ANNEX IV

WUA SUPPORTING PROGRAM IN MEKI (PROGRAM II)

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CHAPTER 1 BACKGROUND

1.1 Prospect of Community-based Irrigation in Meki

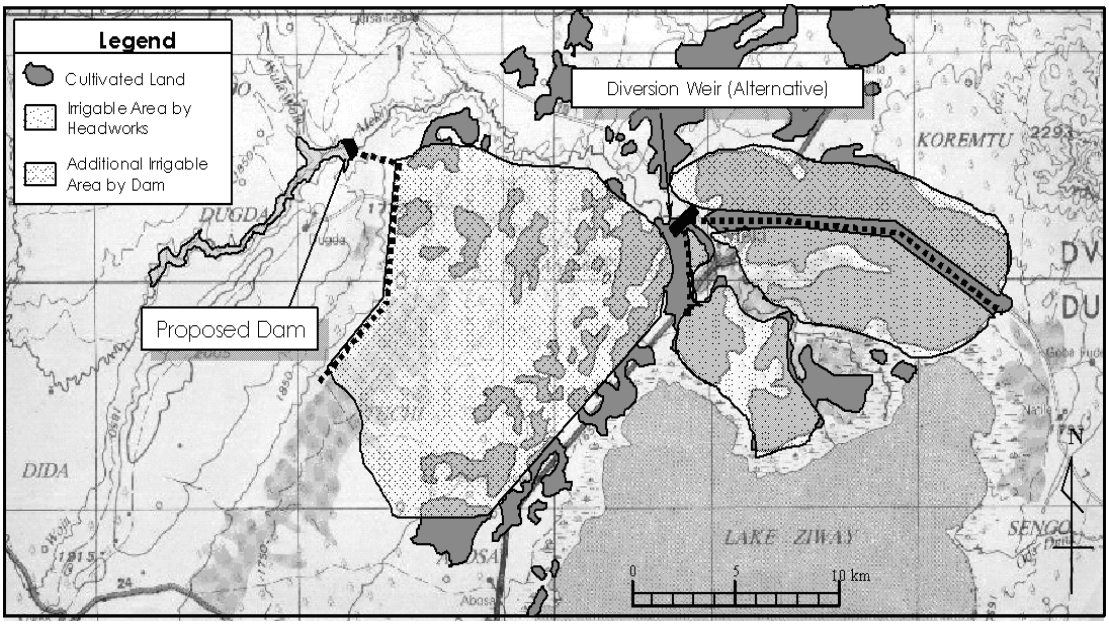
(1) Constraints against Large-scale Development

The Study for Meki Irrigation and Rural Development Project in Oromia Region Ethiopia (hereinafter "the Meki study) was preliminarily formulated by the Ethiopian government in early 1990s. The original plan envisaged to construct a dam of 40 m high on the Meki river and supply irrigation water to some 8,000 ha on the northern plain of the Ziway lake. The proposed gravity system was considered to be more economical and sustainable in comparison with the existing Meki-Ziway pump system.

The above-mentioned proposal was reviewed through the JICA development study for the Meki study. Within the framework of the Meki study, the water balance study was made under the conditions with the proposed dam of three alternative heights, i.e. 30 m, 35 m and 40 m. The analyses verified serious adverse impacts to the hydrological conditions of the lake system, i.e. reduction in lake storages of Ziway and Abjala by 25.3% and 41.9% respectively when a dam height is 40 m. The reduction of water level can cause increased alkalinity of the Abjala lake, which may affect bird sanctuary for Pelican and Flamingo. The details are presented in the final report on the Meki study.

To mitigate environmental impacts, a development alternative without a dam was also studied. The engineering study was made for a diversion weir to be constructed at about 3 km upstream above the Meki town would be able to irrigate 3,200 ha, i.e. [1-2] Meki Irrigation and Water Supply Project. The plan with a diversion weir was judged to be technically feasible. However, this alternative was less attractive because water would become available only in the rainy season and a little area would be irrigable in the dry season. The extent of potential irrigation areas with conditions of a dam and a diversion weir are indicated in the next page.

