would be making profits but insurance is there to cover losses rather than to make profits.
Can farmers buy WII for perennial fruit and vegetable crops too? / If farmer grow different crops on one hectare, can they get payout for different crops?	Insured period is designed based on the interview with farmers for which crops they want to be insured during crucial periods, and basically designed for major cereal crops (maize, sorghum, wheat, barley, teff) as well as haricot beans. It does not mean others fruits and vegetable are excluded but insured period may differ from others, so farmers need to check it. / farmers can get payout if the rainfall is below the index during the contract period regardless of damage level, so no matter how many kinds of or what kinds of crops they grow in same field.
How actual rainfall of a given area is measured?	The satellite data are freely available at: http://iridl.ldeo.columbia.edu/SOURCES/.NOAA/.NCEP/.CPC/.FEWS/.Africa/.DAILY/.ARC2/.daily/.est_prcp/?help+dataselection
How insurance payment does takes place?	There is payout depending on the actual rainfall. If the amount of rainfall is below the trigger the insurance company will pay for farmers and no need to visit farmers’ field.
Is it possible to buy insurance for rented crop land?	Yes it is possible.
Is it possible to buy insurance in group?	No, this insurance is designed for individual not for group.
How can farmers purchase weather insurance ?	Farmers must register through one of the OIC intermediaries in each Kebele.

Source: JICA RREP Team

4.4 Groundwork of WII Promotion and Product Sales

4.4.1 Awareness Creation Meeting with Key Farmers

Groundwork was commenced after the afore-mentioned capacity building trainings completed. Table 4.4.1 shows the schedule submitted by in-charge Unions. Union and DAs were well aware of the importance of starting awareness creation meeting with the key farmers as early as possible. Earliest awareness creation meeting was discharged on 6th February 2014 about one week after the capacity building training at Rafu Haragesa kebele in Arsi Negele woreda.

Table 4.4.1 Schedule of Awareness Creation Meeting with Key Farmers

Woreda	Kebele	Date
Adami Tulu	Abine Germama	11,14,17,20 Feb & 14,17 Mar & 3 Apr
	G/W/ Boremo	11,12,15,18,20 Feb & 3,19 Mar
	Welinbula	7,12,14,17 Feb & 21,27,28 Mar
	Abeyi Deneba	11,12,14,18,21 Feb & 17 Mar
	Negalgne	10,16,19 Feb & 25,26,27 Mar
	Ilika Chelemo	13,14, 20, 21,26 Feb & 8 Mar
	Edo Gojola	14,21,28 Feb & 12,18 Mar
	Galo Hirape	10,12,13,14 Feb & 12 Mar
	Wolicho Boremo	17,26 Feb & 5,23 Mar
	Gobejocho Asebo	12,14,18 Feb
	Haleku Gulanta Boke	8,11,12 Feb & 11 Mar
	Aneno Shisho	8,17,18,22,27 Feb & 27,28 Mar
	Hurgo Mechafera	13,15 Feb & 7,11Mar
	Elelan Ababo	12,19,26 Feb & 19 Mar
	Oetu Basuma	7,8,10,14 Feb
Bora	Tube Suti	9,14,16,19 Feb
	Dalota Mati	9,10,13,19 Feb
	Bite Daba	14,15,16,21 Feb
	Doyo Leman	14,16,20,21 Feb
	Tuchi Deko	9,11,14,18 Feb
Boset	Buta Wegere	26, 27,28,29 Feb
	Borchota	18,19 Feb
	Gari	22,23 Feb
	Buta Denqore	24 Feb
	Tedecha	20 Feb & 20,21 Mar

Woreda	Kebele	Date
Arsi Negele	Alge	10, 17 & 24 Feb, 3 Mar
	Shala Bila	12, 19 & 26 Feb, 5 Mar
	Mudi Arjo	12, 15, 22 Feb & 1 Mar
	Gale fi Kelo	11, 18 & 25 Feb, 4 Mar
	Rafu Haragesa	6,16,23 Feb & 9 Mar
	Gubata Arjo	11,13,18 Feb & 20 Mar
	Hada Bossa	12,17,19 Feb & 20 Mar
	Boku Walda	17,18,19 Feb & 20 Mar
	Tufa	10,17,24 Feb & 3 Mar
	Dawe	8,10,12 Feb & 13 Mar
Ilfata	Hidabu sendi	8 Feb
	Ambelta Godeti	9 Feb
	Sato Luku	8 Feb
Dano	Direhareyu	3 & 4 Mar
	Direhujuba	3, 4 & 5 Mar
	Seyu Gambela	5, 6 & 7 Mar
Dawa	Ulima Busa	24,25 Feb
	Nano Gebriel	24,25 Feb
Elu	Keta	3,4 Feb
	Kule Gefersa	2,3 Feb

Source: JICA RREP Team

Number of insured farmers in the Phase I was the largest in Adami Tulu woreda, and Meki Batu Union supervised the groundwork for Adami Tulu woreda. For the Phase II, Meki Batu Union introduced "training for facilitators" before staring awareness creation meeting based on lessons learned from the Phase I experiences. It was to review what they have learned during capacity development training and to discuss how they can facilitate the awareness creation meetings effectively. Participants joined for this training were: woreda agricultural officer/expert, kebele chairperson, DA, DA supervisor, PC members, team leader and facilitator assigned by the Union.

The awareness creation meetings at kebele level were facilitated mainly by DA, DA supervisor, kebele representative (either chairperson or PC members), and team leader and facilitator from the Union. Key farmers invited to the awareness creation meeting were informed the purpose of the meeting beforehand. This was effective because they came to the meeting with money for buying policy and could register them during the meeting. The team leader of Union and DA discussed and set the date for the registration for other farmers who are given the information on WII by the key farmers or key farmers themselves who need more time to make decision to buy WII.

Farmers who attended FGIs during monitoring period last year complained that sales period for Phase I WII was very short and they couldn't buy the policy because they could not prepare for the money in that short period. Accordingly, Meki Batu Union tried to take an enough time for the farmers as much as possible to enable farmers to internalize what they learned in the awareness creation meeting, to make decision whether they will buy or not, then to prepare the money for premium if they want to buy based on the Phase I experience.

Agenda for the awareness creation meetings with the key farmers in Adami Tulu woreda which the Team observed was; 1) brief guidance on WII, 2) Q& A, 3) group discussions, and 4) registration procedure. Each meeting took about 3 hours to 5 hours. In the group discussion, key farmers were asked to explain what they have learned by their words for other participants and facilitation team clarified when the farmers raised further question.

Table 4.4.2 summarizes the questions and comments raised during awareness creation meetings. Questions raised during the Q & A sessions were similar to those of Phase I, e.g. how crop damages are measured in relation to payout, other perils such as flood, pest, etc. are covered or not (index / product design), where the money paid will be gone if drought did not occur (will it be returned or will be carried over to the next year or not?), etc.

The main targets of the awareness creation meetings were kebele chairpersons, key farmers or model farmers who are influential in their farming communities. Through the awareness creation meetings, these people were able to learn the benefits of WII and how the RREP WII works. They are usually supposed to be early adopters, so that if they understand the benefits of the RREP WII properly, they are expected to promote the insurance to other farmers, who usually hesitate to adopt new ideas and technologies.

Table 4.4.2 Summary of Questions Raised During Awareness Creation Meetings (2nd year)

Category	Questions / comments raised	Total No.	(%)
Payout	-Who will measure the rainfall amount, and how it will inform to OIC?s -How can we know whether we can get payout or not / result of the satellite data? -How is satellite data verified / how we can say satellite is correct? -How will insurance company decide for the amount of payout for individual? -What kind of material will be used for measuring the rainfall amount? -Who will come to check our crops during our facing difficulties of rain? -Who will make a payment / to where we can claim the payout? -Payout amount is too small for covering all damages we may face.	152	27.8
Index/ Product design	-What kinds of crops are insured? -Any other agricultural risks are covered such as flood, insects etc.? -Why insurance period is separated into two periods? -Our livestock can be covered too?	148	27.1
Premium	-Can I buy policy at below 100 Birr? How much is minimum premium? -How much policy one farmer can buy? -if there was no payout, premium paid will be returned? Or any interest we can get? -Premium is same for both planting and flowering periods? Do we need to pay separately for each period or only one time? -Premium is same amount for any crops?	115	21.1
General / Others	-How can we believe insurance company? -Why participants for this meeting are limited only to 200? -Can insurance company give us seed too? -Where we can go if we have any comment. -Do we need collateral for buying policy? -Insurance works like Iddir? what is insurance? -Insurance company can pay entire household if whole area get payout? -One organization deceived us some time ago, what is the guaranty if this organization does the same thing? -Why don't you trust god rather than promoting insurance?	79	14.5
Registration	-Can we get some evidence after purchasing policy? -Who can be an insurer? Any requirement? (Land holdings, age etc.) -If policy holder dies, what will happen? -At Where and how we can pay for the money? -Registration duration is too short. -Can we buy individual or group like Iddir?	52	9.5
Total		546	100

Source: JICA RREP Team

During the awareness creation meetings, a team member from the Microinsurance Department of Oromia Insurance Company talked to the farmers in the Sato Luku kebele; "When farmers knew improved seed and fertilizer for the first time, they hesitated to buy them because they didn't know the benefits. But now they understand the benefits and are willing to buy. WII is the same. Farmers still don't know the real benefits of the insurance, and it is too late to realize it after a drought happens." Responding to this, a farmer in Sato Luku kebele, Ilfata woreda, who purchased the insurance with 200 birr said; "I bought the insurance last year, and I also purchase the insurance this season again. I could not get any payout last year, but I was lucky because there was enough rainfall. Nobody knows this year. I do not know the future. Therefore, I need the insurance."

An OIC staff explains the benefit of WII during the awareness creation meeting in Sato Luku Kebele (8 Feb., 2014)

4.4.2 Marketing Materials Introduced for Further Promotion of WII

The Team has introduced radio program, brochure, and banner for further promotion of WII for the Phase II implementation. Radio program was broadcasted once a week during the groundwork period. Each radio program content was designed as 1) WII introduction, 2) interview with OIC, and 3) interviews with Unions, DAs and farmers. As for brochure (see the photo left), it was designed by each woreda (total 8 kinds) because brochure should has a table of indices for each target kebele defined separately and 30,000 copies were distributed through DAs. Lastly, banner was also prepared by each woreda and was delivered for the kebeles. Each banner posted the closing date of sales for each woreda on it.

Sample of Brochure (only one side extract)

Banner hung at awareness creation meeting venue

The main purpose of the introduction of these mass-promotion materials was to deliver the accurate information about the WII over wide range of farmers. The brochures included all the necessary information about the WII such as the specific dates of the insurance contract periods, indices, background of the Project, and contact address. The radio programmes were broadcasted 6 times. The programmes included the general information about the WII as the radio programmes covered the whole Oromia region. The following are major findings of brochure and radio program introduction;

- ✓ The brochures made the awareness creation meetings more effectively. The DAs could refer to the brochures when they explained the WII to the farmers. Famers also understood deeply through reading the brochures. In addition, they could also know the specific contract dates and Trigger and Exit millimeters specified in the brochures. The brochures helped to standardize the different capacity of the DAs and reduce misunderstanding of the DAs and farmers.

- ✓ Farmers who could not attend the awareness creation meetings could learn how the WII works. In fact, one of the major problems of the groundwork was mobilization of the farmers. Some farmers were busy and they could not attend the meetings; however, they could still know the

WII through the brochures. From this point of view, the brochures could contribute to increasing the outreach of the WII.

RREP Staff (left) explains the WII to farmers by using the brochures (Boset woreda).

- ✓ The radio programs also helped to promote the WII widely. The programs could increase reliability of the WII product, and it could motivate farmers to buy or attend the awareness creation meetings. In fact, some of the farmers who attended the awareness creation meetings told that they listened to the radio programs and they felt that they wanted to join the WII.
- ✓ Nevertheless, the radio programs seemed not to have a direct impact on farmers to buy the insurance. Only 7 among 120 farmers answered that they listened to the radio programs according to the FGI during the monitoring. Farmers who answered they have not listened to the programmes shared with the Team the reason that they do not have radio, they were too tired to listen to the radio, or they like more interactive way to learn new thing such as awareness creation meeting. Further, radio programs were not broadcasted based on the schedule because of some internal administrative issues of the radio station and this also might have reduced the effectiveness.
- ✓ Regarding the brochures, management of the distribution is important. Although the brochures help farmers a lot understand the WII, DAs did not distribute the brochures to the farmers during the awareness creation meetings, and some DAs kept it in the office in some target kebeles. Hence, when it comes to distribution of the brochures, it is important to clarify distribution channels and guide the DAs when and how to distribute these materials.

4.4.3 Achievement of WII Sales of Phase II

The number of the insured farmers under Phase II implementation reached 5,623 farmers as shown in Table 4.4.3. The take-up rate is approximately 20% of the total estimated farmer households in the target areas. This take-up rate is far higher than the take-up rate in the Phase I with around 12%, The total sum insured amount is 572,500 birr, and this is almost 4 times as that of the last season with 146,350 birr.

Table 4.4.3 Summary of WII Sales Result (Phase II)

Cooperative Union	Woreda	No. of Target Kebeles	No. of Estimated HH	No. of Insured	Take-up Rate of the Total HHs: %	Sum Insured Amount (Birr)	Average Premium (Birr)
Meki	Adami Tulu	15	9,989	2,250	22.5%	229,300	102
Bora	Bora	5	2,263	447	19.8%	46,800	105
Lume	Boset	5	3,148	569	18.1%	57,900	102
Uta	Arsi Negele	10	6,571	1,201	18.3%	120,100	100
Ambo	Ilfata	3	2,163	97	4.5%	10,100	104
	Dano	3	1,918	605	31.5%	62,900	104
Becho	Dawa	2	1,679	231	13.8%	23,100	100
	Elu	2	1,231	223	18.1%	22,300	100
Total		**45**	**28,962**	**5,623**	**19.4%**	**572,500**	**102**

Source: JICA RREP Team

Meki Batu Cooperative Union covered 15 kebeles in Adami Tulu woreda for Phase II because the JICA Team and OIC highly evaluated their capacity and potential to promote the WII based on their 1st phase achievements. As discussed earlier, Meki Batu Union improved the groundwork process by introducing “training for facilitators” before awareness creation meeting. Further, DAs in this woreda were busy in other governmental activities during the groundwork periods and the progress of the groundwork was not good as they expected. Therefore, the Union decided to involve kebele chairpersons for the mobilization of the relevant farmers to overcome this difficulty.

Similarly, the target number of kebele in Arsi Negele was also increased to 10 in the Phase II for the same reasons with Meki Batu Union. There were 1,201 farmers insured in this Phase II and the take-up rate in Arsi Negele woreda reached 18.3%. This is higher than the take-up rate of the Phase I with 12.1%. One of the main reasons for this high take-up rate is the capacity of the Union. Uta Wayu Union also improved the groundwork operation based on the Phase I experiences. For example, they assigned exclusive staff for the groundwork and both manager and deputy managers were actively involved in the groundwork, which altogether created “team spirit” among the concerned.

A farmer pays the premium for the insurance policy (Elu woreda)

On the other hand, the take-up rate of Phase II in Ilfata woreda, 4.5%, was lower than others and even that of Phase I, 8.0%. One of the main reasons is that all the target kebeles in Ilfata woreda for Phase II are the same as last year with no new kebele added. Since there were no payouts last year, and accordingly the farmers who purchased last year showed hesitation to buy the the insurance again this season. Therefore, it was difficult to convince the farmers to buy the insurance this year and the take-up rate has thus decreased in Ilfata woreda

4.4.4 Rainfall Amount during Contract Period and Payout Discharged

1) Rainfall Amount and Triggered Kebeles

Insurance contract period for planting phase for the Phase 2 covered from March to June for maize and sorghum, and May to July for teff. The triggering rainfall millimeters were set ranging from 25mm (Gari in Boset woreda) to 74 mm (Galefi Kelo in Arsi Negele woreda) for maize and 118 mm (Keta and Kule Gefesrsa in Elu woreda) to 199 mm (Nano Gabriel in Dawo) for teff, respectively. The total rainfall amount was calculated by summing up the daily rainfall amount during the contract period with 10 mm cap per day to avoid the situation that one big rainfall passes the triggers.

As shown in Table 4.4.4 and Figure 4.4.1, the total rainfall amounts in the planting contract period in 8 kebeles (2 in Boset, 2 in Bora and 2 in Dawa and 2 in Elu woreda) were below the triggering amounts. For Boset woreda, except for one kebele (Buta Denqore, of which rainfall amount was 147% to the triggering amount), two remaining kebeles’ total rainfall amounts during the contract periods were only 1mm larger than the triggering amounts (trigger was 30mm and actual rainfall was 31mm: 102% to the triggering rainfall).

The result for Bora woreda was of mixed one. The total rainfall amounts of two among five kebeles were below the triggering amount, and one kebele’s rainfall amount showed only 1mm difference with the triggering amount (trigger was 30mm and actual rainfall was 31mm: 104% to the triggering amount). On the other hand, two remaining kebeles’ total rainfall amounts were not so low (176% and 161% to the triggering amounts, respectively).

For the remaining three woredas (Adami Tulu, Arsi Negele, Ilfata and Dano woredas), all kebeles’ total rainfall amounts were more than the triggering amounts, and the ratio ranged as much as from 120% (Arsi Negele) to 483% (Ilfata Woreda) against the triggering rainfall amount.