Apart from the environmental issue, the social impact was also crucial. Assumed that a diversion weir would be implemented in future, some 3,200 ha would become irrigable and 6,400 HHs at average holding size of 0.5 ha/HH would be mobilized under the project. Land consolidation including exchange for 3,200 ha will result in complex issues among the rural communities. Although the economic and financial viabilities of a diversion weir were not examined, initial investment of a diversion weir would be obviously large.



General Plan of Irrigation Project Studied under the Meki Study

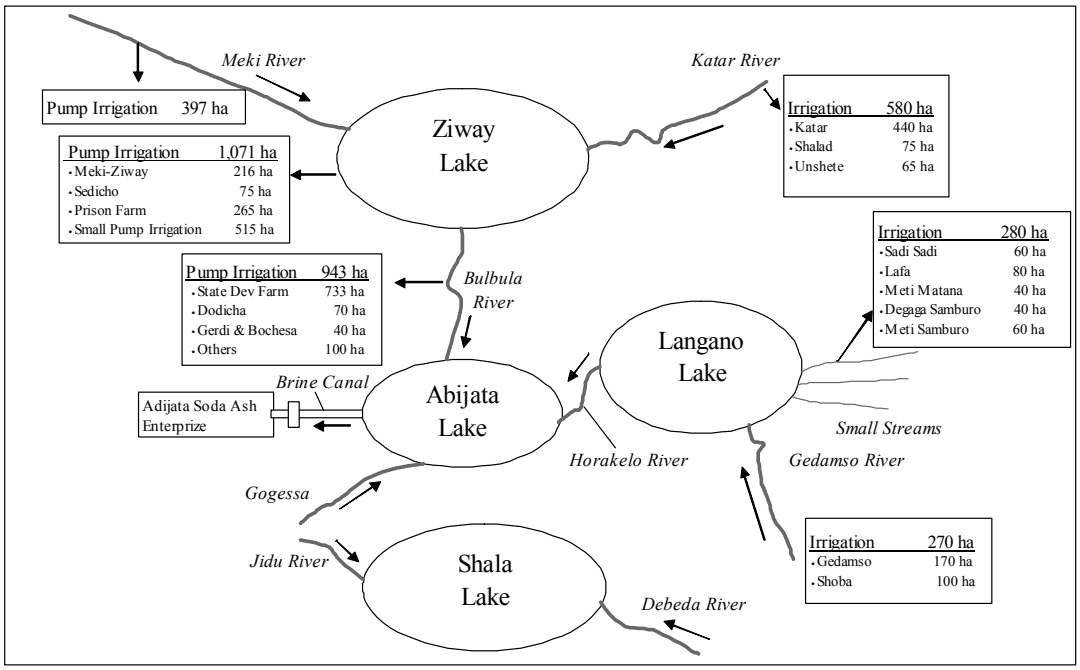
Taking several difficulties mentioned above into consideration, no immediate action was taken up for its implementation. However, the Meki study sustained future possibility of [1-2] Meki Irrigation and Water Supply Project proposed under the master plan and recommended to continue the engineering study.

(2) Necessity of environmental monitoring for water resource development

The Meki area in the Rift Valley is prone to drought because of limited and erratic nature of rainfall. The supplemental irrigation is one of the means to minimize drought risk and sustain small holders' agricultural production. The Meki-Ziway-Abijata sub-basin is important in the Rift Valley in terms of potentials for water resources exploitation. However, the lakes and rivers have interconnected system and the constraints for water resources are complex. Use of the Meki river water will directly affect water recharge of the Ziway lake, which can lead to change in outflow to the Bulbula river and will ultimately affect water level of the Abijata lake. Negative impacts to the Abijata lake can be caused by excess water use not only water use from the Meki river but also in the Ketar river, which also flows into the Ziway lake. Therefore, the water resources development of the basin requires a judicious planning for protection of the eco-system. The Meki-Ziway-Abijata system is illustrated in the next page.

Even water use by small-scale irrigation development is negligibly little in comparison with total available water resources, its environmental impact has to be frequently monitored to ensure necessary actions for its mitigation. The Meki study proposed to continue the environmental monitoring s as a part of the master plan in

parallel to irrigation development.