Table 4.4.4 Actual Rainfall Amount and Difference form Triggering Amount (Planting Phase)

Woreda	Kebele	Trigger (mm)	Actual (mm)	Difference (mm)	Woreda	Kebele	Trigger (mm)	Actual (mm)	Difference (mm)
Adami Tulu	Abine Germama	40	82	42(205%*****)	Arsi Negele	Alge	61	124	63(203%)
	G/W/ Boremo	46	82	36(178%)		Shala Bila	61	124	63(203%)
	Welinbula	40	82	42(205%)		Mudi Arjo	60	111	51(185%)
	Abeyi Deneba	40	90	50(224%)		Gale fi Kelo	74	107	33(145%)
	Negalgne	40	82	42(224%)		Rafu Haragesa	52	71	19(137%)
	Ilika Chelemo	40	82	42(205%)		Gubata Arjo	74	107	33(145%)
	Edo Gojola	40	82	42(205%)		Hada Bossa	74	107	33(145%)
	Galo Hirape	50	123	73(246%)		Boku Walda	67	81	14(120%)
	Wolicho Boremo	46	82	36(178%)		Tufa	45	109	64(242%)
	Gobejocho Asebo	46	82	36(178%)		Dawe	67	81	14(120%)
	Haleku Gulanta Boke	46	82	36(178%)	Ilfata	Hidabu sendi	40	154	114(385%)
	Aneno Shisho	44	114	70(259%)		Ambelta Godeti	35	169	134(483%)
	Hurgo Mechafera	50	117	67(233%)		Sato Luku	43	178	135(414%)
	Elelan Ababo	45	102	57(228%)	Dano	Direhareyu	138	320	182(232%)
	Oetu Basuma	45	99	54(220%)		Direhujuba	146	264	118(181%)
Bora	Tube Suti	37	33	-4(90%)		Seyu Gambela	142	347	205(244%)
	Dalota Mati	37	33	-4(90%)	Dawa	Ulima Busa	169	133	-36(79%)
	Bite Daba	32	56	24(176%)		Nano Gebriel	199	187	-12(94%)
	Doyo Leman	40	65	25(161%)	Elu	Keta	118	99	-19(84%)
	Tuchi Deko	39	40	1(104%)		Kule Gefersa	118	99	-19(84%)
Boset	Buta Wegere	30	31	1(102%)					
	Borchota	26	15	-11(58%)					
	Gari	25	22	-3(88%)					
	Buta Denqore	28	41	13(147%)					
	Tedecha	30	31	1(102%)					

= Kebele of which rainfall amount I is below trigger mm

*= %of Actual amount to the trigger

Source: JICA RREP Team based on ARC2 http Site

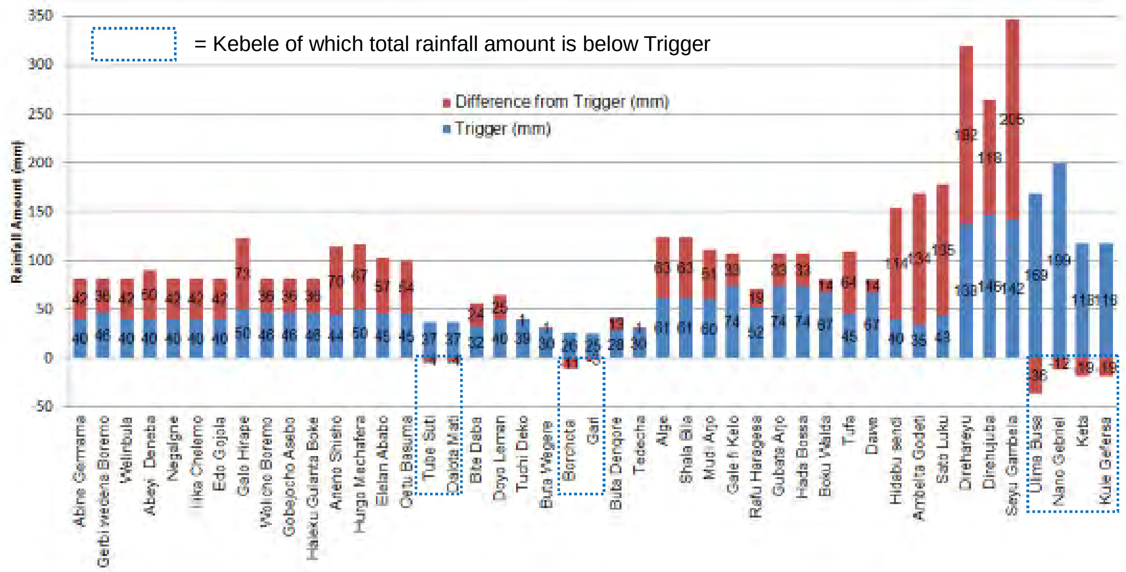


Figure 4.4.1 Actual Rainfall Amount and Difference from Triggering Amount

Source: JICA RREP Team based on ARC2 http Site

Note: Actual Rainfall Amount is adjusted with 10mm daily cap.

As for the flowering phase, as shown in Table 4.4.5 and Figure 4.4.2, total rainfall amounts in all 45 kebeles showed more than the triggering amount. Difference in triggering amount varied from 117% (Buta Wegere kebele in Boset Woreda) to 466% (Welinbula kebele of Adami Tulu woreda).

Table 4.4.5 Actual Rainfall Amount and Difference form Triggering Amount (Flowering Phase)

Woreda	Kebele	Trigger (mm)	Actual (mm)	Difference (mm)	Woreda	Kebele	Trigger (mm)	Actual (mm)	Difference (mm)
Adami Tulu	Abine Germama	29	135	106(466%)	Arsi Negele	Alge	70	117	47(167%)
	G/W/ Boremo	50	125	75(251%)		Shala Bila	70	117	47(167%)
	Welinbula	29	135	106(466%)		Mudi Arjo	56	128	72(228%)
	Abeyi Deneba	46	131	85(284%)		Gale fi Kelo	58	122	64(210%)
	Negalgne	29	135	106(466%)		Rafu Haragesa	68	87	19(128%)
	Ilika Chelemo	29	135	106(466%)		Gubata Arjo	58	122	64(210%)
	Edo Gojola	29	135	106(466%)		Hada Bossa	58	122	64(210%)
	Galo Hirape	39	124	85(318%)		Boku Walda	70	125	55(179%)
	Wolicho Boremo	50	125	75(251%)		Tufa	34	115	81(339%)
	Gobejocho Asebo	50	125	75(251%)		Dawe	70	125	55(179%)
	Haleku Gulanta Boke	50	125	75 (251%)	Ilfata	Hidabu sendi	43	127	84(295%)
	Aneno Shisho	37	124	87(335%)		Ambelta Godeti	36	82	46(227%)
	Hurgo Mechafera	43	95	52(220%)		Sato Luku	41	144	103(351%)
	Elelan Ababo	44	108	64(246%)	Dano	Direhareyu	110	166	56(151%)
	Oetu Basuma	34	115	81(339%)		Direhujuba	111	168	57(151%)
Bora	Tube Suti	33	141	108(428%)		Seyu Gambela	104	182	78(175%)
	Dalota Mati	33	141	108(428%)	Dawa	Ulima Busa	17	53	36(313%)
	Bite Daba	28	126	98(448%)		Nano Gebriel	34	61	27(180%)
	Doyo Leman	26	80	54(307%)	Elu	Keta	32	74	42(232%)
	Tuchi Deko	37	135	98(364%)		Kule Gefersa	32	74	42(232%)
Boset	Buta Wegere	76	89	13(117%)					
	Borchota	45	81	36(179%)					
	Gari	63	94	31(149%)					
	Buta Denqore	30	73	43(242%)					
	Tedecha	76	89	13(117%)					

Source: JICA RREP Team based on ARC2 http Site
*= %of Actual amount to the trigger

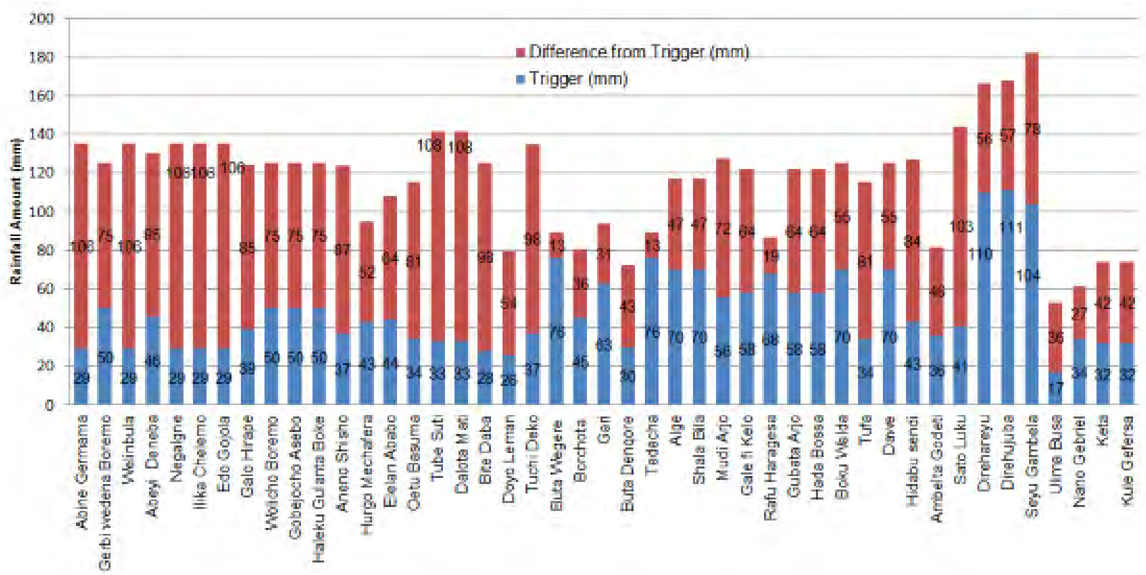


Figure 4.4.2 Actual Rainfall Amount and Difference from Triggering Amount (Flowering Phase)
Source: JICA RREP Team based on ARC2 http Site
Note: Actual Rainfall Amount is adjusted with 10mm daily cap.

2) Payout Discharged

Although there were only 8 kebeles, for which total rainfall amounts of the contract periods were below the triggering amounts many farmers in interviewed kebeles during the monitoring showed strong anxiety about the rain situation this year 2014 because they faced shortage of the rain or fluctuation of the rainfall.

OIC had an experience in conducting "Crop Cutting Experiment (CCE) " to overcome basis risk for other WII project (IFPRI funded project) and the OIC explained to the Team that if result of the rainfall measurement by satellite does not meet the actual damage on the ground, farmers will no longer believe the insurance company and this might cause negative impact on the reputation of a company itself. OIC showed eagerness to minimize the basis risk and conducted quick "gap assessment" by visiting all target 45 kebeles from June 10 to 21, 2014 in order to finalize how OIC will make a payout for the planting phase.

OIC conducted field observations (not CCE) and also had interviews with farmers, woreda and kebele government officials and agricultural experts there. Table 4.4.6 summarizes the crop status observed in the fields based on the report submitted by OIC. There are 16 kebeles at which crop status was observed "very good "or "good" and crop status of the rest of kebeles (29 in total) was observed as "sparsely populated", "wilting", and "failed to germinate" mainly because of untimely rainfall or shortage of rainfall.

For the three kebeles of Ilfata woreda, the observation result was summarized as "damaged by worms", but this was also associated with the fluctuation of the rainfall according to the farmers. According to the gap assessment report prepared by OIC, there was rainfall at sowing time but it interrupted after the crop was emerged for 15 consecutive days and this created high temperature in the soils that created infestation of worms that damaged maize to a great extent.

Table 4.4.6 Summary of Crop Status Observed during Gap Assessment by OIC (10 to 21 June, 2014)

Woreda	Kebele	Date	Woreda	Kebele	Date
Adami Tulu (15)	Abine Germama	Sparsely populated, wilting	Arsi Negele (10)	Alge	Failed to germinate, wilting
	G/W/ Boremo	Good		Shala Bila	Failed to germinate, wilting
	Welinbula	Good		Mudi Arjo	Failed to germinate, wilting
	Abeyi Deneba	Sparsely populated, wilting		Gale fi Kelo	Failed to germinate, wilting
	Negalgne	Good		Rafu Haragesa	Failed to germinate, wilting
	Ilika Chelemo	Good		Gubata Arjo	Failed to germinate, wilting
	Edo Gojola	Good		Hada Bossa	Failed to germinate, wilting
	Galo Hirape	Sparsely populated, wilting		Boku Walda	Good
	Wolicho Boremo	Good		Tufa	Sparsely populated, wilting
	Gobejocho Asebo	Good		Dawe	Good
	Haleku Gulanta Boke	Good	Ilfata (3)	Hidabu sendi	Damaged by worms
	Aneno Shisho	Good		Ambelta Godeti	Damaged by worms
	Hurgo Mechafera	Good, except Berta Zone		Sato Luku	Damaged by worms
	Elelan Ababo	Sparsely populated, wilting	Dano (3)	Dire Hareyu	Good status
	Oetu Basuma	Very good		Seyu Gambela	Good status
Bora (5)	Tube Suti	No rain after sowing, crops are wilted		Dire Hujuba	Good status
	Dalota Mati	No rain after sowing, crops are wilted	Dawa* (2)	Ulima Busa	No enough rain
	Bite Daba	No rain after sowing, crops are wilted		Nano Gebriel	No enough rain
	Doyo Leman	No rain after sowing, crops are wilted	Elu* (2)	Keta	No enough rain
	Tuchi Deko	No rain after sowing, crops are wilted		Kule Gefersa	No enough rain
Boset (5)	Buta Wegere	No rain after sowing, crops are wilted			
	Borchota	No rain at all			
	Gari	No rain after sowing, crops are wilted			
	Buta Denqore	No rain after sowing, crops are wilted			
	Tedecha	No rain after sowing, crops are wilted			

Source: Source: JICA RREP Team based on OIC's field report

* Main crop of these Kebele is teff and sowing time has not yet come as of surveyed, so crop statuses are not mentioned for these Kebeles.

OIC has decided to make a payout for these 29 kebeles (shadowed ones in Table 4.4.6) for the planting phase. In order to simplify the procedure, payout amount was not calculated by each kebele separately, but OIC has decided to pay for the insured farmers 50% of the sum-insured[2] equally and 773,250 birr in total was discharged by OIC as shown in Table 4.4.7.

Table 4.4.7 Summary of Payout Made by OIC for 29 Kebeles

Woreda	Kebele	Sum Insured (Birr)	Payout (Birr)	Household
Adami Tulu	Elelan Ababu	88,500	44,250	176
	Abine Germama	73,000	36,500	146
	Abeyi Deneba	115,000	57,500	224
	Galo Hirape	73,000	36,500	132
Bora	Dalota Mati	8,000	4,000	11
	Tube Suti	19,500	9,750	37
	Tuchi Deko	11,500	5,750	12
	Doyo Leman	24,500	12,250	46
	Bite Daba	23,500	11,750	46
Boset	Tedecha	70,500	35,250	136
	Buta Dongore	50,000	25,000	100
	Buta Wegere	57,000	28,500	113
	Borchota	57,500	28,750	111
	Gari	54,500	27,250	569
Arsi Negele	Mudi Arjo	93,500	46,750	187
	Hada Bossa	42,500	21,250	85
	Gubata Arjo	43,500	21,750	87
	Rafu Haragesa	32,500	16,250	65
	Shala Bila	73,000	36,500	146
	Alge	78,500	39,250	157
	Tufa	74,000	37,000	148
	Gale fi Kelo	91,000	45,500	182
Ilfata	Hidabu sendi	18,000	9,000	33
	Ambelta Godeti	17,000	8,500	33
	Sato Luku	18,000	9,000	30
Dawa	Ulima Busa	55,500	27,750	106
	Nano Gebriel	69,500	34,750	125
Elu	Keta	56,500	28,250	109
	Kule Gefersa	57,500	28,750	114
Total		**1,546,500**	**773,250**	**3,466**

Source: JICA RREP Based on Information from OIC

The OIC has started to hold payout ceremony on 11th November 2014, at which insured farmers receive the payout and continued up to the late November. The head of Bora woreda administration office said during the payout ceremony; "I have never heard about WII until JICA RREP intervention, and none of us may have not expected its success, but now we all know there is a solution for our farmers who face the drought. What I want to say to all farmers here that you have the responsibility to deliver the information for the rest of the farmers who didn't buy insurance because the drought is problems for all the farmers, not only yours".

Payout Ceremony in Bora Woreda. From left, representative from the Union, OIC, Woreda Administration Office and the Project Team

[2] If a farmer paid 100 birr for the premium, he / she can get 125birr as a payout for planting period from OIC under this arrangement because 100 birr premium is divided into two phases, planting (50 birr) and flowering and each premium rate is 20%, therefore, farmer can get 250 birr for the planting season if he total rainfall amount is below the exit in normal case. OIC, whereas, made an arrangement for insured farmers to pay 50% of the maximum payout amount and therefor the payout amount becomes 125 birr for 100 birr premium (50 birr for planting season only, and therefore 50 / 20% x 0.5).

A manager of Meki Batu Union, on the other hand, showed his impression toward WII during the payout ceremony in Adami Tulu woreda, “Our union had an experience in selling MPCI for OIC before but it was quite new experience for us to start handling WII. Nevertheless, when we compare MPCI and WII, we feel WII is very simple and easy for implementation. Farmers also now realize the benefit of WII because they received payout.”

4.4.5 Major Findings of the Groundwork of Phase II

The groundwork of the Phase II WII was commenced at the beginning of February 2014. The main activities of the groundwork were the awareness creation meetings and the premium collection at each of the target kebeles. The groundwork is a key to scale up the WII promotion. From the lessons in the Phase I, the groundwork in the Phase II has been improved mainly in the following four aspects; 1) groundwork period, 2) selection of the participants for the awareness creation meetings, 3) involvement of primary cooperatives, and 4) radio programmes and brochures.

The groundwork was extended from one month for the Phase I implementation to two months in the Phase II implementation. The groundwork was conducted in February and March 2014, whereas there was only March in the Phase I. This was because one of the main constraints of the groundwork in the Phase I was tight schedule within the limited time. Some farmers complained that the registration period was too short in the last year 2013. For this reason, the registration period was extended to two months in this 2014 season.

Involvement of PCs was also new arrangement in the Phase II. The main reason for this arrangement was to utilize local resources into the groundwork activities. As the target kebeles increase, burden of the Unions becomes heavy. Unions have to use more resources for the groundwork than the resources they deployed in the Phase I. To establish sustainable groundwork system, the PCs were involved in the Phase II WII promotion.

Another difference from the Phase I groundwork was the target number of the awareness creation meetings. The number of target farmers in the Phase II for the awareness creation meetings were rather limited and main target of the awareness creation meetings was key farmers. These key farmers were expected to promote the WII to other farmers after they have attended the awareness creation meetings. This arrangement was meant to reduce the logistics cost of the groundwork under the need of the expansion of target area, 15 kebeles to 45 kebeles for the Phase II.

In addition, radio program broadcasting and distribution of the brochures were new activities in the Phase II. Since the awareness creation meetings targeted limited number of farmers, these mass-promotion programs and materials helped the rest of the farmers access to the WII information. The radio programs were broadcasted once a week during the groundwork. The 15-minites radio programs contained the basic concepts of the WII and how the WII works. Not only did the brochures help farmers, but also they helped DAs and the Union staff to understand the WII. These activities were meant to support the awareness creation for a larger number of farmers.

The following section describes major findings out of the groundwork 2014. These findings are summarized by the major stakeholders of the groundwork; namely, the agricultural cooperative unions, the primary cooperatives, the Development Agents, and the farmers:

1) Unions

The capacity of the Unions was a key to implement the groundwork. The main role of the Unions was to supervise field activities during the implementation of groundwork in cooperation with the PCs, the DAs, and the farmers, and to oversee all the activities. The performance of the Unions has directly impacted the results of the groundwork as follows:

- ✓ There are 6 Unions involved in the groundwork of the Phase II WII promotion, and half of them newly joined the WII implementation in this 2014 season. The rest of half Unions have participated in the groundwork since the 2013 season. The Unions, which have the WII experience in last year, were more active compared to the Unions which joined the project this year 2014. For example, Meki Batu, Bora Denbel and Uta Wayu Cooperative Unions were well organized to implement the groundwork. Take-up rates of these Unions were also higher than those of the new Unions.

- ✓ Self-motivation is a key aspect for the groundwork performance. Meki Batu Cooperative Union insured the largest number of farmers. They conducted training for their own staff beforehand they actually started the awareness creation meetings. Their well-trained staff were able to convince farmers of the benefits of WII. As a result, more than 1,000 farmers singed up. The manager of the Union mentioned that they know the benefits of the WII and they think that the WII is an important tool for farmers to reduce drought risk.

- ✓ The expansion of the registration period has led the 2nd year WII implementation to better results. The groundwork was started one month earlier than that of last season. This arrangement helped the Unions implement the groundwork efficiently. Most of the Unions were busy to distribute fertilizer in February and March. If there was only one month to conduct the groundwork, it would have been difficult for the Unions to increase the number of insured farmers. In fact, one of the main lessons from the last year was time constraint. The Unions had a certain flexibility to conduct the awareness creation meetings in the Phase II because they had two months to complete it. Although the Unions are busy to distribute agricultural inputs, they are still able to conduct the awareness creation meetings.

2) Primary Cooperatives (PCs)

Involvement of the PCs was one of the main challenges with regard to the implementation of the groundwork. The following are summary of the major findings regarding the involvement of the PCs;

- ✓ PCs in high inputs areas seemed to be more active than those in low inputs areas. This is because these active PCs distribute a large amount of agricultural inputs so that they have a strong relationship with their member farmers. For example, in Bora woreda, the PC collected the premium from the farmers using their own receipt and staff. According to the baseline survey which was conducted by the JICA team in Phase I, the percentage of input using households was the highest in Dalota Mati kebele with 83% in Bora woreda. From this point of view, if there is an area that farmers are willing to use fertilizer, PCs in that area could be active.