Meki-Ziway-Abijata System

(3) Small-Scale Irrigation Development in Meki Area

The irrigation development in Meki contributes to food security and poverty alleviation of local farmers. The irrigation development needs to be encouraged more. As mentioned above, however, excess water use will directly affect environment of the Meki-Ziway-Abijata system. In parallel to watershed management, all the efforts have to be directed to rationalization of water use within the Meki-Ziway-Abijata system. Since the irrigation sector is one of primary water users, irrigation activities in the system have to be frequently monitored and optimized under the responsibility of the regional government especially by OIDA in order to reduce a risk of environmental degradation and optimize irrigation water use in the fragile system.

Under such conditions in the Meki area, the community-based irrigation schemes have been developed since late 1990s. As of April 2003, 18 WUAs including three (3) WUAs of the Shubi-Sombo schemes were established and technically assisted by the Dugda Bora Wareda Irrigation Development Desk (hereinafter "OIDA Meki office"). The total irrigation was amounted to 405.2 ha for 733 households in Dugda Bora wareda.

The particular attention is paid to NGOs' activities in the program. With current financial constraints, it is important for OIDA and other governmental agencies in

Ethiopia to coordinate with NGOs at grass roots level. Program III will also extend the technical training to local NGOs, who are expected to be promoters for small-scale irrigation development in Oromia as well as Meki.

Existing Community-based Irrigation Schemes in Meki

No.	WUA	PA	Member			Irrigat. Area (ha)	Source of Water	Year of Establish	Donor/ NGO
			Male	Female	Total				
1.	Shubi	Shubi Gemu	15	2	17	5.8	Meki river	2001	JICA
2.	Sombo Genet	Shubi Gemu	18	5	23	6.3	Meki river	2001	JICA
3.	Sombo Aleltu	Shubi Gemu	13	7	20	5.0	Meki river	2001	JICA
4.	Tuchi Dembel	Tuchi Dembel	16	1	17	8.0	Ziway lake	1996	SHI
5.	Wayyo Gabriel	Wayyo Gabriel	17	5	22	13.8	Ziway lake	1996	SHI
6.	Wayyo Serriti	Wayyo Gabriel	42	5	47	17.0	Ziway lake	1999	ESRDF
7.	Dodoata Denbel	Dodoata Denbel	15	-	15	10.5	Ziway lake	1997	SHI
8.	Cheleleka Denbel	Dodola Denbel	26	0	26	10.9	Ziway lake	1998	SHI
9.	Teppo-140	Teppo Chareke	42	4	46	13.0	Ziway lake	1997	
10.	Meilka Korma	Welda Korma	15	6	21	16.8	Ziway lake	1998	SHI
11.	Melka Aba Godana	Welda Kelina	12	1	13	7.8	Meki river	1998	SHI
12.	Lega Meki-1	Shubi Gemu	12	-	12	32.5	Meki river	1997	
13.	Lega Meki-2	Bekere Girrisa	19	5	24	6.0	Meki river	1998	
14.	Oda Bokota	Oda Bokota	-	23	23	5.0	Meki river	1999	SHI
15.	Jara Wayu	Elen	20	5	25	8.1	Elen lake	1998	Gov.
16.	Melka Cherecha	Welda Mekdela	34	-	34	14.1	Ziway lake	1998	
17.	Kelina Denbel	Wedia Kelina	15	1	16	8.6	Ziway lake	1998	
Total			331	70	401	189.2			

Source: OIDA Meki Office

Remarks: 1) Gov. indicates government, SHI-Self Help International.
2) The farmers of Bekela Girrisa (331 farmers, 216 ha as of 2002) under the Meki-Ziway system are excluded

1.2 Objectives of Program II

In the Verification Study on WUAs Support Program in Meki (Program 4) under the Meki Study, the attempt was made to standardize the procedure for establishment of WUAs in Meki, .i.e. Shubi-Sombo WUAs, in 2001. Program II continued the efforts to elaborate the work results of the verification study and the capacity building of OIDA staff. The objectives of Program II were summarized below.