- ✓ On the other hand, the PCs in Arsi Negele woreda were not cooperative to the groundwork. According to the Union staff, farmers do not trust the PCs, and their relationship is not good. For this reason, the Union did not work with the PCs when they conducted the awareness creation meetings. Again, from the results of the baseline survey in the Phase I, the lowest percentage of input use households was Alge, Shala Bila, and Mudi Arjo kebeles with 3.2%, 3.2% and 3.4% respectively. All these kebeles are in Arsi Negele woreda. Farmers who do not use fertilizer have only limited deal with the PCs. Therefore, involvement of the PCs cannot be strong in such areas.

- ✓ Another difficulty of involving the PCs was transaction time. This is particularly true for OIC to follow up the premium transaction. In the 2013 season, the Unions conducted the groundwork and OIC could easily confirm the transaction amount from the Unions. By contrast, the PCs actually collected the premium in this season 2014; thus, OIC had to wait for their report longer period of time, and worse sometimes reported information was not accurate.

3) Development Agents (DAs)

The main role of the DAs was to raise farmers' awareness on the WII. This was the same arrangement as the last year. The main findings through the Phase II experiences are the following;

- ✓ Most of the DAs were busy with their routine duties such as watershed management activities. They could not be fully committed to the groundwork activities. For this reason, the Unions faced a difficulty in conducting the groundwork on schedule. The DAs are a good entry point to the farmers; however, they could not work for the WII promotion exclusively since they were at the same time engaged in government works. It can be a good strategy to deploy the DAs for WII promotion, but there is a need to coordinate the activities with other activities.
- ✓ There is not strong incentive for the DAs to conduct the awareness creation meetings. As mentioned above, most of them are already busy with government programs. Their salary is the same even if they conduct the awareness creation meetings and get a large number of insured farmers. This is one of the issues with regard to the project sustainability. Government policy or guidance to the DAs should be necessary to efficiently mobilize them.
- ✓ Kebele chairpersons and other community leaders have strong relations with the farmers in the community in every aspect, and field activities went well where their active involvements were observed. Involvement of kebele chairperson and other community leaders can facilitate not only smooth mobilization of the farmers for the field activities but also can help to build informal platform among the farmers to share and discuss what key farmers learned in the awareness creation meeting in various occasions.

4) Farmers

There are three main findings in the Phase II regarding farmers' response to the WII; namely, 1) farmers in the new kebeles were more willing to purchase the WII than those farmers in the old kebeles, 2) some farmers who purchased the policy last year complain about the WII because they faced rainfall shortage, but there were no payouts, and 3) most of the famers had to pay tax to the government at the time of the WII promotion. Details are as follows:

- ✓ Farmers in the new kebeles were more willing to purchase the WII than those in the old Kebeles. This is because insured farmers in the old kebeles could not receive any payouts from the insurance company last year; therefore, most of the farmers who purchased the WII last year were hesitant to buy this season. In fact, it takes time to convince farmers what the real benefits of the WII are. When a drought hit farmers, they would realize the importance of the WII. In this sense, the insurance company should keep providing the WII every year.
- ✓ Some farmers complained about the WII because they faced rainfall shortage problem last year, but they could not receive payouts. This problem happened in one of the zones in Alge kebele, Arsi Negele woreda. The indices could not reflect the real situation on the ground in the part of that kebele. Improving the insurance product is important to avoid this kind of basis risk.
- ✓ At the time of the awareness creation meetings, one of the most frequent answers to why not to buy WII was that they did not have cash at that time. According to the Union staff, the government raised land tax double this year 2014, so that most of the farmers had spent their money on paying the land tax before buying the WII. To cope with this situation, providing the WII with credit basis such as bundling with agricultural inputs could be considered in future.

CHAPTER 5 WII INTRODUCTION (FOLLOW-UP PHASE)

The RREP Weather Index Insurance Promotion moved onto the follow-up phase after two successful consecutive years (the years of 2013 and 2014). One of the key concerns from the previous years was sustainability of WII promotion. This follow-up phase was to monitor how the insurance company and other stakeholders could possibly continue WII promotion in the future. For this reason, the Project Team got less involved in the WII promotion activities, and the local stakeholders took more initiative to promote WII.

The follow-up phase started from April 2015 and ended in November 2015. The insurance company introduced the same insurance product to the same 45 kebeles as the Project did in the 2014 season. The WII promotion activities started in January in the previous year; however, the WII promotion started in April in this follow-up phase due to a delay in budget disbursement of the Project. Due to this delay, the insurance company decided to cover only the flowering period of the insurance contract.

The survey on farmersôbehavior change was also conducted during the follow-up phase. The purpose of the survey was to analyze solid impacts of WII introduction to the farmers. Both insured and non-insured farmers were covered by the survey and compared their behavior change. In addition to the results of the WII promotion activities, the result of the behavior change survey was also discussed in this chapter.

5.1 Implementation Arrangement

The basic institutional arrangement was set up in accordance with that of phase II. OIC took all risks of the WII product, and the agricultural cooperative unions played the roles of intermediaries. OIC worked with the same six cooperative unions as they worked with the last season since the target area of WII introduction was not changed. The groundwork was also conducted through the government extension channel with the DAs to promote farmersôawareness creation of WII.

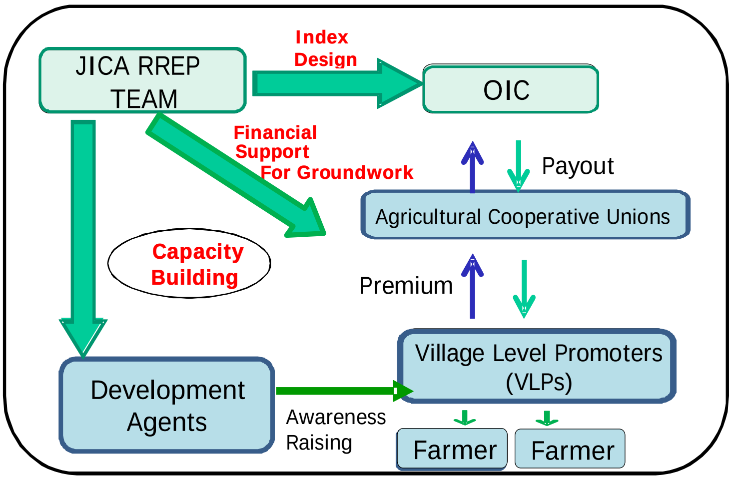


Figure 5.1.1 Institutional Set-up for the Follow-up Phase

Reinsurance arrangement was rather different in this season. OIC transferred their risks to Swiss Re after the groundwork of phase I and phase II; however, OIC did not arrange reinsurance in this phase. This is because they started the groundwork much later than the previous years. The insurance contract period of the planting season already started when they started the groundwork. Reinsurance companies could not take any risks in such situation. Therefore, OIC decided to take all their risks themselves.

The agricultural cooperative unions worked with Village Level Promoters (VLPs) instead of primary cooperatives in this phase. In the phase II, the primary cooperatives played the roles of conducting awareness creation workshops with the DAs and helping in premium collection. Yet, their capacity was limited and their performance was not high enough to conduct the groundwork effectively. Therefore, the unions selected kebele chairpersons, heads of development team and key farmers as the

VLPs to facilitate the groundwork.

5.2 Training for the Agricultural Cooperative Unions and the Village Level Promoters

OIC kicked off the WII groundwork of the 2015 season with the training for the agricultural cooperative unions. A series of training was conducted on 20th of April 2015 in Adama and on 22th in Ambo. In Adama, four agricultural cooperative unions attended the training; 1) Meki Batu, 2) Bora Dembel, 3) Lume Adama, and 4) Uta Wayu cooperative unions. In Ambo, two agricultural cooperative unions attended the training; 1) Ambo and 2) Becho Waliso cooperative unions. DAs and woreda officers also joined the training to learn implementation arrangement of this season.

The training programme consisted of 4 main topics; 1) Introduction of WII, 2) The RREP WII in the 2015 season, 3) Simulation and exercise of WII, and 4) Implementation plan of the groundwork. These were the same contents as the training conducted in the last year. In the session of “Implementation Plan of the Groundwork”, OIC staff mentioned the importance of VLPs’ roles and asked the unions to arrange awareness creation workshops with the DAs.

OIC further requested that the unions should make schedule of the WII promotion activity because the national election was to be held in May 2015. The DAs and the woreda officers would become busy with election campaigns in April and May, and they might not be able to join the groundwork all the time.

The agricultural cooperative unions started training for the VLPs on 27 April 2015 and it ended in the beginning of May 2015. A series of the training was conducted at each target kebele. The agricultural cooperative unions reminded the VLPs the basic concept of the RREP WII product and discussed schedule of the awareness creation activity. The major roles of the VLPs are to coordinate with the DAs and farmers to hold awareness creation workshops. At the end of the training, the VLPs made an action plan for promoting the awareness creation activity.

5.3 Groundwork for WII Promotion

5.3.1 Farmers’ Awareness Creation

The DAs had conducted the farmers’ awareness creation workshops from the middle of May to the end of May 2015. The awareness creation workshops targeted around 200 farmers at each kebele. The DAs invited about 50 farmers in each workshop and they held a workshop two to four times. Only Bache Waliso cooperative union, which covers Dawa and Elu woredas, started the awareness creation workshops in June 2015. Unlike the other areas, their major crop is teff and farmers started cultivation later than farmers in other areas. For this reason, OIC launched the awareness creation in Dawa and Elu woredas in June 2015.

The awareness creation activity was conducted through only the workshops facilitated by the DAs. In the previous seasons, the WII promotion materials were applied such as distributing the brochure and broadcasting the radio programme; yet, these promotional materials were not used in this follow-up phase. This follow-up phase is the 3rd year since the RREP WII was introduced. It is assumed that somehow a certain number of farmers have already heard about WII. Also, it takes time to prepare for these materials. Therefore, awareness creation of WII was conducted only through the workshops with the DAs in the follow-up phase.

5.3.2 WII Sales and Premium Collection

OIC and the agricultural cooperative unions collected insurance premium from the middle of May to July 2015. They started premium collection when the DAs commenced the awareness creation workshops in the middle of May. OIC planned to stop the premium collection at the end of May 2015;

however, they decided to continue the premium collection until July 2015. The number of insured farmers did not reach their expectation and the progress of the WII groundwork was behind their schedule due to the national election held in May 2015. Hence, OIC and the agricultural cooperative unions decided to continue the premium collection even after all the awareness creation workshops were done.

Farmers were gathering at the awareness creation workshop (Adami Tulu woreda).

A farmer was paying the insurance premium to insurance staff (Adami Tulu woreda).

5.4 Achievement of the 2015 Season

The number of insured farmers under the follow-up phase reached 2,845 farmers in total. These insured farmers account for 9.8% of the total households in the target area. The highest take-up rate reached 21.0% in Elu woreda; whereas the lowest take-up rate was 5.8% in Adami Tulu woreda. Collected premium came up to 313,500 birr in total. The total average premium per farmer is just 10 birr over the minimum premium: 110 birr. The highest average premium was 124 birr per farmer in Adami Tulu and Arsi Negele woreds; yet, it is just around 100 birr in the most woredas.

Table 5.4.1 Result of the Groundwork in the 2015Season

Woreda	Union	No. of Kebele	No. of Estimated HH	No. of Insured	Take-up Rate	Total Premium (birr)	Average Premium (birr)
Adami Tulu	Meki Batu	15	9,989	577	5.8%	71,600	124
Bora	Bora Denbel	5	2,263	400	17.7%	40,600	102
Boset	Lume Adama	5	3,148	450	14.3%	45,000	100
Arsi Negele	Uta Wayu	10	6,571	511	7.8%	63,400	124
Ilfata	Ambo	3	2,163	232	10.7%	23,200	100
Dano	Ambo	3	1,918	250	13.0%	25,000	100
Dawa	Bacho Waliso	2	1,679	167	9.9%	17,500	105
Elu	Bacho Waliso	2	1,231	258	21.0%	27,200	105
Total		45	28,962	2,845	9.8%	313,500	110

Source: JICA RREP Team

Comparing the result of the 2014 season, the number of insured farmers in the 2015 season is more than half of that in the 2014 season. Other indicators such as take-up rate and the premium amount in the 2015 season are also lower than these of the previous season. The follow-up phase provided minimum input to promote the WII groundwork and the agricultural cooperative unions was trying to implement the WII promotion with the limited resources. Also, the groundwork was delayed to start due to the project administrative issues. These aspects seem to have affected the result of the follow-up phase.

Only the average premium amount per farmer is higher than that of the previous season. The average premium amount is 110 birr in this season; while that was 102 birr in the 2014 season. There are two reasons for this result. Firstly, Meki Batu union which is in charge of Adami Tulu woreda had strategy to increase the number of policies from potential farmers rather than increasing the number of insured farmers. In fact, their take-up rate is rather low as compared to the other areas.

Another reason is that some farmers who got payouts in the last year tended to buy a large number of policies. For example, according to the OIC, there was a farmer who bought 50 policies in Arsi Negele woreda. This farmer bought the policies such a large amount because he expected to get a payout this year as well. For these reasons, the average premium amount in Adami Tulu and Arsi Negele woredas was increased. Then, the average premium amount of these two woredas contributed to increasing the total average premium amount in 2015.

Table 5.4.2 Comparison of the Groundwork Result between 2014 and 2015

Woreda	Union	2015				2014			
		No. of Insured	Take-up Rate	Premium (birr)	Average Premium (birr)	No. of Insured	Take-up Rate	Premium (birr)	Average Premium (birr)
Adami Tulu	Meki Batu	577	5.8%	71,600	**124**	2,250	22.5%	229,300	102
Bora	Bora Denbel	400	17.7%	40,600	102	447	19.8%	46,800	105
Boset	Lume Adama	450	14.3%	45,000	100	569	18.1%	57,900	102
Arsi Negele	Uta Wayu	511	7.8%	63,400	**124**	1,201	18.3%	120,100	100
Ilfata	Ambo	232	10.7%	23,200	100	97	4.5%	10,100	104
Dano	Ambo	250	13.0%	25,000	100	605	31.5%	62,900	104
Dawa	Bacho Waliso	167	9.9%	17,500	105	231	13.8%	23,100	100
Elu	Bacho Waliso	258	21.0%	27,200	105	223	18.1%	22,300	100
Total		2,845	9.8%	313,500	110	5,623	19.4%	572,500	102

Source: JICA RREP Team

5.5 Rainfall Result and Payout Distribution

5.5.1 Rainfall Result in the Planting Period

One of the most severe rainfall shortage areas is Arsi Negele woreda in the 2015 planting season. The rainfall amounts of the four kebeles in Arsi Negele were below their triggering amounts; Gale fi Kelo, Rafu Haragesa, Gubata Arjo, and Hada Bossa kebeles. In these four kebeles, the rainfall amounts were around 10 mm to 15 mm below the triggering amounts. As such, if the insurance contract had covered the planting season, insured farmers in these kebeles could have gotten the payouts of approximately 240 birr to 330 birr. In addition, the rainfall amounts of the other six kebeles in this woreda were also close to the triggering amounts. Thus, farmers in Arsi Negele woreda seemed to have suffered from rainfall shortage the most among the target woredas.

The rainfall amounts in Adami Tulu, Bora, and Ilfata woredas were not triggered payouts; yet, their rainfall amounts were not much high from the trigger level. Rather, they were close to the triggering amounts. For example, the average difference between the rainfall amounts and the triggering amounts in Adami Tulu was only about 14 mm. In Boset woreda, for instance, the average difference was about 70 mm. This result shows that the gap of 14 mm in Adami Tulu is not high enough from the trigger level. From this point of view, although there were no payouts in Adami Tulu, Bora, and Ilfata woredas, farmers in these woredas got almost the minimum rainfall amounts in the planting season.

Table 5.5.1 Rainfall Result in the 2015 Planting Period

Woreda	Kebele	Trigger (mm)	Result (mm)*	Difference (mm)
Adami Tulu	Abine Germama	40	58	18
	Gerbi wedena Boremo	46	59	13
	Welinbula	40	58	18
	Abeyi Deneba	40	49	9
	Negalgne	40	58	18
	Ilika Chelemo	40	58	18
	Edo Gojola	40	58	18
	Galo Hirape	50	55	5
	Wolicho Boremo	46	59	13
	Gobejocho Asebo	46	59	13
	Haleku Gulanta Boke	46	59	13
	Aneno Shisho	44	59	15
	Hurgo Mechafera	50	66	16
	Elelan Ababo	45	58	13
	Oetu Basuma	45	62	17
Bora	Tube Suti	37	62	25
	Dalota Mati	37	62	25
	Bite Daba	32	45	13
	Doyo Leman	40	60	20
	Tuchi Deko	39	70	31
Boset	Buta Wegere	30	105	75
	Borchota	26	99	73
	Gari	25	86	61
	Buta Denqore	28	95	67
	Tedecha	30	105	75

Woreda	Kebele	Trigger (mm)	Result (mm)	Difference (mm)
Arsi Negele	Alge	61	79	18
	Shala Bila	61	79	18
	Mudi Arjo	60	79	19
	Gale fi Kelo	74	64	-10
	Rafu Haragesa	52	36	-16
	Gubata Arjo	74	64	-10
	Hada Bossa	74	64	-10
	Boku Walda	67	74	7
	Tufa	45	62	17
	Dawe	67	74	7
Ilfata	Hidabu sendi	40	46	6
	Ambelta Godeti	35	55	20
	Sato Luku	43	53	10
Dano	Direhareyu	138	222	84
	Direhujuba	146	235	89
	Seyu Gambela	142	227	85
Dawa	Ulima Busa	169	240	71
	Nano Gebriel	199	315	116
Elu	Keta	118	149	31
	Kule Gefersa	118	149	31

Source: JICA RREP Team based on ARC http site
*Rainfall amounts were capped with 10mm daily.
*Shaded columns indicate payouts.

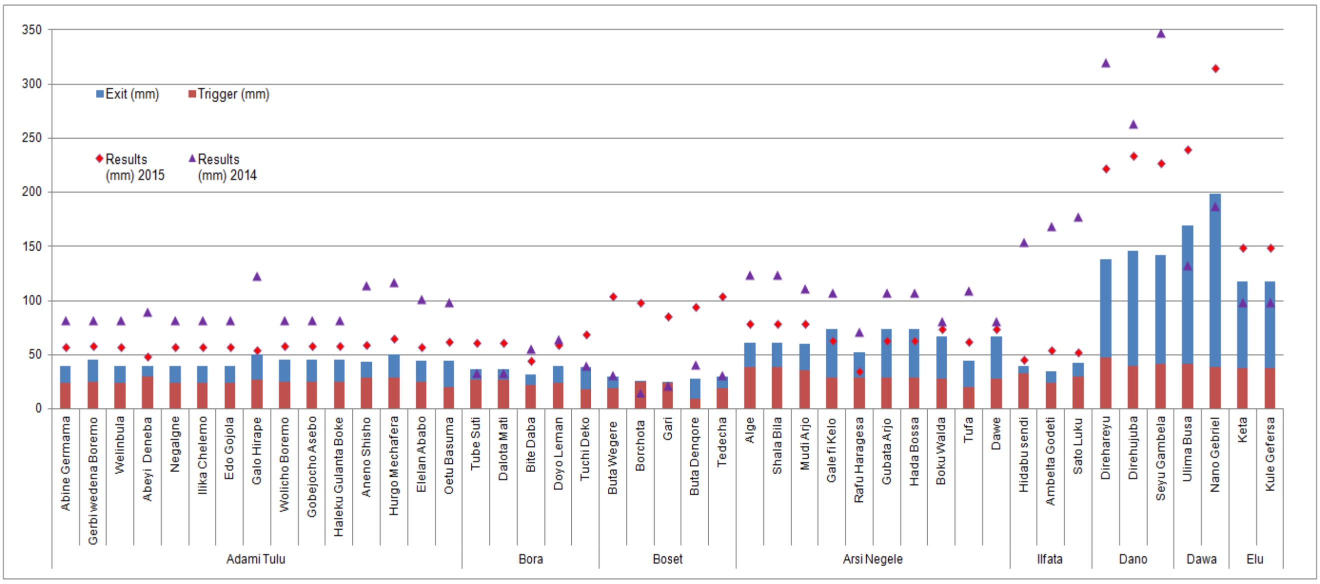


Figure 5.5.1 Comparison of the Rainfall Result in 2014 and 2015 (Planting Period)

Source: JICA RREP Team based on ARC2 http site

By contrast, the rainfall amounts in Bora, Dano, Dawa, and Elu woredas were much higher than their triggering millimeters. In other words, there was enough rainfall in these woredas. For instance, the rainfall amounts were approximately 70 mm higher than the triggering amounts on average in Bora woreda. Even Elu woreda, the rainfall amounts were above the triggering amounts more than 30 mm. This result indicates that farmers in these woredas had no problem with rainfall in the planting season.

Comparing the rainfall result of the 2014 season, the result of the 2015 season has almost opposite trend. Taking, for instance, Boset, Dawa, and Elu woredas, their rainfall amounts in the last season were below the triggering amounts; by contract, the rainfall result in this season were high enough from the triggering level in these woredas. In addition, there were enough rainfall amounts in Adami Tulu and Ilfata woredas in the last season; contrary, their rainfall amounts were close to the triggering amounts in this season. These differences show that the trend of the rainfall has nearly opposite between the 2014 season and the 2015 season.

5.5.2 Rainfall Result in the Flowering Period

The rainfall amounts in the flowering period were rather low throughout the target woredas. Particularly, Arsi Negele woreda got the small amount of rainfall just same as the planting season. In fact, there are 10 target kebeles in Arsi Negele and half of the target kebeles triggered payouts. Three kebeles out of these five kebeles triggered payouts even in the planting season. This situation shows that farmers in Arsi Negele suffered from shortage of rainfall throughout the season in 2015. The average gap between the rainfall amounts and the trigger amounts in these five keeles was around 13 mm and the average payout amount reached approximately 360 birr with one policy.

The rainfall amounts of the flowering period in 2015 were lower than that of 2014 in almost all the kebeles. Although there were no payouts, the rainfall amounts in Adami Tulu were close to the triggering amounts; whereas the results of the 2014 season were high enough from the trigger level in the same area during the same period. There are only two kebeles which their rainfall amounts were higher than the previous season; Direhereyu kebele of Dano woreda and Nano Gebriel kebele of Dawa woreda. From this result, almost all the kebeles got the small rainfall amounts in the 2015 flowering period compare to the 2014 flowering period.

Table 5.5.2 Rainfall Result in the 2015 Flowering Period

Woreda	Name of Kebele	Trigger (mm)	Results (mm)	Difference (mm)
Adami Tulu	Abine Germama	29	34.90	5.90
	Gerbi wedena Boremo	50	57.43	7.43
	Welinbula	29	34.90	5.90
	Abeyi Deneba	46	53.21	7.21
	Negalgne	29	34.90	5.90
	Ilika Chelemo	29	49.08	20.08
	Edo Gojola	29	34.90	5.90
	Galo Hirape	39	43.19	4.19
	Wolicho Boremo	50	57.43	7.43
	Gobejocho Asebo	50	57.43	7.43
	Haleku Gulanta Boke	50	57.43	7.43
	Aneno Shisho	37	39.63	2.63
	Hurgo Mechafera	43	42.62	-0.38
	Elelan Ababo	44	52.00	8.00
	Oetu Basuma	34	57.56	23.56
Bora	Tube Suti	33	64.75	31.75
	Dalota Mati	33	64.75	31.75
	Bite Daba	28	49.74	21.74
	Doyo Leman	26	41.49	15.49
	Tuchi Deko	37	63.78	26.78
Boset	Buta Wegere	76	84.76	8.76
Arsi Negele	Alge	70	77.86	7.86
	Shala Bila	70	77.86	7.86
	Mudi Arjo	56	68.21	12.21
	Gale fi Kelo	58	41.36	-16.64
	Rafu Haragesa	68	71.60	3.6
	Gubata Arjo	58	41.36	-16.64
	Hada Bossa	58	41.36	-16.64
	Boku Walda	70	63.59	-6.41
	Tufa	34	57.56	23.56
	Dawe	70	63.59	-6.41
Ilfata	Hidabu sendi	43	67.12	24.12
	Ambelta Godeti	36	59.83	23.83
	Sato Luku	41	75.17	34.17
Dano	Direhareyu	110	177.69	67.69
	Direhujuba	111	166.12	55.12
	Seyu Gambela	104	166.59	62.59
Dawa	Ulima Busa	17	36.85	19.85
	Nano Gebriel	34	70.69	36.69
Elu	Keta	32	68.25	36.25
	Kule Gefersa	32	68.25	36.25

Source: JICA RREP Team based on ARC http site

	Borchota	45	74.56	29.56
	Gari	63	69.07	6.07
	Buta Denqore	30	32.00	2.00
	Tedecha	76	84.76	8.76

*Rainfall amounts were capped with 10mm daily.
*Shaded columns indicate payouts.

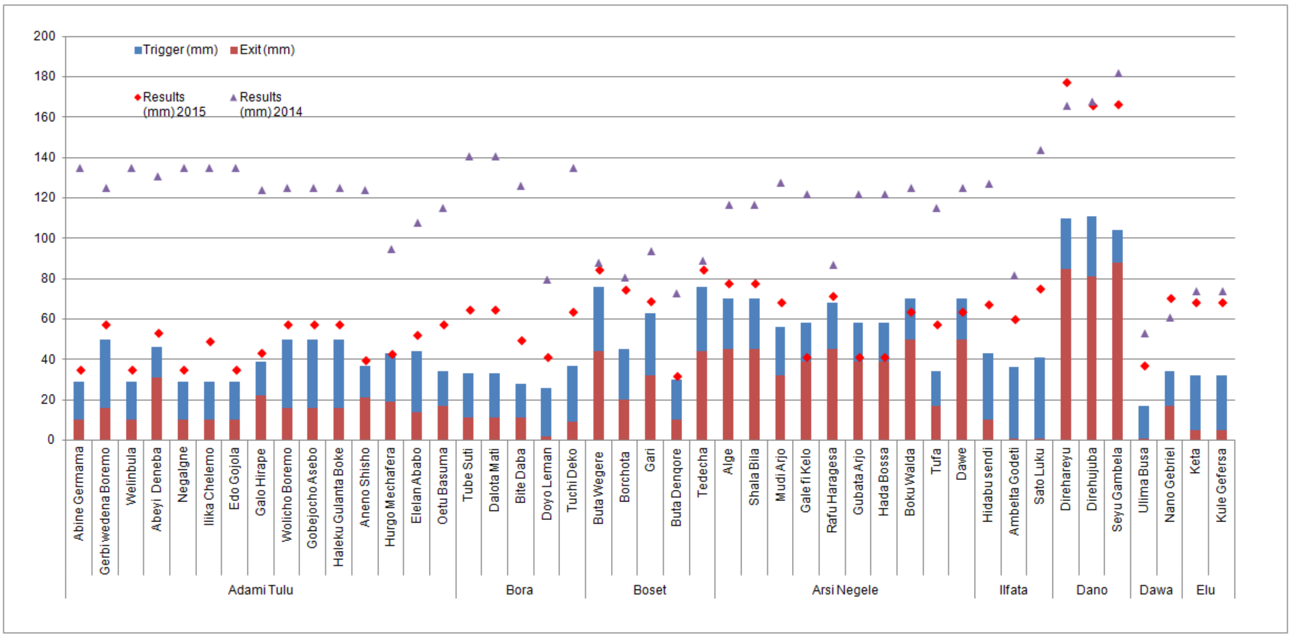


Figure 5.5.2 Comparison of the Rainfall Result in 2014 and 2015 (Flowering Season)

Source: JICA RREP Team based on ARC2 http site

5.5.3 Payout Distribution

Although four kebeles of Arsi Negele triggered payouts in the planting season, this result was not announced and the payouts were not distributed. This is because OIC decided that their insurance contract period targeted only the flowering period in this follow-up phase. OIC actually made insurance contract with farmers after the contract period of the planting period started. They gave up covering both the planting and the flowering periods. In fact, the agricultural cooperative unions and the DAs explained that the RREP WII in this season could not provide any payouts for shortage of rainfall in the planting period. For this reason, OIC did not make any payouts for the results of the planting period.

On the other hand, OIC is to distribute the payouts of the flowering season of this season 2015. There are six kebeles triggering payouts in the flowering period. One kebele from Adami Tulu was just below the trigger amount so that the payout amount is only 106 birr per policy. Five kebeles from Agrsi Negele was below the trigger amounts around 16 mm. Their payouts would be 450 birr per policy at each kebele.

According to the OIC, not only these six kebeles, but also they are planning to distribute payouts to all the kebeles in Adami Tulu and Boset woredas. This is because many farmers in these woredas got drought damage in the flowering period. In fact, the rainfall result in these woredas was very close to the triggering level, and OIC recognized that the rainfall situation in these woredas is worse than what the satellite rainfall data shows. Therefore, OIC decided to give payouts in all the kebeles in Adami Tule and Boset woredas, though their payouts were not triggered in these woredas. As of 24 November 2015, the payout was not done yet and OIC is still preparing for its distribution.

5.6 Major Findings of the Groundwork in the Follow-up Phase

The groundwork in this follow-up phase was rather different from the previous seasons. Firstly, the input for the groundwork was limited comparing to the previous seasons. For example, there were not extra promotion materials such as brochures and radio programmes in this follow-up phase. Secondly, the groundwork was commenced in the middle of April. This is almost three months behind the proper staring period of the groundwork. Finally, the WII product covered only the flowering period in the follow-up phase. All these differences seem to have affected the result of the groundwork in this phase. In this section, major findings of the groundwork are summarized as follows:

1) One of the purposes of this follow-up phase was to give OIC an initiative to operate the WII activities. The capacity of OIC is a key to continue the WII promotion in the future. One of the findings of the follow-up phase is that OIC could have the capacity to set up institutional arrangement and conduct training for the agricultural unions. These parts of the groundwork could be done by OIC with the limited support from the Project.

2) On the other hand, OIC's capacity is still limited in terms of product development, rainfall monitoring and payout distribution. OIC did provide exactly the same insurance product as they provided in the previous season and they did not change any indices of the product. It is necessary to adjust the indices of the WII product after a couple of years based on the feedback from the farmers. It may seem to be difficult for OIC to improve accuracy of the WII product by themselves. Also, there are payouts in the flowering period in some kebeles; yet, OIC did not deliver the payouts on time. They are still preparing for the payout distribution after one month already passed since the insurance contract completed. For these reasons, it may be said that OIC could not be fully ready to provide WII products without any support from outside.

3) Although capacity of OIC was limited to manage the WII activities, OIC made positive efforts on the own involvement in WII activities. For example, they decided and conducted a gap assessment with their own budget in order to evaluate actual crop situation in the 2014 season. As a result, they decided and provided additional payouts out of their budget. In addition, OIC monitored agricultural cooperatives to follow-up the progress of the WII activities with their own car. OIC conducted these activities at their own initiative with their budget. These positive responses of OIC indicate that OIC could invest more in WII activities if coverage area of WII spreads in order to make the WII financially sustainable from private business point of view.

4) The timing of the groundwork was not proper in the follow-up phase. Many DAs and Village Level Promoters (VLP) were busy with preparation of the national election, which was held in 24 May 2015. The agricultural cooperative unions faced the problem about mobilization of the DAs and the VLPs. The unions and the VLPs had to delay their activities because they sometimes could not gather enough number of farmers at the workshops. Therefore, mobilization of the relevant stakeholders was limited and the progress of the groundwork was slow especially during May.

5) The WII groundwork was burden imposed on the agricultural cooperative unions. The groundwork in the follow-up phase started in April 2015 and it ended in July 2015. It took about four months to complete the groundwork. The unions, however, had limited resources for the groundwork. It was difficult for some of the unions to keep assigning the same staff to conduct the groundwork for such a long period. Intensive groundwork in a short period of time seems to be convenient for the agricultural cooperative unions.

6) Farmers who got payouts in the last season responded to the WII promotion positively. OIC made payouts at three to four kebeles in each woreda in the last year. They distributed the payouts to more than 3,400 households last year. Some of these farmers could understand that they could

trust the WII product and OIC actually provides payouts if farmers suffer from shortage of rainfall. Therefore, the payouts in the last year have a positive impact on the WII promotion in this phase. A payout is one of the best ways to show the benefit of the WII to farmers.

7) Contrary, some of the farmers who did not get payouts complained about the WII product this season. These farmers insisted that they had damage on their crops because of shortage of rainfall; yet, OIC did not pay in the last season. For example, some farmers in Arsi Negele mentioned that they lost their crop production; however, OIC assessed that there was no shortage of rainfall in these areas. Therefore, some farmers in these areas complained that the WII product could not reflect actual damage on the ground. The agricultural cooperative unions faced difficulty to promote WII in such kebeles.

8) The indices of the insurance product should be modified based on actual situation in the field. OIC decided to distribute payouts to not only the kebeles where the rainfall amount triggered the payouts, but also the kebeles where their rainfall amounts did not trigger the payouts. This is simply because there is a gap between actual rainfall results and satellite rainfall results. OIC faced this, so called basis risk, in both the 2014 season and the 2015 season. This situation suggests that the indices should be adjusted again based on the actual situation in the field.

9) Strong commitment of the Ministry of Agriculture is necessary to mobilize DAs and woreda officers. OIC and the agricultural cooperative unions have limited linkage with the governmental officers and the DAs, and limited control over their activities. All OIC and the unions can do is to request the woreda officers and the DAs to do the WII groundwork. Their request was sometimes not taken in time and not priority to the officers and the DAs. Direct intervention of agricultural administration from the central level could help the insurance company and the unions mobilize the woreda officers and the DAs on the ground.

10) Furthermore, the farmersô awareness creation activity should be internalized in the DAs and the woreda officersô mandatory service. The purpose of the awareness creation activity is to raise farmersô awareness of how to minimize agricultural risks. This is an essential part of DAsô activities especially in drought prone areas. Also, it is expected that they are able to provide information to farmers integrating the idea of WII and various existing agricultural techniques. Therefore, the WII awareness creation activity should be incorporated in DAsôregular works.

CHAPTER 6 WAY FORWARDS ACTIVITIES

In this chapter, in order to extract conclusion and recommendations which are summarized in the next chapter, result of two interview surveys on the WII pilot project implementation is firstly presented. Then, information of three similar WII related projects, HARITA/R4 and IFPRI in Ethiopia, and Kilimo Salama in Kenya is updated and introduced.

6.1 Follow-up Interviews on Weather Index Insurance Promotion

Follow up interviews on WII promotion were conducted by two batches: first batch of the focus group interview (FGI) was to obtain feedback from farmers in the target areas for the WII pilot project implementation for further improvement, and second batch was to examine the impact on behavior changes of the farmers who purchased RREP WII. Since the monitoring result of Phase I revealed various positive changes for the insured farmers, these follow-up surveys also try to see their changes.

6.1.1 Interviews on Weather Index Insurance Pilot Project Implementation

First batch of FGIs was conducted from 12 to 23 May 2014 and 57 insured farmers and 61 non-insured farmers in 10 kebeles of 6 woredas[1]were interviewed as shown in Table 6.1.1 below. Main objectives of the first interview was to know general impression of the farmers in target areas on WII promotion such as the reasons why farmers purchased / did not purchase WII, behavior changes observed, and recommendations toward further promotion of WII in the target areas, etc.

Table 6.1.1 Schedule and Covered Kebeles of Follow-up Interview on WII Promotion

Date	Woreda	Kebele	Distance from Woreda	Classification*	Nr. of farmers interviewed					
					Insured			Non-insured		
					F	M	Total	F	M	Total
12/May	Adami Tulu	Abine Germama	4km	Old	1	4	5	2	8	10
13/May		Aneno Shisho	10km	New	2	4	6	1	5	6
14/May	Bora	Bite Daba	14km	New	1	4	5	0	5	5
15/May		Doyo Leman	15km	New	0	7	7	1	4	5
16/May	Arsi Negele	Mudi Arjo	50km	Old	0	6	6	1	5	6
17/May		Gale Fikelo	20km	Old	1	5	6	2	4	6
19/May	Boset	Buta Wegere	7km	Old	0	6	6	0	5	5
20/May		Tedecha	7km	New	2	3	5	2	5	7
22/May	Dawo	Nano Gabriel	5km	New	0	5	5	0	5	5
23/May	Elu	Keta	7km	New	1	5	6	2	4	6
		Total			8	49	**57**	11	50	**61**

Source：JICA RREP Team
*"Old" means Kebeles selected in the Phase I and "New" means Kebeles newly added for the Phase II

1) Knowledge on WII before RREP Intervention

FGI participants were asked whether they had any information on WII before RREP intervention. Only one non-insured farmer in Doyo Leman kebele answered that he had information on WII through his friend before RREP started. Rest of the participants answered that they did not know about WII except for some farmers as exampled below, and therefor WII was a quite new concept for both the insured and the non-insured farmers:

- ✓ Two insured farmers (Aneno Shisho Kebele) knew index based livestock insurance program which has been conducted in Borena zone from the radio and
- ✓ One insured farmer (Nano Gabriel Kebele) knew Multi-peril Crop Insurance (MPCI) informed by a friend.

1 Although total number of target woredas for the Phase II is 8 in total, the security situation in the Ambo area was not stable at the survey periods, and therefore the Team selected only 6 woredas which could be accessible without passing through Ambo.

2) Rain Situation of Crucial Period for Major Crops

Sorghum waiting for rain in Buta Wegere Kebele, Arsi Negele Woreda (19 May, 2014)

In FGIs held at Buta Wegere kebele (sorghum growing kebele), every farmer said "there was shortage of rainfall last year, but the situation was still better than that of this year. Sowing time for Sorghum has already passed this year, and therefore we will have to resort to other crops such as barley, teff, haricot beans and lentils". They said that they will have to sell goats to buy foods for family this year, 2014.

Maize growing farmers also showed strong anxiety for the rain situation of this year. For example, farmers in Doyo Leman kebele raised that they have not yet received any rainfall before the interview day, and if the rain will not come within 15 days, they cannot get any profit from maize this year 2014 at all and they will have to shift to other crops such as barley and wheat, yet the total profit will be far smaller than that of regular year, say only half.

3) Attendance to Awareness Creation Meeting (ACM) and Access to Promotion Tools

Table 6.1.2 shows the access of participants to the each tool which RREP introduced for further promotion of WII in the 2nd year, Phase II. Attendance to the awareness creation meeting for the insured FGI participants was far larger (98%) than that of the non-insured (64%). Non-insured farmers strongly recommended the Team that "all" farmers should attend the awareness creation meeting, which is the best way to convey the importance of WII effectively." Similarly, access to the rest of the tools by the insured farmers was also higher than that of the non-insured except for the Radio. In fact, very few farmers have accessed to the broadcasting program by radio.