1) Rationalization of community-based irrigation development procedure in Meki by referring to the experience and performance in the verification study (Program 4) of the Meki study.
2) Actual provision of technical supports for establishment of new WUAs at five locations according to the rationalized procedure.

1.3 Capacity Building of OIDA under Program II

The concept of the program is Training-of-Trainers (TOT). Firstly, the JICA Study Team will provide intensive training program the senior experts of the OIDA headquarters and Central Branch Office through PRA at three selected locations out of five. Secondly, the experts thus trained up will train engineers and social workers at the wareda level. The program envisages training 10 to 20 staff in terms of the following aspects.

1) National and regional policies on agriculture and rural development, etc.
2) Concepts and procedures of participatory development
3) Gender issues and poverty reduction strategy
4) Environmental and watershed conservation
5) Fundamental knowledge of irrigation farming, O&M of irrigation facilities, etc.
6) Post-harvest techniques and marketing of agricultural products
7) Agricultural supports particularly for micro-credit
8) NGO's activities in Oromia Region
9) Capacity building for report preparation and statistical analysis
10) Practices on the basic technology to access international data sources through internet facilities

CHAPTER 2 SELECTION OF CANDIDATE COMMUNITIES

2.1 Applications

Given information about successful performance of the Shubi-Sombo schemes, 52 farmers groups submitted their applications to the OIDA Meki office. The main factors behind the motivation of the applicant farmers are summarized into four (4) factors, namely (i) the presence of repeated drought and erratic rainfall; (ii) the presence of water source for irrigation farming; (iii) unfair and insufficient realization of benefit-making through contracted irrigation farming with private pump owners (PPOs); and (iv) the presence of an opportunity to obtain a pump for collective irrigation farming purpose through OIDA in assistance of JICA. All the applications were prepared by groups. The lists of individual farmers are attached to the applications. All the applications are authorized with official stamps of the relevant peasant association (PA) chairmen.

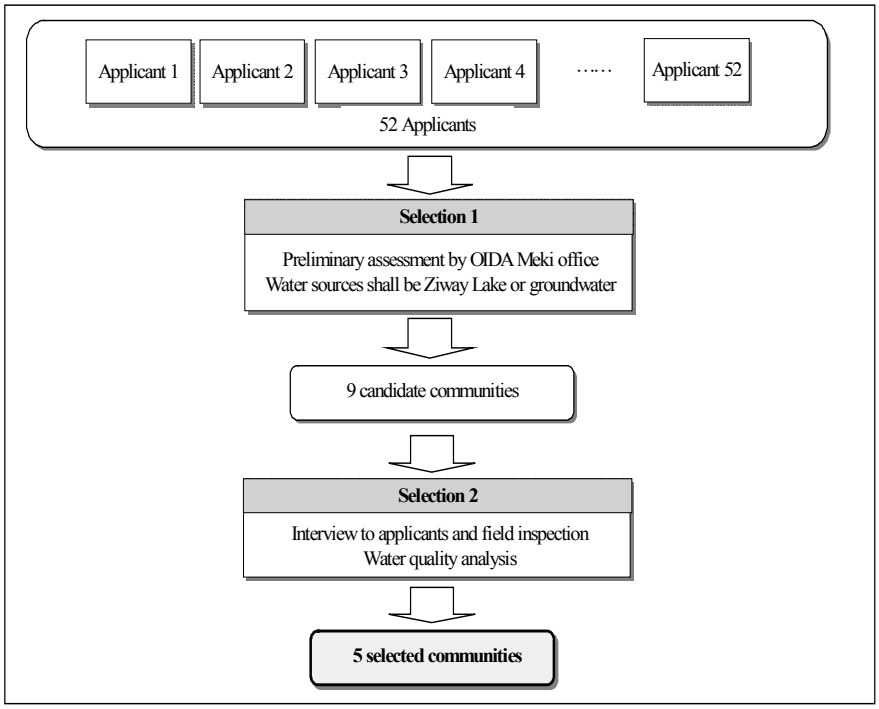
2.2 Selection Criteria

In order to select five (5) applications among 52 applications, the selection criteria are set up as follows.