Table 6.1.2 Access to Tools for WII Promotion Introduced by RREP

Tools	ACM	Brochure	Banner	Radio
Insured	56 (98%)	42 (74%)	46 (81%)	3 (5%)
Non-Insured	39(64%)	30 (49%)	40 (65%)	4 (7%)

Source：JICA RREP Team

4) Reason for Purchase and Not-purchase of the 2014 RREP WII

Insured FGI participants shared the Team that they had been facing rainfall deficit and fluctuation during the planting and flowering periods that are crucial for their main crops such as maize, teff, and sorghum for a long time. Therefore, all the participants expressed the reason why they purchased as "risk hedge", of course.

Interviewees further added, "There was no compensation even if we faced drought problem until now, so I thought WII is a good chance to get compensation if we have severe shortage of rainfall" (a farmer in Gale Fikelo). "I understood WII same as *Iddir* which can help us when we face such difficulties as family death, etc. and *Iddir* cannot help us if we are not the member, that is why I want to be prepared for uncertainty" (a farmer in Doyo Leman)."

Then, the Team raised a question, "why did you purchase the WII policy this year again even if there was no payout last year?" to the farmers of old kebeles. One of the common answers given to the Team was: "There was no payout last year because the rain situation of the last year was good, but we don't know about this year, so I bought it for preparation of uncertainty this year!"

A farmer from Buta Wegere kebele (old kebele) also mentioned that "my understanding level on WII has far increased because I attended the awareness creation meeting both last year and this year. We could not get payout last year even if we faced some shortage of rainfall in that last year, but I am afraid we may face more severe situation this year, so I want to be prepared for it. That is why I bought the WII this year too"

Also, farmers in Mudi Arjo kebele, Arsi Negele woreda, mentioned that Primary Cooperative members motivated them to buy WII by conveying the importance of WII at the various social occasions such as funeral, wedding, etc. In addition, DAs have also explained them the mechanism of WII by referring to the livestock insurance which is under implementation in Borena zone of Oromia region during the awareness creation meeting and it helped them for their easier understandings.

As for the non-insured farmers, various reasons were raised on why they have not purchased the insurance as shown in Figure 6.1.1. Lack of money at the sales time shared the most (38%), followed by lack of detail information on the product as well as the sales (16%), and then not well convinced the benefit of the WII (14%) continued.

Most of the reasons raised were related to the sales arrangement. The Team started groundwork of the Phase II much earlier than Phase I taking into account lessons learnt from the Phase I experiences, but it was still not good timing for some farmers to pay the premium, and sales duration set by the Unions was also too short for those farmers.

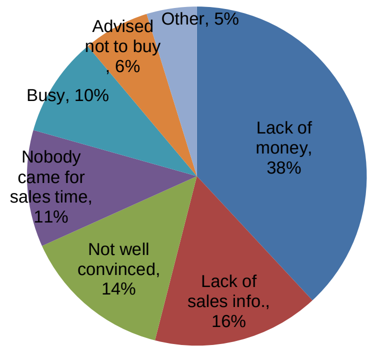


Figure 6.1.1 Reasons Why Non-insured Farmers Did not Purchase WII Policy of Phase 2
Source: JICA RREP Team

There were 26 farmers who purchased the WII of the Phase I, but 14 farmers (53%) did not purchase the WII this year 2014. The reason why not purchased may be related to the attendance to the awareness creation meeting. Only 4 among 14 farmers attended the meeting in the Phase II; on the other hand, all those 14 farmers attended it in the first year. Only two explained the reason that they did not buy the policy as they did not have any information on the sales because they did not attend the awareness creation meeting.

The other reasons raised were; 1) Union's sales arrangement (6 farmers, 43%) was not good, 2) no money at the sales time (3 farmers, 21%), 3) disappointed because there was no payout even my crop was damaged last year (2 farmers, 15%), and 4) nobody from the Project came for the awareness creation meeting this year, so I felt abandoned from the Project (1farmer).

5) Behavior Change observed after Purchasing RREP WII Policy Phase 2

Insured farmers in the interviewed 8 kebeles shared with Team that they have a plan to increase/start to use fertilizer/improved seed on condition that "if the rain condition is good" as an example of behavior change after purchasing WII this year. Other farmers also told that WII motivated them to work harder because they may get some compensation if rainfall condition is not good this year.

Table 6.1.3 Sample of Behavior Change After 2013 WII: Input

Farmer	A	B	C	D	E
DAP Before (kg)	0	0	50	50	50
DAP After(kg)	100	100	100	100	100
Urea Before (kg)	0	0	50	50	0
Urea After(kg)	100	50	50	100	0
Yield Change (%)	(+) 500	(+) 300	(+) 500	(+) 200	(-) 40

Source: JICA RREP Team

Farmers who also purchased Phase I WII reported the change of the input after having purchased the Phase I WII and five samples among them are shown in Table 6.1.3. Except for farmer E whose area's rain condition was not good, yields of all were better than those of average[2] year ranging from 200 % to 500% with an increment of fertilizer application. Concerning the behavior changes, additional interviews focused on it were conducted and the result is summarized in next section.

6) Willingness to Buy WII Policy Next Year And Affordable Premium Amount

All interviewed farmers expressed their willingness to buy WII policy next year too, and even non-insured farmers showed eagerness to buy the policy. One of non-insured farmers explained the reason as "I did not understand the benefit of WII fully at the training time, but now I understood the benefit after getting information from other farmers and also by observing this year's rain condition (A farmer in Gale Fikelo)". Other farmer said, "I could not buy it because I did not have money at the sales time, but I will prepare the money for the next year (A farmer in Doyo Leman)."

Insured farmer (center) shows confidence in WII during FGI in Aneno Shisho Kebele, Adami Tulu Woreda (13 May, 2014)

Insured farmers whereas shared that their confidence in WII has become stronger after observing this year's rain situation, and said "I felt secured and realized the importance of the WII because we are in worry about this year's rain (A farmer in Gale Fikelo)." Other insured farmer also said, "If we do not buy WII, we cannot get chance to be paid even if we face rainfall deficit. Even if there is no payout in our kebele, the money that we paid is used for other farmers in other areas who face difficulty than us, so I will continue to be a member of the insured. Even if I die, my family will continue to buy it (A famer in Aneno Shisho, see photo)".

When interviewees were asked about their opinion on affordable premium amount for the next year, about 90% of participants of both insured and the non-insured came up with the amounts more than 200 birr as shown in Figure 6.1.2. Amounts from 200 to 299 birr shared the most by the both insured and non-insured farmers, followed by 300 to 399 birr the second. Certain differences between the insured and the non-insured can be observed for the categories of 500 to 599 birr, 100 to 199 Birr, and "don't know".

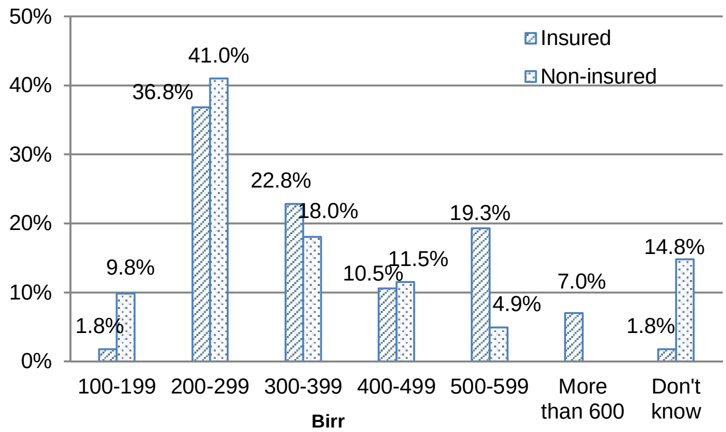


Figure 6.1.2 Affordable Premium Amount

Source: JICA RREP Team

Almost 10% of the non-insured famers answered amounts below 200 birr, whereas the insured farmer who raised this category was only about 2%. Similarly, around 15% of the non-insured farmers could not come up with any amount for this question. This shows that non-insured farmers still do not trust WII or do not have clear understanding on the WII premium. On the other hand, almost 20% of the insured farmers answered the amounts between 500 to 599 birr and it reflects the farmers comments raised during the interview that "payout amount based on the 100 birr premium is too small to cover all the crop damages which we may face".

[2] "Average" was asked to estimate average yield of the years of which they got "not too small", "not bumper" harvest, so it is based on interviewed farmers perception.

7) Toward Further Promotion of WII

Recommendation for the further promotion of WII was also asked. "Awareness creation meeting was good to raise our awareness on WII, and therefore all remaining famers who did not attend the meeting should also be given the chance to learn it" was mostly raised. Especially, usefulness of getting ideas on WII through Q & A session during the meeting was often raised. Most of the FGI participants suggested conducting the training at kebele center inviting all farmers together because issues raised during Q & A session may be different if it is conducted at different places such as by zone[3] of each kebele. Necessity of refresher training, close monitoring by the Project, and the introduction of other kinds of insurance (other weather risks, livestock, fire, etc.) were also raised.

6.1.2 Interviews on Behavior Change after Purchasing WII and its Impact on Yield increase

Second interviews were conducted by putting more focus on behavior changes after purchasing WII policy. More specific to say, the survey was conducted to know whether purchasing WII had positive effect on behavior changes of the insured farmers on agricultural practice. Information was collected from farmers in Adami Tulu, Bora, Boset, and Arsi Negele woredas. Newly added kebeles/woredas from Phase II were excluded because by the time of this survey the season has not finished yet, so that the behavior "change" over the season could not be observed.

Then, since main crop of farmers in Phase I target areas was maize, such kebeles were selected where their main crop was maize. Abine Germama and Walin Bula from Adami Tulu woreda, Shala Bila from Arsi Negele woreda, Bite Daba from Bora Woreda and Borchota from Boset woreda were selected for the interview. Fifty insured farmers and another 50 non-insured farmers were interviewed per kebele; namely, 100 per kebele and 500 samples in total. Farmers were selected randomly from different zones in each kebele. Based on the aforementioned criteria,

Table 6.1.4 Schedule of Survey on Behavior Change

Date	Woreda	Kebele	Distance from Woreda	Nr. of farmers interviewed					
				Insured			Non-insured		
				F	M	Total	F	M	Total
9/Jun	Adami Tulu	Abine Germama	4km	2	8	10	4	6	10
10/Jun				2	14	16	4	12	16
11/Jun				9	15	24	10	14	24
12/Jun		Walin Bula	10km	0	25	25	4	16	20
13/Jun				2	18	20	2	18	20
14/Jun				1	3	4	1	9	10
17/Jun	Arsi Negele	Shala Bila	50km	5	25	30	0	5	5
18/Jun				1	19	20	8	27	35
19/Jun				0	0	0	0	10	10
20/Jun	Bora	Bite Daba	14km	3	12	15	9	11	20
23/Jun				0	14	14	0	20	20
24/Jun				0	21	21	0	10	10
25/Jun	Boset	Borchota	7km	0	16	16	3	7	10
26/Jun				5	12	17	3	19	22
27/Jun				2	8	10	1	12	13
28/Jun				0	7	7	2	3	5

Source: JICA RREP Team

Pie charts of upper left of Figure 6.1.3 show the rate of the farmers who applied fertilizer, pesticide, herbicide, improved seed, or increased time of weeding/ hiring the labors for weeding, and deployed a pair of oxen for ploughing more than that of average year. 96 % of the insured farmers (left) changed at least one of the above mentioned agricultural practice, whereas 69% of the non-insured farmers (right) answered as such. Bar charts of Figure 6.1.3 show the difference between 2013 season and average year by each item.

Since the weather condition in 2013 season was generally good, even the non-insured farmers invested more or worked harder than average year and in fact more than 40% of the non-insured farmers increased time of weeding and ploughing, and labor for the weeding and a pair of oxen. Then, as expected the ratios of the insured farmers who invested more and worked harder in such agricultural

[3] Kebele is divided into 3 zones, to each of which one DA is assigned, often called Kebele Zone. This zone is different from the Zone right under Region.

activities were larger than those of the non-insured. Thus it can be said that the differences between the insured and the non-insured, i.e. positive change more on the insured farmers, came out of the purchase of WII.

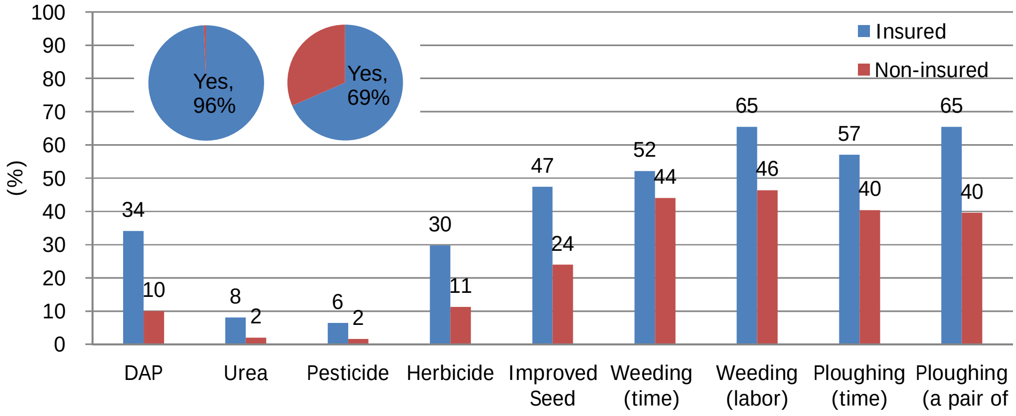


Figure 6.1.3 Farmers who Changed Agricultural Practice in 2013 Season
Source: JICA RREP Team

In addition, in order to understand the behavior change, we firstly need to know the status of application of agricultural inputs in the interviewed areas beforehand. Figure 6.1.4 summarizes the interviewed farmers' fertilizer application and utilization of improved seed for the 2013 agricultural season for both the insured and the non-insured maize growing farmers.

Almost 30% of the insured maize growing farmers answered that they did not apply any chemical fertilizers, but applied compost or cow-dung only, instead. They explained that "If we apply chemical fertilizer when we have small rainfall, our land will be damaged, so we use compost or cow dung only and not chemical fertilizers in such situation." On the other hand, the rate for "no-fertilizer" is far larger for the non-insured farmers than that of the insured. More than 55% of non-insured maize growing farmers answered that they did not apply any chemical fertilizers, but applied compost or cow dung only.

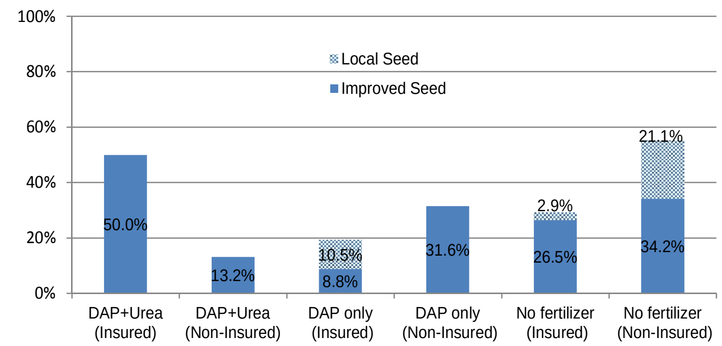


Figure 6.1.4 Fertilizer Application for Maize of Interviewed Farmers
Source: JICA RREP Team

On the contrary, 50% of the insured maize growing farmers said that they used both DAP and Urea, while the rate for non-insured maize growing farmers was only 13.2 %. Farmers who used only DAP shared about 19% for the insured farmers while about 32% for the non-insured farmers. All insured and non-insured farmers who answered that they applied both DAP and Urea also used improved seed. As for the insured farmers who did not apply any fertilizer, almost all of them (90%) used improved seed while for the non-insured farmers, only 62% (21.1/34.2) of them used the improved seeds.

Then, farmers' perception has also been asked in terms of rainfall condition in order to compare with the satellite based data. They were asked to pick up the "average" year which is not too bad, nor too good for own kebele, and further asked the perception on the rainfall of 2013 season. As earlier discussed in Chapter 4, basic risk is one of difficulties for the

Table 6.1.5 Rain Situation of 2013 Season Observed by Interviewed Farmers

Kebele	A.Germama	W.Bula	B.Daba	Borchota	S. Bila
Rain 2013	Good	Good	Bad	**Very bad**	Moderate

Source: JICA RREP Team

WII promotion. Table 6.1.5 shows famers' perception on the rain of 2013 season in each kebele and we can see a gap between the satellite result and farmers perception for Borchota kebele where total rainfall amount was more than double of the triggering amount by satellite estimation while the farmers perception was very bad.

1) Fertilizer Application (DAP)

Figure 6.1.5 summarizes the comparison of DAP application between the insured (shown as Y) and the non-insured farmers (shown as N), showing the change in terms of percentage for the 2013 season from the average year. Shala Bila kebele was omitted from this comparison because none of interviewed farmers applied DAP for those two years (2013 agricultural season and average year). As discussed earlier, farmers who apply fertilizer, especially both DAP and Urea, are not so many in the target areas. Therefore, we can see the changes only for kebeles where farmers have practice of application of DAP. The changes of increasing the fertilizer application are observed more on the insured farmers, and especially large difference is observed for the farmers of Bit Daba kebele between the insured (70%) and the non-insured (22%).

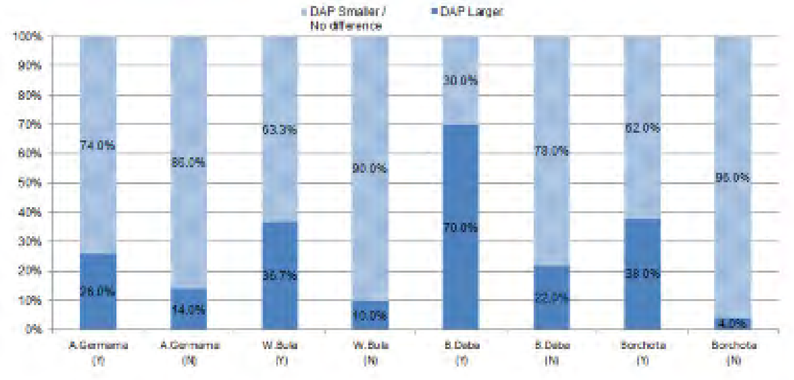


Figure 6.1.5 DAP Application Comparison
Source: JICA RREP Team

2) Improved seed

As for the change towards increasing the use of improved seed as in Figure 6.1.6, more than 50 % of the insure farmers show more amount of improved seed usage in 2013 agricultural season than the average year except for the farmers in Bite Daba (26%) and Borchota kebeles (30%).

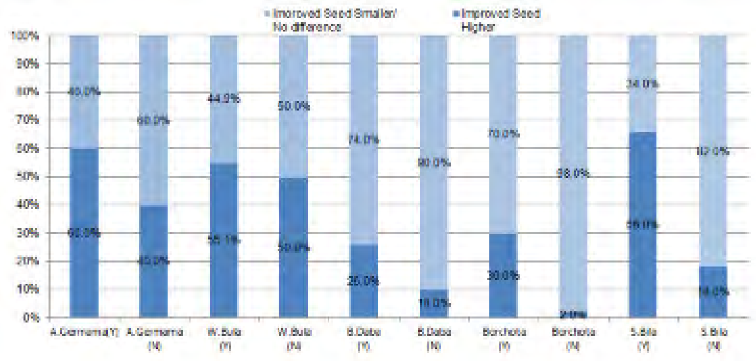


Figure 6.1.6 Improved Seed Usage Comparison
Source: JICA RREP Team

On the other hand, 50% of the non-insured farmers of Walin Bula kebele also answered that they increased the amount of improved seed than that of average year, which showed highest percentage among the five interviewed kebeles. For the rest of kebeles, ratio of farmers who used more improved seed was below 40%, and most of the kebeles showed the large difference between the insured and the non-insured, such as Borchota kebele (30% for the insured and 2% for the non-insured) and Shala Bila kebele (66% for the insured and 18% for the non-insured).