1) Location: Dugda Bora wareda
2) Water sources: the Ziway lake or groundwater
3) Physical conditions:
    - Pump capacity: around 10 hp
    - Canal length: not longer than 500 m
    - Related structures: no special structures such as aqueducts, siphons, etc. are required for easy O&M suitable for local farmers.
    - Sufficient water discharge and suitable water quality
4) Sociological conditions: The farmers groups should be:
    - Strengthened in their unity,
    - Fairly formed and democratically managed,
    - With strong leadership, and

- Organized by youths, who can accept modern farming technologies, in a majority. The Study placed the emphases on management capacity of candidate groups. A priority was given to groups, which were expected to become leaders among rural communities. The irrigation schemes of selected groups should be model schemes with high performance encouraging other groups. The Study also paid a special attention to diversification of water sources. The water source of the Shubi-Sombo schemes is only the Meki river, of which discharge in the dry seasons, i.e. January to March, is significantly reduced. To examine possibilities of alternative

water sources, groups of which water sources are either the Ziway lake or groundwater were prioritized in the selection. The flow of community selection is illustrated as below.



Flow of Community Selection

2.3 Selected Communities

The JICA Study Team in collaboration with the OIDA Meki office carried out the interview and field inspection in May 2003. At the same time water quality analyses were carried out for candidate communities in corporation with Oromia Water Resources Bureau. The results are shown in Table 2.3.1. The results show that groundwater at Derere Delecha is not suitable for irrigation due to high electrical conductivity (= 2.008 mS/cm), which indicates irrigation may cause a salinity problem in farm land. Finally, the following five (5) communities were selected.

Selected Five (5) Communities for Program II

No.	PA	Water source	WUA (HH)	Area (ha)	From Meki (km)
1	Tuchi Dembel	Ziway	19	4.75	16
2	Abono Gabriel	Ziway	50	7.00	11
3	Welde Mekdele	Ziway	21	5.25	11
4	Taticha Elan	Groundwater	24	5.00	32
5	Dodo Wadaraa	Groundwater	23	5.00	20
Total			137	27.00	

Some applicant groups such as Abono Gabriel were organized by larger number of farmers, when their applications were submitted. The JICA Study Team suggested these groups to split into two or three sub-groups to adjust optimum scheme size, i.e. 20 households (HH) and 5.00 ha.

CHAPTER 3 APPROACHES TO COMMUNITIES FOR ESTABLISHMENT OF WUA

3.1 Premises

(1) Conditions Set Up under the Meki Study

During the Meki study, an optimum approach to a small pump irrigation development was studied and conceptualized into a form of standardized approach, which is constituted by the following main ingredients;

a)	Numbers of households for WUA	: 20 households;
b)	Size of command area	: not more than 5.0 ha
c)	Size of irrigation farming plot	: 0.25 ha per household;
d)	Water lifting device	: Pump
e)	Size of a pump	: 10 horse power (HP)
f)	Financial policy	: Cost recovery for replacement of pumps
g)	Financial implementation modality	: Formation of WUA's group fund
h)	Size of initial capital cost	: Birr 80,000 per scheme at maximum

The land holding size of irrigated farm plots is restricted by Oromia Regional Proclamation no. 56/1994 to be less than 0.5 ha per HH under irrigation projects implemented by public organs. Prior to this proclamation, the Meki study advised groups to share a limited land at the rate of 0.25 ha per HH as maximum size of land holding. There are the three main reasons, namely (i) maximization of the number of memberships for WUA; (ii) equitable distribution of farm plots for irrigation; and (iii) optimum performance and efficiency of irrigation farming by using a small pump with around 10 HP.

(2) Issues for Further Conceptualization in the Study

In line with the above-mentioned approach of the Meki study, four (4) issues were additionally discussed in the Study. The first issue is identification of a key resource i.e., a pump, used for the intervention. The second issue is concerned with ownership of a pump, while the third issue is related to categorization of relations between users' community as receiving side of a pump and OIDA as delivery side of a pump. The fourth issue is concerning project cost-sharing.

1) Key resource: a Pump

A small size of pump is identified with the key resource that is provided users' community with by an external supporting agency including a governmental organ like OIDA through its public intervention.

2) Ownership of a Pump

The ownership of a pump is held by OIDA with hypothetical thoughts that effective and efficient use of pump can be sustained by users' community through determent measure by holding the ownership by an external organ of OIDA. In other words, OIDA keeps the right to take over pumps when their operation performance is assessed as extremely low without realizing a goal of project intervention and re-allocate them to other beneficiary groups. Although OIDA holds the ownership of a pump, in return, users' community can fully enjoy usufruct rights of pump for a set purpose of irrigation farming.

3) Pattern of relationship between OIDA and WUA

Pattern of relations between users' community and OIDA can be compared as a contract lease agreement. The WUA utilizes a pump for a certain period of time during which the WUA is requested to cover pump replacement cost (PRC) of the pump instead of payment of lease fees to the government. At the completion of depreciation period of a pump, OIDA will purchase a new pump for the WUA by using reserve of PRC, while the pump that completed service period would be given to the WUA as disposal measure by OIDA.

4) Project cost-sharing

The concept of cost-sharing in this project implementation is closely referred to the modality of development project implementation prevailing in this country. The representative of the implementation modality to be referred to is the one of the Ethiopian Social Rehabilitation and Development Fund (ESRDF) since its modality has been widely adopted as nationwide scale by wareda administrations as well as PAs.

Before the year of 2002, user community of ESRDF should share 10 % of investment cost in both forms of cash and kind. User community should also cover expenses for pre-feasibility study cost. This conditionality with regards to cost-sharing is said to be slightly modified into the one that ESRDF will provide each WUA with minimum amount of farm inputs like seeds as grant only after the irrigation scheme is officially handed over to the community. This change of modality is understood that WUA normally faces difficulties to be sufficiently engaged in irrigation farming due to no availability of farm inputs. The provision of farm inputs is roughly estimated with a rate of around 5 % of total investment cost.

The initial investment for one scheme is estimated to be Birr 80,000. If the current ESRDF's modality on cost-sharing can apply into the case, 5 % of share

accounts for Birr 4,000. The amount of Birr 4,000 can be converted into 400 man-days (MD) of labor inputs at daily wage of Birr 10. Therefore, it is formulated as one of project implementation modality that 400 MD of labor forces are to be provided by a user community. In other words, it deems reasonable or suitable for each of beneficiaries to contribute their farm family workforce for 20 days (400 MD for 20 HH) in order to motivate their ownership to the project. In case of groundwater irrigation using a small pump, however, a total investment cost is estimated to account for around Birr 40,000, of which 5 % or Birr 2,000 are converted to 200 MD.

Through the review of project intervention in the Shubi-Sombo schemes, central among pre-requisite for the implementation of the intervention of this kind is recognized to be a clear understanding on the above four issues before any project planning activities would be carried out. In this context, it is decided to formulate a project premises that articulate the above four conceptual concerns in the framework of project implementation.

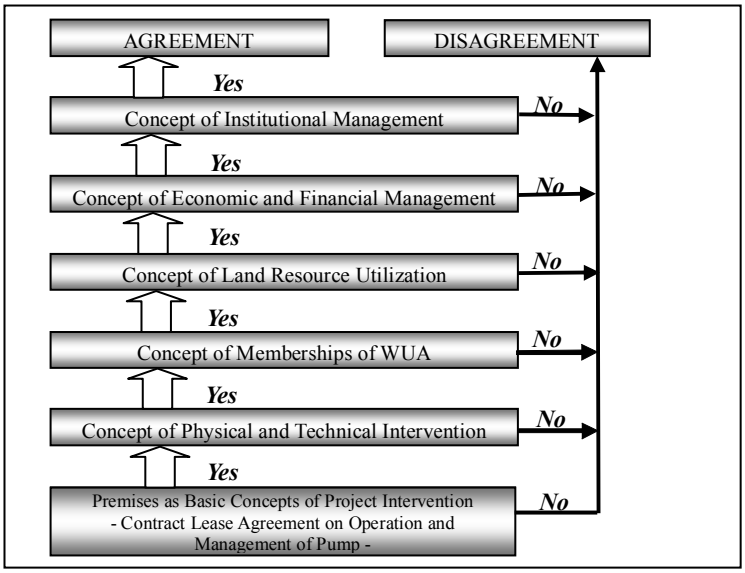
In so doing, following 11 conditions of the project are highlighted to form the project premises.