3) Weeding

Figure 6.1.7 and Figure 6.1.8 show the comparison of weeding practice in terms of times and labor. About 90% of both insured and non-insured farmers in Abine Germama and Walin Bula kebeles answered that they spent much times for weeding than average year. Farmers in the rest of the kebeles did not change the time of weeding much compared with those two kebeles, less than 30% only.

However, still the ratio of the change observed in those three kebeles differs between the insured and non-insured; namely, higher for the insured farmers. Same tendency was observed for the labor, and difference between the insured and the non-insured revealed more than that of time for the weeding.

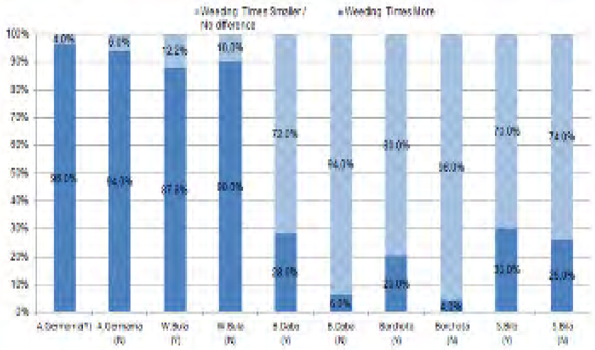


Figure 6.1.7 Times of Weeding Comparison
Source: JICA RREP Team

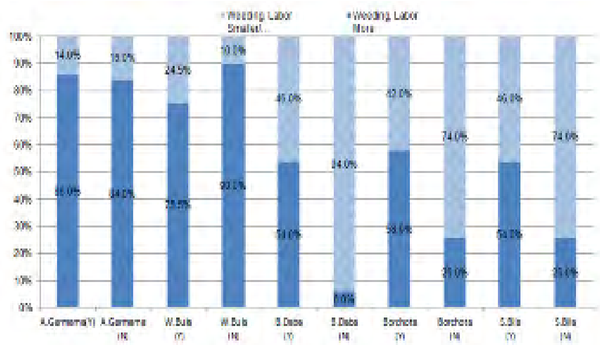


Figure 6.1.8 Labor for Weeding Comparison
Source: JICA RREP Team

4) Ploughing

As for the ploughing, both the times of ploughing and number of a pair of oxen used were asked. Same tendency was observed as weeding; about 80% of both insured and non-insured farmers in Abine Germama and Walin Bula kebeles increased the time and number of a pair of oxen, whereas the ratio of the remaining kebeles are smaller than that of these kebeles, but the insured increased more time and number of pair of oxen than that of non-insured. These examples explain that not only insured farmers to whom rain situation was good, but for farmers in kebeles where rain situation was not good also changed behavior in an increasing way such as weeding, ploughing after having purchased the WII.

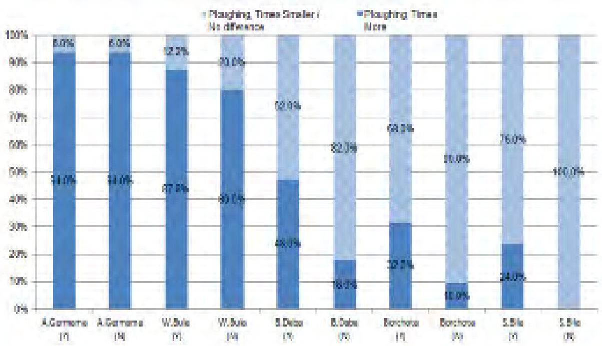


Figure 6.1.9 Ploughing (Times) Comparison
Source: JICA RREP Team

Figure 6.1.10 Ploughing (Nr. of Pair of Oxen) Comparison
Source: JICA RREP Team

5) Maize Yield

Farmers were also asked about maize yield of 2013 agricultural season and that of "average" year to know if there was any difference between the insured and non-insured farmers. Figure 6.1.11 shows the percentage of interviewed farmers of which maize yield of 2013 agricultural season was larger or smaller than that of "average" year. Abine Germama and Walin Bula kebeles where weather situation was good in 2013 season showed almost same tendency for the both insured

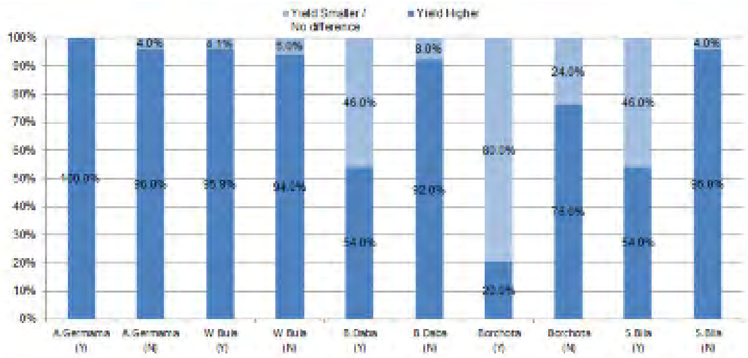


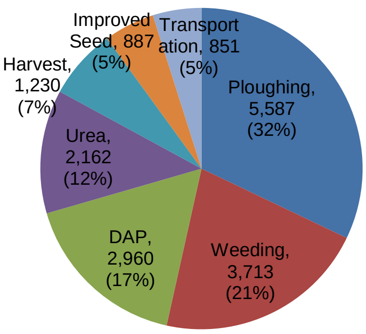
Figure 6.1.11 Maize Yield Comparison
Source: JICA RREP Team

and the non-insured farmers. Most of farmers answered that the maize yield of 2013 season was higher than that of average year.

On the other hand, Bite Daba, Borchota and Shala Bila kebeles where weather situation was not good, or moderate in 2013 season, the result for the insured and the non-insured shows complexity. Almost half (46% for all three kebeles) of insured farmers told that maize yield of 2013 season were lower than that of regular year, while more than 92% of non-insured farmers answered yield of 2013 year season was higher than that of the regular year. The rainfall condition may have exercised decisive impact on the yield of maize rather than what the insured farmers have invested and worked more than the non-insured.

6) Expenditure Pattern for Maize Production

As a supplemental information collection, expenditure for maize production was asked to know how minimum premium amount, 100 birr, means to the farmers and also how maximum payout mount, 500 birr against the minimum premium, can benefit them. Ten active farmers were selected from each interview group and total 50 farmers participated in this supplemental survey. Figure 6.1.12 shows expenditure compositions for the farmers who apply both DAP and Urea to their maize fields (left) and who do not apply any chemical fertilizers to their maize fields (right).



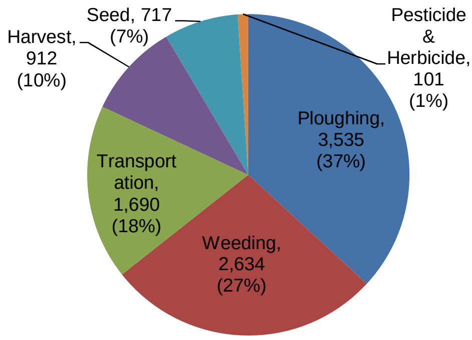


Figure 6.1.12 Expenditure for Maize Production: (Left: Farmer with DAP + Urea, Right: without Fertilizer), Birr
Source: JICA RREP Team

Both categories showed that farmers spend much money for ploughing than other items and this shared 32% for the farmers with DAP and Urea and 37% for the farmers without fertilizer. Average amount spent for ploughing was 3,535 birr (farmers with DAP and Urea) and 5,587 birr (farmers without fertilizer) respectively. Expenditure for weeding shared the second biggest expenditure for the both categories, then DAP shared the third for the farmers with fertilizer while transportation for the farmers without fertilizer.

The expenditure amount was estimated for average maize cultivated land of 2013 agricultural season for the both categories, namely 2 ha for the farmers who applied both DAP and Urea, and 1.7 ha for the farmers who did not apply any chemical fertilizer. Therefore, though we cannot compare the total and each expenditure amounts directly between the 2 groups, we can see that even if a farmer can get maximum payout (500 birr), it can cover only improved seed and most of the expenditure spent for the maize production cannot be covered.

6.2 Comparison between Satellite Estimation and Nearby Meteorological Station

Although the WII introduced in RREP utilized satellite data for the monitoring of rainfall amount during the contract period, OIC made payout based on their own field assessment responding to the farmers' complaints for the Phase II sites. Basis risk is actually common problem for the WII related project regardless of the data source, either from meteorological station or satellite. Yet, it is still important to know whether there is difference between satellite data and metrological station's data to minimize complaints from the farmers on the basic risk.

Table 6.2.1 shows the list of the meteorological stations adjacent to each target kebele, distance difference between coordinates of GPS (satellite) data and the place of ground station, and also elevation difference between the two. The difference of distance ranges from 1 km (Tuchi Deko, Bora Woreda) to as far as 208 km (Sato Lulu, Ilfata woreda) while the difference of elevation does 2m (G/W/ Boremo, Adami Tulu woreda) to 492m (Ambelta Godeti, Ilfata woreda).

Table 6.2.1 Comparison between Satellite and Meteorology Station (Distance and Elevation)

Woreda	Kebele	Grand Station	Dis-tance (km)	Ele-vation (m)	Woreda	Kebele	Grand station	Dis-tance (km)	Ele-vation (m)
Adami Tulu	Abine Germama	Ziway	8	NA	Arsi Negele	Alge	Gimbichu	23	-401
	G/W/ Boremo	Adami Tulu	15	2		Shala Bila		23	-353
	Welinbula	Ziway	8	NA		Mudi Arjo		19	-308
	Abeyi Deneba	Adami Tulu	4	80		Gale fi Kelo	Arsi Negele	17	-129
	Negalgne	Ziway	8	46		Rafu Haragesa		7	-124
	Ilika Chelemo		8	59		Gubata Arjo		17	-199
	Edo Gojola		8	84		Hada Bossa		17	157
	Galo Hirape		18	217		Boku Walda	Dagaga	8	-327
	Wolicho Boremo		8	127		Dawe			-340
	Gobejocho Asebo	Adami Tulu	15	100		Tufa	Bulbula	17	-10
	Haleku Gulanta Boke		15	89	Ilfata	Hidabu sendi	Ambo Agriculture	183	-88
	Aneno Shisho		15	93		Sato Luku		208	-14
	Hurgo Mechafera	Hassen Husman Bulbula	5	-270		Ambelta Godeti	Jeldu	99	-492
	Elelan Ababo		11	-202	Dano	Direhareyu	Seyo	6	-128
	Oetu Basuma		17	76		Direhujuba		16	-96
Bora	Tube Suti	Alem Tena	11	-30		Seyu Gambela		9	-104
	Dalota Mati		11	27	Dawa	Ulima Busa	Busa	8	-26
	Bite Daba		15	42		Nano Gebriel		12	18
	Doyo Leman		11	127	Elu	Keta	Asgori	3	27
	Tuchi Deko		1	72		Kule Gefersa		3	24
Boset	Buta Wegere	Wolenchiti	42	7					
	Borchota		50	-194					
	Gari		34	-78					
	Buta Denqore		37	109					
	Tedecha		42	5					

Source: JICA RREP Team

The Team then compared the rainfall amounts of planting season in 2014 between the satellite estimated one and the measured one at the nearby meteorological station as shown in Figure 6.2.1. Since the complete data set for comparison were not available in the meteorological station of 6 kebeles in 3 woredas (Adami Tulu, Arsi Negele and Elu), the following are summarized by remaining available 39 kebeles data.

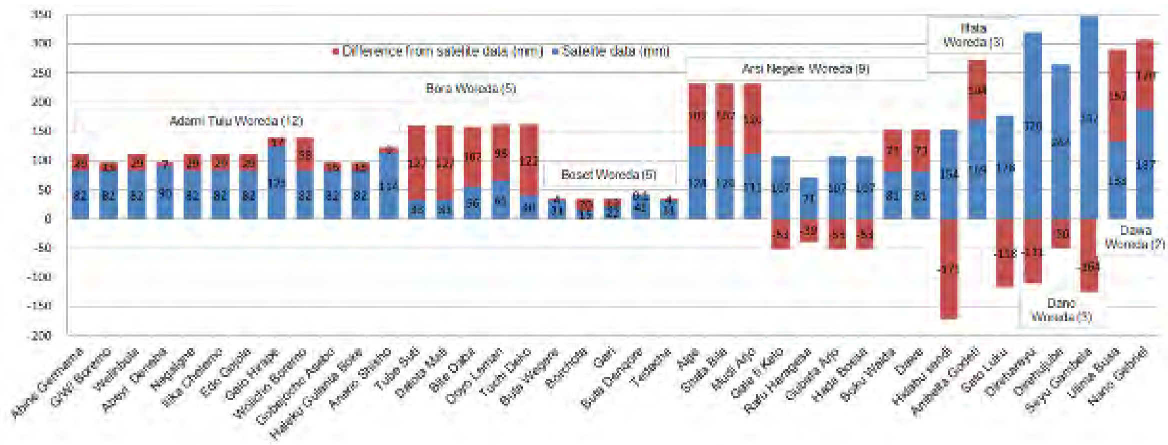


Figure 6.2.1 Comparison between Satellite Data and Near-by Meteorology Station

Source: JICA RREP

In 9 kebeles out of the 39 kebeles, the rainfall amounts collected from nearby meteorological stations showed smaller amount than that of the satellite estimation. It means rainfall amounts recorded at the ground station for the remaining 29 kebeles (75%) showed larger amount than that of satellite estimation data. In addition, if we have a look at the difference between the nearby meteorological station data and that of satellite estimation, the rainfall amount by the ground station in some kebeles shows more than 3 times than that of the satellite.

The difference between the satellite data and the nearby meteorological station's data varied among the kebeles. The result in Adami Tulu woreda shows similar tendency, e.g. both show that all kebeles had enough rainfall during the period and even difference observed was small, say, within 30% difference. Bora showed mixed result; nearby meteorological station's data shows that all kebeles had enough rainfall while satellite data shows 2 among 5 were below the trigger and also 1 kebele was almost near the trigger.

Boset woreda also shows similar tendency as Adami Tulu, e.g, although the data of nearby meteorological station shows that rainfall amount of all kebeles were above trigger, satellite data showed that the rainfall in 2 kebeles were below the trigger and also other two kebeles' data were just within one millimeter difference from the trigger. Difference between satellite estimated data and the rainfall data recorded at nearby meteorological station ranged from 13% to 130%.

Arsi Negele woreda shows mixed result; namely, satellite data shows rainfall amounts of all kebeles were above trigger while the nearby meteorological station's data showed that 4 among 9 kebeles were below trigger. Difference between satellite data and nearby meteorological station's data ranged from 49% to 108%. Ilfata woreda also shows mixed result; namely, satellite indicated that rainfall amounts of all kebeles were above trigger while nearby meteorological station's data showed one was below trigger. Dawa woreda showed opposite result; satellite showed that rainfall amounts of both kebeles were below the trigger while the nearby meteorological station's data showed enough rainfall. Dano woreda shows similar results between the two, indicating enough rainfall with a difference from 35% to 47%.

Figure 6.2.2 shows the rainfall amounts measured by the meteorological station and difference from the Trigger of WII. As shown in Figure 6.2.2, total rainfall amount of 5 kebeles measured by nearby meteorological station are below the triggering amounts. None of those kebeles are same with those of satellite estimated, namely 8 kebeles of which total rainfall amounts were below the trigger by satellite estimation are not below the trigger by the nearby meteorological station's data , but the total rainfall amount of other kebeles were below the trigger, instead.

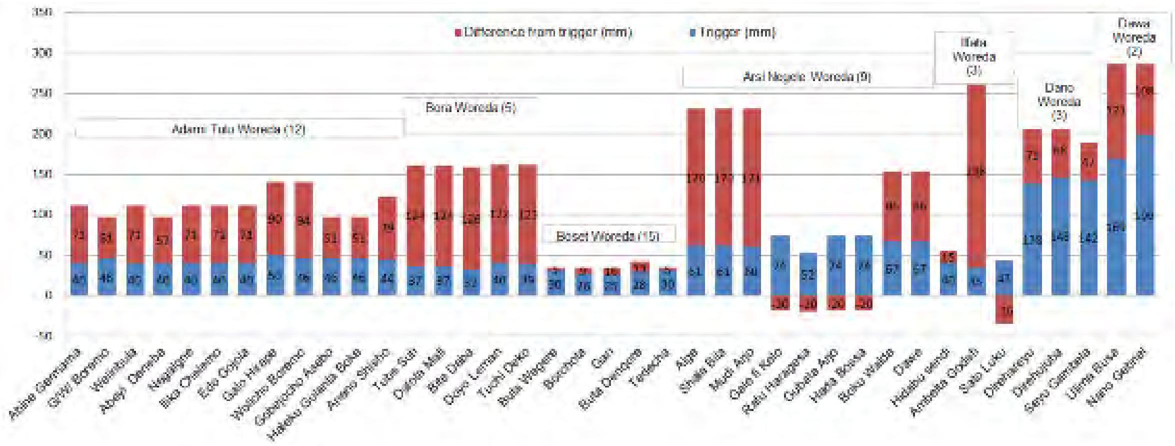


Figure 6.2.2 Rainfall Amounts by Nearby Meteorological Station and Difference from Trigger

Source: JICA RREP

In addition, rainfall amount estimated by satellite in 2 kebeles (Borchota and Gari in Boset woreda) among 6 triggered kebeles by satellite (totally 8 kebeles were triggered by satellite, but full data set of 2 kebeles were not available) showed similar tendency with nearby meteorological station's data, near to the trigger whereas remaining kebeles show far larger rainfall amounts.

6.3 The Survey on Farmers' Behavior Change in the Follow-up Phase

The survey on farmers' behavior change was also conducted at the end of the follow-up phase (November 2015). The main objective of this survey was to understand WII's impacts on farmers and analyze how to maximize its impacts in the future. There are two main limitations under this survey:

1) The WII promotion and sales were commenced after the sowing period started in most kebeles. Because of this time gap, the WII product was supposed to cause nothing about farmers' behavior change in the follow-up phase. The results of the survey would rather suggest that what kind of farmers' behavior lead to purchase of the WII product.

2) The number of survey sample is limited. The total sampling number was 195 farmers. It consists of insured farmers with 99 samples and non-insured farmers with 96 samples. There are more than 2,000 insured farmers in total in this phase; however, the sampling number of this survey was limited to 99 insured farmers due to time constraints. For this reason, statistical accuracy of the results may be limited.

6.3.1 Outline of the Survey

The survey was conducted in four kebeles; Welinbula and Abine Germama kebeles of Adami Tulu woreda and Hada Bossa and Shala Bila kebeles of Arsi Negele woreda. The reasons for selecting these four kebeles are; 1) their major crop, which is maize, is the same in all the four kebeles, 2) the survey was conducted in these kebeles in the last year as well so that the result of the survey could even compare the result in the last year, and 3) there are enough number of both insured and non-insured farmers. The following table shows the outline of the survey.

Table 6.3.1 Outline of the Survey

Woreda	Kebele	Total Sample No.	Male	Female	Insured	Non-Insured
Adami Tulu	Welinbula	49	41	8	24	25
	Abine Germama	50	42	8	24	26
Arsi Negele	Hada Bossa	51	48	3	31	20
	Shala Bila	45	39	6	20	25
Total		195	170	25	99	96

Source: JICA RREP Team

The survey was conducted as a group interview with a questionnaire format. The groups for the interview were formed separately from insured farmers and non-insured farmers. There were five to six farmers in each group interview. The questionnaire included questions such as participation for the WII awareness creation workshops, agricultural practices, and influence of the WII product.

6.3.2 Agricultural Practice Change

As shown in Figure 6.3.1, the result of the survey reveals that there is little clear connection between the WII product and positive agricultural practices. According to the survey result, 79% of the insured farmers answered that they increased at least one of the following agricultural practices; the amount of fertilizer, the amount of seed, the number of weeding times, the labour amount of weeding, the number of ploughing times, and the labour amount of ploughing. The answer of the non-insured farmers to the same question was 75%. The difference is only 4 percentage points between them. There is almost the same ratio of the insured farmers and non-insured farmers who increased one of their agricultural practices. Therefore, a direct linkage between the WII product and positive agricultural practices was little found under this survey.

The result of the behavior change survey in 2014 (refer to Figure 5.1.3), however, showed that insured farmers invested in agriculture more than non-insured farmers did. The result of the 2014 survey clearly supported the idea that the WII product encourages farmers to invest more in agriculture. There are two main reasons for this difference between the results in 2014 and the result in the 2015 surveys.

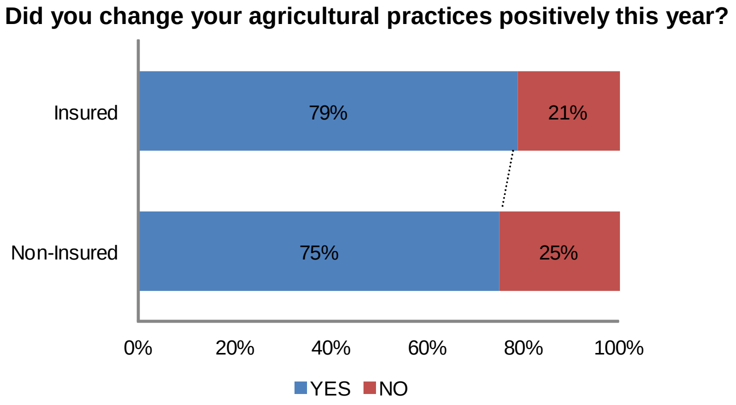


Figure 6.3.1 Positive Change of Agricultural Practices in 2015

Source: JICA RREP Team

Firstly, the timing of the survey implementation is different. The promotion and sales of the WII product in this phase were actually commenced after farmers had done planting preparation such as purchase of fertilizer, seed, and ploughing farmland. There is no surprise if the insured farmers did not increase their agricultural input because most of the farmers had completed their agricultural preparation when they purchased an insurance policy. Therefore, positive agricultural practices could not be found regardless of WII policy purchase.

Secondly, the weather condition of this phase was worse than the last year. Particularly, the survey areas got the small amount of rainfall and farmers in the survey kebeles suffered from shortage of rainfall. By contrast, the rainfall situation in 2014 was good. For example, the difference of the rainfall amounts between 2014 and 2015 in the flowering period in Adami Tulu reached 100 mm. Therefore, this severe rainfall situation appears to have discouraged both the insured and the non-insured farmers to invest in their agricultural activities.

Table 6.3.2 Rainfall Comparison between 2014 and 2014

Woreda	Kebele	2014		2015	
		Planting	Flowering	Planting	Flowering
Adamit Tulu	Abine Germama	82	135	58	35
	Welinbula	82	135	58	35
Arsi Negele	Shala Billa	124	117	79	78

Source: JICA RREP Team based on the ARC http site

The Figure 6.3.2 shows the ratio of farmers who increased input for agricultural activities. The left bar of each agricultural activity is the ratio of the insured farmers; while the right bar of each category is the ratio of the non-insured farmers. The ratios for "Weeding" and "Ploughing" are almost same between the insured and the non-insured farmers. Approximately, 40% to 45% farmers responded that they increased the labour amount and/or the number of times of

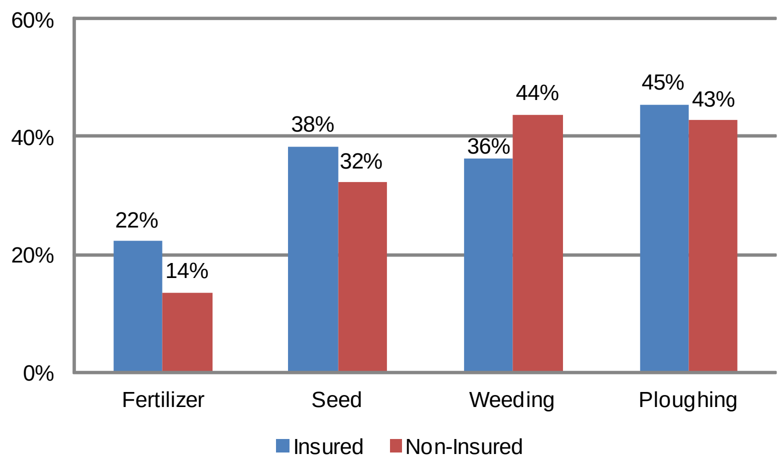


Figure 6.3.2 Ratio of Positive Change on Agricultural Practices

Source: JICA RREP Team

"Weeding" and "Ploughing".

The biggest difference between the insured and the non-insured farmers was "Fertilizer". The ratio of the insured farmers who increased the amount of fertilizer was eight percentage points higher than the ratio of the non-insured farmers who increased fertilizer. This result indicates that farmers who applied more fertilizer than the average years tended to purchase the WII policy. Thus, using the large volume of fertilizer could become one of the major motivations for farmers to pay the WII premium.

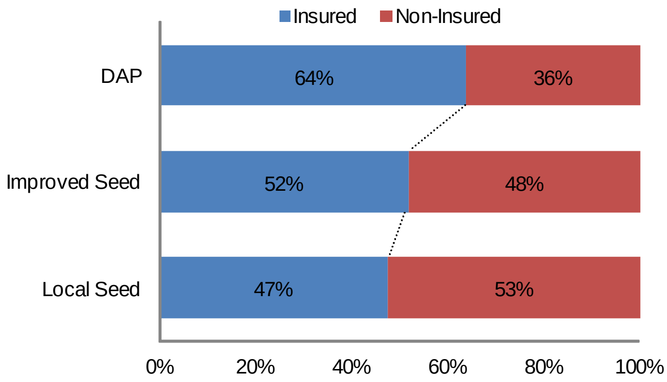


Figure 6.3.3 Ratio of Insured Farmers in Agricultural Input

Source: JICA RREP Team

The survey also reveals that one of the biggest differences between the insured farmers and the non-insured farmers is the use of DAP fertilizer. As shown in Figure 6.3.3, 64% of DAP users are the insured farmers; whereas only 36% of them are the non-insured farmers. This ratio of the insured farmers is higher than that of improved seed users. Almost half of the farmers who used improved seed and local seed are the insured farmers and the rest of the half is the non-insured farmers. It is, therefore, concluded that DAP fertilizer could encourage farmers to purchase the WII policy.

At the end of the questionnaire, the farmers were asked the question "Do you think that the WII purchase affect on your agricultural practices positively?" Half of the farmers answered "YES", and 99% of this positive answer came from the insured farmers. In other words, they are willing to change their agricultural practices positively. Although the behaviors change of the insured farmers and the non-insured farmers was almost the same under this survey because of the WII sales promotion delay in this phase, the insured farmers are willing to change their agricultural practices positively if they are able to get the insurance well in advance of their agricultural season.

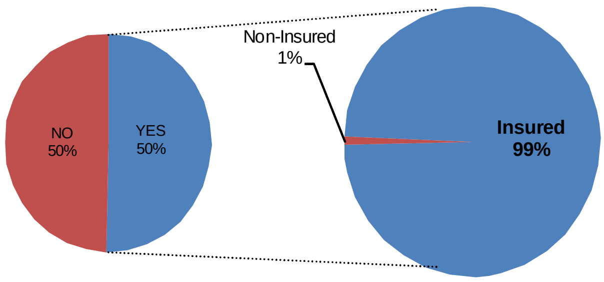


Figure 6.3.4 Impact of WII on Agricultural Practices

Source: JICA RREP Team

6.3.3 Further WII Promotion Strategy

Although the survey could not identify the direct impacts on farmers' behavior change, it is revealed that there was a strong connection between the WII product and use of fertilizer as well as the insured farmers' willingness to change. These results suggest some of WII promotion strategy in the future. For example, the survey result supports the idea that the WII product should be delivered bundling with agricultural input particularly DAP fertilizer. Selling DAP fertilizer with WII promotion is expected to increase take-up rate of the WII product. Also, the insured farmers' perception tells that the proper timing of the WII promotion is a key to maximize the impact of WII on farmers' behavior change.

6.4 Update of Other WII Related Projects Progress

6.4.1 Oxfam HARITA/R4[4]

1) Summary of HARITA/R4 WIII from 2009 to 2014

With an aim to strengthen farmers' long-term food and income security, a pilot of the HARITA (Horn of Risk Transfer for Adaptation) model was conducted in Adi Ha, a kebele in Ethiopia's northern Tigray region in 2009. The pilot offered a risk management package that integrated disaster risk reduction with affordable insurance. Table 6.4.1 summarizes the achievement of the project from 2009 to 2014.

Table 6.4.1 Summary of HARITA/R4 Project Achievements

Phase	I	II	III	IV	V	VI
Production year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Covered villages	1	5	43	76	80	84
Insured crops	Teff	Teff , Barley and wheat	Teff , Barley, Sorghum, Maize, bean, and wheat	Teff , Barley, Sorghum, Maize, bean, and wheat	Teff , Barley, Sorghum, Maize, bean, and wheat	Barley, Sorghum, Maize and wheat
Insurance company	NISCO	NISCO	NISCO & AIC	NISCO & AIC	NISCO & AIC	NISCO & AIC
No. of insured farmers	200	1,308	13,195	19,407	20,015	23,001
Male	125	802	8,740	15,334	13,906	15,867
Female	75	506	4,304	4,073	6,109	7,124
Total Sum insured	115,000	974,400	15,883,726	24,481,550	23,064,380	24,694,550
Premium	27,600	357,014	3,633,637	4,840,237	5,273,298	4,843,959
Payout	No	No	295, 654	5,809,890	452,000	NA

JICA RREP Team based on *"Weather Index Crop Insurance / HARITA Project As a Tool For Climate Change Adaptation"*, Relief Society of Tigray (REST).

An index-based weather insurance product was designed to insure teff crop, the most popular crop in the area. The model was expanded to four additional kebeles in 2010, and several adaptations were made based on discussions with farmers. For example, two additional crops, wheat and barley, were covered in 2010. In its third year of the project, 2011, HARITA was expanded to 43 kebeles covering 13,195 households and six crops: wheat, barley, maize, sorghum, bean, and teff.

In 2012, the project has further expanded to 76 kebeles covering 19,407 farmers. In fact, till year 2011, the insurance project was based on insurance-for-work for the premium payment. It means that beneficiaries work and get the insurance instead of being paid wage. In year 2012, the farmers were given a new option to purchase insurance with cash, or partially with cash and partially with labor for the first time. The enrollment was in fact constrained by the budget for the insurance-for-work, and accordingly the project introduced such scheme accepting the cash for premium payment.

The 2012 agricultural season marked the first-ever set of large weather index-insurance payouts. Over 12,200 farmers benefited from drought protection through insurance payouts, receiving money when they needed it the most. Each farmer received a share of the total US$ 322,772 in payouts offered. This amount was equivalent to roughly $26 per farmer. A payout ceremony was hosted by the Relief Society of Tigray (REST) together with Oxfam in December 2012.

[4] Tis sub-section is summarized based on *"Quarterly Report" and "Annual Report" of HARIAT/R4, Oxfam America & WFP* and document collected from REST. WFP and Oxfam America (OA) launched the R4 Rural Resilience Initiative (R4) in 2011 to enable vulnerable rural households to increase their food and income security in the face of increasing climate risks. R4 builds on the initial success of the Horn of Africa Risk Transfer for Adaptation (HARITA) initiative, pioneered in Ethiopia by Oxfam America, the Relief Society of Tigray (REST) and Swiss Re.

2) Basis Risk

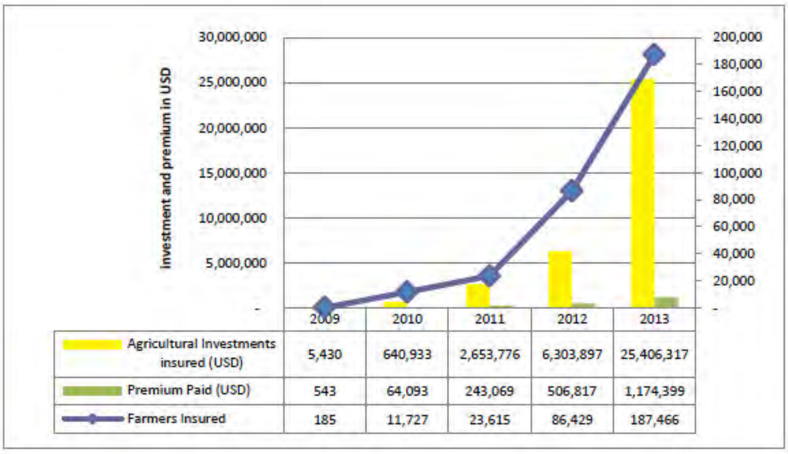
A significant basis risk occurred in the north-east part of Tigray region in the 2013 agricultural season. Complaints were raised by 22 among 79 insured kebeles. The IRI (International Research Institute) for Climate and Society at Columbia University team visited eight among these 22 kebeles which made complaints in order to investigate the sources of the basis risk. These eight kebeles were selected as representative kebeles based on the recommendation of R4's major local partner in Tigray, REST.

In all of the kebeles visited, the farmers reported that 2013 agricultural season was ranked amongst the worst drought years they could recall, with many kebeles ranking the 2013 season amongst their worst three seasons in last 30 years. The project team attempted to diagnose the events in Tigray in 2013 season by looking at other available data sources and ground-based measurement data that could have predicted events during the season including NMA's seasonal assessment for the region, the multi-agency Meher Assessment Report for Tigray region, as well as the FEWS (Famine Early Warning Systems) Net famine early warning system rainfall assessments.

Although these reports have provided a consistent picture of Meher season with below average rainfall and severe dry spells and early cessation of rainfall over different woredas in Tigray, the late season dry spell and early end to the rainfall claimed by farmers were not reflected in most of the independent data sources that are available to track actual events during the season. The only independent data source that has been found to reflect the drought patterns reported in eastern Tigray for the 2013 season was the enhanced Vegetation Index (EVI), a satellite vegetation product.

6.4.2 Kilimo Salama in Kenya &Rwanda

Kilimo Salama (Safe Agriculture in Kiswahili)[5] is an index-based insurance product that covers agricultural inputs in the event of drought or excessive rainfall. It was developed by the Syngenta Foundation for Sustainable Agriculture (SFSA) and launched in partnership with Safaricom which is the largest mobile network operator in Kenya, and UAP, a large insurance company based in Kenya in 2009.



	2009	2010	2011	2012	2013
Agricultural Investments insured (USD)	5,430	640,933	2,653,776	6,303,897	25,406,317
Premium Paid (USD)	543	64,093	243,069	506,817	1,174,399
Farmers Insured	185	11,727	23,615	86,429	187,466

Figure 6.4.1 Updates of Kilimo Salama from 2009 to 2013
Source:http://www.syngentafoundation.org/view/element_href.cfm?src=1/1234.

As Figure 6.4.1 shows, the number of the farmers who purchased Kilimo Salama were only 185 when it was introduced in 2009; however, it has reached more than 187,000 in 2013 season, and Kilimo Salama is also available in Rwanda. Kilimo Salama uses weather stations in each agricultural region. These stations measure rainfall and other climate information such as wind speed and temperature, and continually send the data to a central location.

Since the measurements are automated and there is little room for tampering, data collection is consistent across all regions. The only drawback is that measurements at the station do not always match the rainfall at a neighboring farm. This is inevitable and has caused concern to the farmers, and therefore the farmers are allowed to choose by themselves which station best represents their farms'

[5] Source: http://kilimosalama.files.wordpress.com/2010/02/kilimo-salama-fact-sheet-final11.pdf

climate.

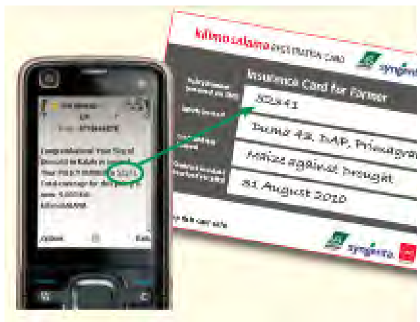
Kilimo Salama is the first micro-insurance product distributed and implemented over a mobile phone network. This was an innovation in insurance delivery in reaction to the lack of infrastructure for distributing such a product. Reflecting Kenyan farmers' cash flow, where farmers invest in their farm as they plan, the farmers can insure as little as 1 kg of maize seed or fertilizer. This "pay as you plan" type of insurance allows farmers to "try out" insurance which they have never bought before. Experience shows that as farmers learn to trust insurance, they expand their coverage and are comfortable investing more in their farm, raising their productivity.

For the operation mechanism of Kilimo Salama[6], local agro vets register Kilimo Salama using a scanner with tailor-made software that allows for paperless registration and immediate confirmation to the farmers of the policy. Agro-vets collect premiums and transfer through MPesa[7] to the insurance company. Based on the stations' measurements and predefined formula (=index) of crop rainfall needs, payouts are made. If a weather station's measurement and the related rainfall formula show that there is payout, the payout is sent to individual farmers using MPesa.

Farmers who buy Kilimo Salama buy it with fertilizer from MEA, seeds from SEED Co, and chemicals from Syngenta East Africa. Insuring inputs requires selling the insurance at the point of sales of these inputs; namely, the agro-vet is the place the insurance is sold. Agro-vets clientele is geographically close to their stores, and they cultivate close relationships with these farmers and may be relatively easier than if the farmer would have to buy insurance at a separate specialized outlet.

Source: http://kilimosalama.files.wordpress.com/2010/02/kilimo-salama-fact-sheet-final11.pdf

As part of the product development, a mobile application was developed that was installed and distributed to the agro-vets contracted. To enable the agro-vets to resister products fast, Quick Response (QR) codes are used to identify product type, size and insurance type. The codes will be displayed on a sheet that is kept by the agro-vet. An agro-vet scans the relevant codes using the mobile phone and application whenever a purchase is made.



Source: http://kilimosalama.files.wordpress.com/2010/02/kilimosalama_v031.pdf

Once the transaction is completed, the farmer receives a receipt that he/she fills in according with the details he/she received in his SMS as shown in the photo right. As for the stockist, when sufficiently large amount of premiums has been collected, the stockiest is automatically asked to transfer them via MPesa to the account of the insurance company.

Table 6.4.2 Example of Premium For Each Agricultural Input

Particular	Seeds	Fertilizer	Chemical
Product Only	Ksh 180 / kg	Ksh 2,000 / 50kg	Ksh 1,055 / lt
Product W/ Insurance	Ksh 189 / kg	Ksh 2,100 / 50kg	Ksh 1,108 / lt

Source: http://kilimosalama.files.wordpress.com/2010/02/kilimosalama_v031.pdf

In case of a payout, no claims processes are necessary. Instead, all the phone numbers linked to a weather station receive a confirmation of their payout via SMS and the payout is made directly by MPesa, which is in fact direct and avoids the delays that are often seen as most frustrating issues about insurance for the farmers. The premium

6 Source: http://kilimosalama.files.wordpress.com/2010/02/kilimo-salama-fact-sheet-final11.pdf

7 Mobile money technology introduced in Kenya 7 years ago. For more details:http://www.safaricom.co.ke/personal/m-pesa

is generally 5% of the recommended retails price as shown in Table 6.4.2.