Basic Conditions of Agreement on Pump Use Management (Premises)

1)	Ultimate Goal of Agreement	:	Food Security – Stability of and Increase in Agricultural Production by user household through irrigation farming
2)	Main Stakeholders in Agreement	:	OIDA, Water Users Association and PA
3)	Specific Scope of Agreement	:	Pump Use Management in Irrigation Farming (Implying no support to farm inputs is provided)
4)	Type of Agreement	:	Contract Lease Agreement
5)	Basic Rights of Pump	:	Ownership held by OIDA Usufruct right enjoyed by Water User Association
6)	Item in Lease Agreement	:	Pump for Irrigation Use Only
7)	Cancellation of Agreement	:	Existing due to Violation or Unjustifiable Application of Agreement
8)	Basic Principles of Lease	:	One Time Investment of Pump by OIDA Cost Recovery by Water Users Association
9)	Contributions by WUA	:	Physical contributions with 400 man-days by WUA
10)	Operational Conditions of Lease	:	Effective, Efficient and Sustainable Use and Management of Pump by WUA
11)	Water Resources	:	Construction and Maintenance of Lead Canals to the Site and Wells under WUA's responsibility

3.2 Participatory Rural Appraisal (PRA)

The objectives of PRA in the Study are to perform a participatory plan formulation of community-based irrigation development with candidate WUA members under the premises. Farmers' preferences were listened to as much as possible in order to incorporate them to final plans. At each step of discussion, however, both OIDA and applicants reserve rights to terminate or cancel the discussion when one or both sides can not agree the conditions arising from the PRA.



Basic Flow of PRA

3.3 Basic Concepts for Physical Plan and Design

(1) General

As a nature of the participatory irrigation development, the physical plan and design are in principle formulated according to farmers' preference. Therefore, PRA is the utmost important step in terms of not only community mobilization but also optimum plan and design. However, it is often difficult for farmers to have realistic images of the irrigation facilities to be constructed during PRA. In order to reflect farmers' preference to the final plan as much as possible, the JICA Study Team listened to their opinions from time to time in parallel to the construction. The basic concepts for preparation of physical plan and design are summarized below.

1) Existing resources, e.g. canals and ponds, are fully utilized for new irrigation system.
2) Basic layout plan is drawn by applicants. Layout plan indicates water sources, location of pump, canals, related structures, farm plots and water delivery system.
3) Water for irrigation would be made available on site by applicants. Lead canals from the Ziway lake and dug-wells are be constructed by applicants.

4) Local materials are to be utilized for construction of irrigation facilities and pump houses as much as possible so as to ensure cost-saving and easy maintenance.
5) Models of pumps should be selected by OIDA taking easy maintenance, after-sale service by suppliers and availability of spare parts into consideration.
6) Pump and canal capacities are to be adjusted talking into account reasonable allowance for farmers' capability in irrigation water management.