6.4.3 IFPRI (International Food Policy Research Institute)

IFPRI project was started in 2011 in Shashamane (West Arsi zone), Adama (East Shewa zone) and Bako Tibe (West Shewa zone) of Oromia region. The number of kebele covered was 25, 19, 21 respectively for the first year 2011. The drought prone kebeles in those woredas were selected based on the criteria such as accessibilities, infrastructures and availabilities of ground meteorological station. Insurance policies were given for free by lottery for *Iddir*[8] and individual based farmers for the first year 2011.

Sales window of IFPRI project is set at two options; namely, 1) for May, June, July and August which open from March to April, and 2) for September which opens in July. In addition, the insurance policy is sold by monthly basis and the project considers that they have five policy months. Therefore the farmers are able to purchase the insurance for each month according to their interests. Further, insurance product is designed for the case of “severe” and “moderate”, with which payout is designed to be made for four times in every seven years and once in every seven years respectively.

Table 6.4.3 WII Sales Result by IFPRI

Operation Year	Total Policy Sold	Premium Earned (Birr)	Premium Collected (Birr)	Premium Discounted (Birr)	Payout Made (Birr)
2011	1,353	75,800	24,040	51,760	150,000
2012	1,537	144,075	76,873	67,202	129,000
2013	176	19,100	19,100	-	32,500
2014	284	24,100	24,100	-	105,500

Source: Busa Gonofa, local partner working as intermediary for IFPRI

In 2012, the farmers were asked to pay 50 and 100 birr for severe and moderate respectively. But the number of farmers who purchased was small. Therefore, discount (20%, 40%, 60% and 80%) of the premium by lottery was introduced for the 2013. Premium was also increased to 75 and 125 birr for severe and moderate products respectively. The farmers preferred the severe product to the moderate one because farmers believed that the probability of getting payout in moderate product was very small mainly because of misleading guidance by sales agents to get higher commission.

Therefore, IFPRI developed a strategy utilizing Local Staff Agents. They are the selected peoples at the target areas and they undertake all the marketing activities of the IFPRI WII product. It was developed during the 2nd sales window of the 2013 marketing period in order to solve the problem observed with external sales agents. It was launched in four selected potential *Iddirs* at both Adama and Shashamane project sites.

The payout amount of the IFPRI WII is fixed, 500 birr, but there are three steps for the payout according to: 1) Monthly cumulative trigger: All policies will pay if the total rainfall in the month measured at the nearby weather station is less than the trigger indicated for each month, 2) Consecutive dry day: All policies will pay out if a long period of consecutive dry days is more than a prescribed period, and 3) Gap Insurance: if none of the May, June and July policies pay but yields of the selected crops were bad for many farmers, a petition of farmers can be made asking IFPRI that a crop cut should be done. If the yield of the crop falls below the gap trigger the farmers are to receive 250 birr. There is no payout made yet with the step 3.

6.4.4 Geodata for Innovative Agricultural Credit Insurance Schemes (GIACIS)

Geodata for Innovative Agricultural Credit Insurance Schemes (GIACIS) is a public-private

[8] It is an informal social group which has been practiced in Ethiopia since long time ago. The members contribute money to the group, and the money will be given to the members who face difficult event or when a problem happens. The members will help each other, for example, at funeral, sometimes wedding ceremony, etc.

partnership aiming at providing financial service to small-scale farmers with a micro-insurance product in order to protect them against weather risks. The total cost of GIACIS Project is 2.1 million euro. 70% of the cost was covered by the government of the Netherlands, and the remaining 30% was paid by Kifiya Financial Technology Plc.(Kifiya), a business partner of GIACIS.

Kifiya was established in 2010 in Ethiopia. They provide digital finance and payment services such as electronic, branchless, and mobile money services. They also run payment system called Unified Billing system in Ethiopia known as Lehulu. Under the GIACIS, Kifiya and their partners are developing a micro-insurance platform, which enables insurance companies to provide an accurate WII product and operate cost effective groundwork of WII in rural areas. Kifiya is planning to launch this micro-insurance platform service in March 2016.

There are wide range of international and local organizations participated in GIACIS; ITC University of Twente (Netherlands), Agricultural Transformation Agency (ATA, Ethiopia), National Meteorology Agency (NMA, Ethiopia), and Swiss Re (Switzerland). ITC University of Twente from the Netherlands provides technical support to NMA and they analyzed historical risks to develop indices of an insurance product. ATA plays a role of knowledge partner to deliver a WII product to farmers on the ground.

One of the main characteristics of GIACIS Project is that they prepared a NDVI (Normalized Difference Vegetation Index) based index insurance product. The NDVI is a graphical indicator and it can analyze the green vegetation on the ground. According to Kifiya, an index of their insurance product was set up for each 5km by 5km area. Due to this small area of index coverage, their insurance product is expected to reduce basis risk as compared to other WII products.

In addition, Kifiya’s micro-insurance platform enables insurance companies to operate WII business easily. ITC University of Twente installed GeoNetCast equipment in NMA. GeoNetCast analyzes various weather and environmental data through satellite connection and visualizes analyzed data. These data will be transferred to Kifiya’s micro-insurance platform every 10-day. As such, the micro-insurance platform can calculate risk premiums as well as payouts. Furthermore, Kifiya plans to provide financial services to collect premium through mobile phones. This kind of service will greatly benefits insurance companies.

Kifiya has already made a partnership with Oromia Insurance Company, Nyala Insurance Company, and Africa Insurance Company. They are planning to launch the insurance product in March 2016 in Amhara region. Although the insurance product and the micro-insurance platform have not been practiced yet, these are expected to lead to the further development of WII in Ethiopia. Results of GIACIS should be shared with donors and other relevant stakeholders in the coming period.

6.5 Breakeven Point of WII as Business

Most insurance companies are interested in microinsurance. Their main motivations for microinsurance are; 1) market potential, 2) Corporate Social Responsibility (CSR), and 3) diversification of their risk portfolio. In order for insurance company to continue the WII promotion, it is necessary for them to realize that WII also can be a business at some point after gone through pilot stage. Therefore, this section presents rough estimation of the breakeven point of WII promotion as business.

Table 6.5.1 shows the result of simulation of breakeven point as business for 100 birr per policy and 150 birr per policy respectively. Both cases are estimated for 300 kebeles as the number of target sites. Of course, it would be difficult to scale up the number of target sites in short years, therefore, this simulation result is estimated on the condition that the target kebele will be increased year by year during 5-year implementation of WII promotion after next year, 2015 agricultural season.

Table 6.5.1 Simulation of Breakeven Point of WII as Business (Left: 100 Birr / policy, Right 150 Birr/ policy)

1) Insured Farmers		25,200	farmers	1) Insured Farmers		25,200	farmers
2) Premium per Farmer		100	birr	2) Premium per Farmer		150	birr
3) Gross Sales	1)×2)	2,520,000	birr	3) Gross Sales	1)×2)	3,780,000	birr
4) Variable Expenses		1,493,100	birr	4) Variable Expenses		2,239,650	birr
Payout	49.3%	1,241,100	birr	Payout	49.3%	1,861,650	birr
Commission for Coop	10%	252,000	birr	Commission for Coop	10%	378,000	birr
5) Fixed Expenses		1,018,000	birr	5) Fixed Expenses		1,018,000	birr
6) Total Expense		2,511,100	birr	6) Total Expense		3,257,650	birr
7) Marginal Profit		1,026,900	birr	7) Marginal Profit		1,540,350	birr
8) Marginal Profit Rate		41%		8) Marginal Profit Rate		41%	
9) Break Even Point		2,498,160	birr	9) Break Even Point		2,498,160	birr
10) Break Even Insured Farmers		24,982	farmers	10) Break Even Insured Farmers		16,654	farmers
Take Up Rate		12.0%		Take Up Rate		12.0%	
Total Target No. of Farmers		208,180		Total Target No. of Farmers		138,787	
Target No. of Kebele		297		Target No. of Kebele		198	

5) Fixed Expenses

OIC Staff	360,000	20,000birr/month*18months
Travel Expenses	528,000	66,000birr/month*4months*2cars
Sales Administrative	30,000	Radio, brochures, etc.
Ground work, others	100,000	
Total	1,018,000	

Source: JICA Team

In addition, it is also expected that expenses of groundwork activities shall be shouldered by donors, not by insurance company up to 4th year and expenses, and insurance company shoulders its cost in 5th year and onward. Breakeven point which is shown in Table 6.5.1 is therefore estimated on the condition that insurance company can shoulder all the necessary costs including groundwork from 5th year, before which all the groundwork cost to reach the 4th year expansion should be shouldered by donor(s), approximately 1.5 million birr per year.

Valuable cost is estimated by the payout amount (estimated as about 50% of the premium collected) and commission fee to intermediaries (estimated as 10% of the premium collected). Also, fixed cost is estimated by salaries of company staff, sales administrative cost, travel expenses and groundwork cost (see the below of Table 6.5.1).

Under the condition above mentioned, in order for insurance company to assure the breakeven point of 2,498,160 birr, insurance company needs to sell 24,982 policies (farmers) if every farmer buy one policy at 100 birr amount, whereas if each policy is sold at 150 birr amount, 16,654 policies (farmers) can be enough to mark the breakeven point. Is it noted that during the RREP WII pilot implementation, most of the farmers purchased only 1 policy (100 birr) while willingness interviewed showed around 200 birr policy per farmer. In case of 150 birr policy amount, the target number of kebeles can be smaller than the original target number, just 198 kebeles.

CHAPTER 7 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

This Project, taking the points below into account, concludes that the Weather Index Insurance (WII), tried out through the implementation of pilot project, can be a very essential mean amongst remedial measures in improving risky agriculture being practiced under meager and erratic rainfall, especially in drought prone areas, and thereby enhancing the rural resilience against droughts. The Government of Ethiopia should therefore embark, at her own cost or with an assistance from donor country(ies), on implementing and expanding the WII program over the drought prone agricultural areas of the Country wherever there are needy farmers:

1) There are a great number of farmers who need a mean of making risk-hedge over their unstable rain-fed agriculture very much affected by meager and fluctuating rainfall. The Phase I pilot project had enrolled 1,286 farmers in 15 kebeles while the Phase II pilot project did 5,623 farmers in 45 kebeles. Also, the follow-up phase enrolled 2,845 farmers even in the limited time of period in 45 kebeles. With this just 3 years trial, it was found that there are lots number of farmers who need such WII to protect their unstable rain-fed agriculture from small rainfalls, especially from droughts.

2) The WII pilot project tried under RREP has not introduced any subsidy for the farmers to buy WII policy, 100 birr per policy, meaning that those farmers who were insured had paid the premium out of their pockets. It is therefore found that WII could go as one of business models run by a private insurance company. It is, however, noted that the first time promotion at rural agricultural areas would need logistics supports including capacity building trainings from outside since such burden could go beyond a private company’s financial capacity.

3) Farmers voices endorse the need of WII quoted as; “If we are not buying WII, we cannot get chance to be paid even if we face drought. And, even if there is no payout in our kebele, the money we paid will be used for other farmers in other areas that faced difficulty than us. So I will continue to buy.”, “If we don’t face any rainfall problem, no money will be paid for us because we can harvest good produce instead. And, if we can get payout, we do not have to resort government aid anymore, able to stand”.

7.2 Recommendations

Through the implementation of the WII pilot project, the JICA Team has learned a lot of lessons and also encountered a number of issues that led to the recommendations presented below. These recommendations should be referred to in continuing and expanding WII project in Ethiopia. However, as is the case with continuous processes, these recommendations are by no means exhaustive and may need to be changed or modified, depending upon the prevailing condition.

1) The selection of the sites to introduce WII should be carefully done since it is an important aspect in order to achieve high take-up rate for the insurance by the farmers. High take-up ratio is very much essential to make the WII program financially sustainable. WII is usually introduced in low and erratic rainfall areas, and to know the farmers due need of protecting their risky agriculture from drought, local key persons such as DAs and kebele chairpersons should be included in the process of selecting the target sites.

2) Somewhat contrary to the above statement, an area less affected by drought should also be included in the target sites as far as there is a need of introducing WII. From the farmers’ point of view, the more drought-prone the area is, the higher priority the WII should be introduced with. However, from a private insurance company’s point of view, they also have to make a risk

hedge over their sales of the insurance product by involving not only frequently paid-out areas, i.e., drought prone areas, but also less paid-out areas; namely, less drought prone areas.

3) In addition, very remote areas may be better not picked up as the target site at least at the initial stage of the WII promotion. Almost all of the insurance companies do not have their branch offices in rural areas, and accordingly logistics cost to reach such rural areas could be a very limitation for them to deliver the insurance product, collect premium and disburse the payout. It is therefor recommended that such rural areas could be left over at the initial stage, and instead at later stage when the WII program establishes its financial viability, they could be included provided that there is a due strong need

4) The premium amount should be set at farmer's affordable amount for ensuring the sustainability and smooth expansion of the WII target areas. Minimum premium amount of the RREP WII was 100 birr per policy, which is in fact not so high and even subsistence farmers could afford to purchase the WII without any subsidies. Nevertheless, it may also be recommended to try out a combination between without-subsidy and with-subsidy such as Insurance for Work, being tried under HARITA / R4, especially for subsistence farmers.

5) Establishment of an effective institutional setup should be an important aspect for the smooth implementation of any WII project. An insurance company plays the role of risk taker and designs insurance products, while intermediaries such as agricultural cooperative unions and primary cooperatives collect premium from and distribute payout to the farmers. DAs are to raise farmers' awareness on agricultural risk management and introduce the WII to the farmers. Among them, the capacity of DAs and intermediaries are especially important, and therefor capacity building training should be administered for them before starting the groundwork activities.

6) Awareness creation meeting with farmers and sales of the WII policy should be commenced soon after the harvest of main crops in the previous season. The groundwork of the RREP Phase II WII promotion was started one month earlier than that of Phase I season, and thus duration of the Phase II registration has been extended. It lead the Phase II (2nd year) WII implementation to better results. Nevertheless, interviews with farmers during monitoring revealed that it was still not good timing for the farmers to pay the premium and also the sales duration set by the Unions was too short for the farmers. Therefore, sales of WII policy should and could be set in and from December.

7) Strong commitment of the Ministry of Agriculture is necessary to mobilize DAs and woreda officers. These filed governmental officers play a significant role to promote the WII product on the ground; yet, private insurance companies do not have strong relationship with these governmental officers. In fact, insurance company commented that they expected more direct intervention of the government, particularly state and regional level to mobilize DAs and woreda officers. Governmental commitment on the WII encourages DAs and woreda officers to coordinate with insurance companies and promote WII products.

8) WII promotion should be internalized as an agricultural risk management into DA's ordinary activities. It was sometimes difficult for the JICA Team to get full engagement of the DAs during pilot project implementation. They are government officers and they thought WII activities as additional works or burden for them because they have their own jobs such as providing new agricultural techniques and solving local farming issues. In addition, sometimes DAs participate in other projects and they have to attend training programs to get new knowledge. It is therefore recommended for Agriculture Offices to take up the WII promotion as DAs recurrent works.

9) WII promotion should be continued at least 5 years or more. Farmers in the new kebeles, kebeles undertaken only under Phase II pilot project, were more willing to purchase the WII than those in the Phase I kebeles. This is because insured farmers in the Phase I kebeles could not receive any payouts from the insurance company due to enough amount of rainfall; therefore, most of the farmers who purchased the WII in that year were hesitant to buy this season. In fact, it takes time to convince farmers what the real benefits of the WII are. When a drought hit farmers as this year 2014, they realize the importance of the WII. In this sense, the insurance company should keep providing the WII every year.

10) Sales of WII policy bundling with agricultural inputs need to be explored and may be introduced in future. At the time of monitoring interview meetings, one of the most frequent answers of why not to buy WII was that they did not have cash at that time. To cope with this situation, one of the possible solutions is to set the sales timing right after the harvest as aforementioned, and another possible solution could be to provide the WII bundled with the sales of agricultural inputs under credit basis. This bundling of the WII with agricultural input sales is now tried under Kilimo Salama program implemented in Kenya, and succeeded in insuring a great number of farmers, already over 190,000 in 2013.

11) Using the satellite rainfall data should be continued to use for future WII promotion. Designing WII by using the satellite rainfall data has a big advantage of scaling-up the WII over Ethiopia. The satellite estimated rainfall data enables WII related projects to expand the target sites easily even to areas without any ground weather station. In fact, JICA team also could scale up its target site from 15 kebeles in Phase I (2013 season) to 45 kebeles in Phase II (2014 season). It is however noted that basis risk is a common problem associated with index based insurance, which is a gap between what has actually happened on the crops and the rainfall data estimated by the satellite.

12) Monitoring of weather data should be arranged in the future implementation. Most of the insurance companies do not have enough capacity to handle weather data in large areas. In fact, it was taking a long time to confirm satellite weather data and calculate payout amounts in the follow-up phase. The insurance company is struggling to handle weather data of even 45 kebeles. It is not practical if the insurance company monitors weather data by themselves when the WII target area is expanded. Hence, weather data should be monitored by National Meteorological Agency (NMA) or private weather data suppliers. Involvement of these institutions in WII implementation should be considered in the future.

13) In order to minimize the basis risk, measures such as providing rain gauges or establishment of automated weather stations need to be considered. Sample field visits may need to be conducted in order to know the actual field condition, based on which supplemental payouts may have to be discharge in order to respond the crop condition that the farmers had lost. Also, Enhanced Vegetation Index (EVI) may be referred in order to better reflect the crop condition, which was the only independent data source found to reflect the drought patterns reported in eastern Tigray for the 2013 season where strong basis risk was observed under HARITA/R4 WII project.

14) Mobile transaction should be explored, and introduced in WII promotion in future. It enables farmers to sign up and to receive payout easily and also insurance company can save the time and cost for the premium collection and payout process. It does not even require all farmers to have own mobile phone, but farmers can access to their own account through other’s phone such as family, friend, primary cooperative, etc. Since the mobile transaction is not available at this moment in Ethiopia, this mechanism should be tried as pilot basis and then extended not only in WII related transaction but also in others, e.g., micro finance related transaction.

15) Awareness creation meeting with famers should be conducted as a main activity for the groundwork. All interviewed farmers said that chance to attend the meetings should be given to all the farmers to learn about WII. Getting ideas on WII through Q & A session during the awareness creation meeting was found very useful for the farmers to understand. Most of the interviewed farmers suggested the meeting should be held at kebele center and even at lower levels of zone of each kebele. Though it raises logistics cost, awareness creation meeting should target as many farmers as possible to invite.

16) Mass promotion tools such as brochure, banners and radio program should be incorporated as one of supplemental tools for awareness creation. The JICA team has introduced radio program, brochure, and banners for effective promotion of WII under the Phase II pilot implementation. The main purpose of introducing these mass-promotion materials was to deliver the accurate information about the WII over wider range of farmers, e.g. the concept and mechanism of WII, how the rainfall is measured and assessed, how it pays out, range of premium and payout, terminologies of *trigger*, *exit* and *cap*, etc.

17) The brochures made the awareness creation meetings more effective. The DAs could refer to the brochures when they explained the WII to the farmers. Famers also understood deeply through reading the brochures. In addition, they could also know the specific contract dates and trigger and exit millimeters stipulated in the brochures. The brochures helped to standardize the different capacity of the DAs and reduce misunderstanding of the DAs and farmers. It is therefore necessary to introduce mass promotion tools e.g. brochures for awareness creation on the WII for farmers and also DAs.