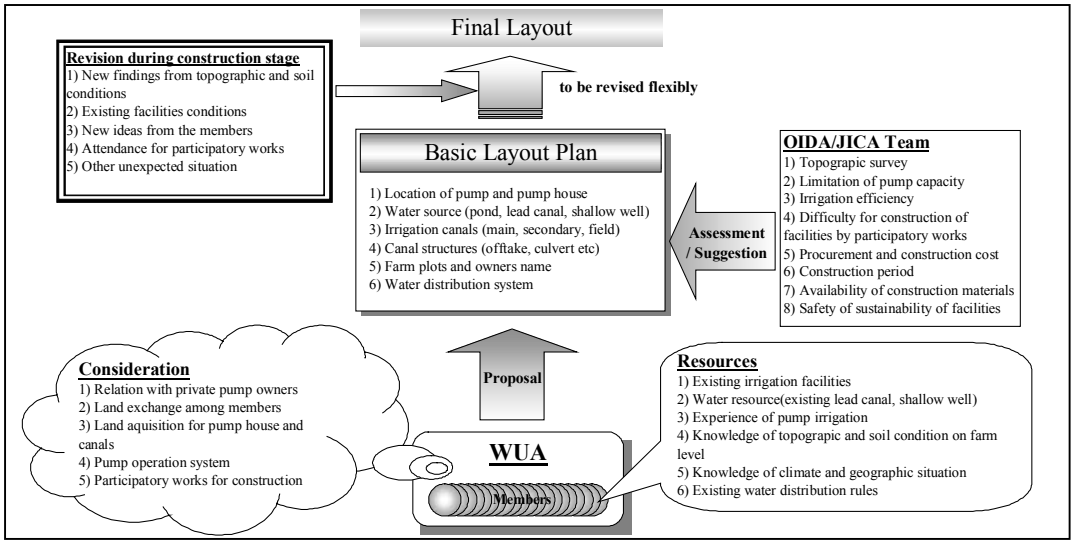
The background of each concepts and detail explanation are described below.

(2) Full Utilization of Existing Resources

Several members have experiences of irrigation under the agreement with PPOs, and they have existing irrigation facilities, e.g. canals, pond, and lead canal. Full utilization of their resources will make two advantages, one is saving construction costs, and another is enhancing the sustainability of irrigation scheme.

(3) Flexibility in Plan and Design Change

WUA applicants are asked to prepare a basic layout plan. OIDA will assess their plan and provides advices to facilitate WUA's plan formulation. It is often observed that WUA members would have gradually different ideas to the facility plan and design as construction is in progress. In principle, WUA's requests for design change would not be ignored but discussed between WUA and OIDA. Even after commencement of construction works, their plan and design can be revised flexibly. This procedure is expected to enhance a sense of ownership of the irrigation project among the WUA members. Those procedures are illustrated below.



Concept of Preparation of Basic Layout Plan

(4) Water Resources Development

In order to give the same condition to all candidate sites, taking water to pump site which means water source development is the responsibility of WUA applicant group. Some candidate groups, e.g. Tuchi Dembel, which have no water sources, have to excavate lead canals for pump irrigation by themselves. If water level of lake or shallow well goes down in a drought year, WUA is to be responsible for improvement of facilities concerning water source. OIDA will provide WUA s with necessary technical advice for excavation of lead canals and shallow wells.

(5) Construction Materials, Equipment and Labor

In order to minimize construction costs as well as maintenance costs, construction materials are ideally to be procured from sites, Meki or vicinity. Since the farmers have to repair facilities after handing over, the common construction methods in the Meki area such as wet masonry would be also selected. The required construction materials and procurement sites are summarized in the next page.

Required Construction Materials & Procurement Places

Items	Procurement place		
	Site	Meki / vicinity	Addis Ababa / Adama
1. Materials			
1) Cement	-	●	△
2) Stone	-	●	△
3) Sand	○	●	△
4) Soil	●		△
5) Materials for pump house	-	●	△
6) PVC pipe	-	-	●
7) Diesel	-	●	△
2. Equipment			
1) Diesel engine pump	-	-	●
2) Construction tools	-	●	△
3) Tractor	○	●	△
4) Truck	-	●	●
3. Labor			
1) Common labor / farmers participatory	●	△	△
2) Mason	-	●	△
3) Carpenter	-	●	△

Note) ●: Proposed procurement place, -: Not available, ○: Available in some sites
△: Available, but high transportation cost

(6) Model of Pump

In order to reduce maintenance costs and stock of spare parts, the same pump model as Shubi-Sombo schemes would be applied. If required pump power is bigger than the ones at Shubi-Sombo schemes, the feasibility of scheme would be checked and

layout plan also would be revised to minimize pump capacity. In the case of using groundwater, OIDA/JICA team would conduct preliminary pumping test to check the yield of water and decide the pump capacity.

(7) Pump and Canal Capacities

In the small scale pump irrigation schemes, farmers' pump operation and water delivery schedule can not be completely forecasted at planning stage. Therefore the capacity of irrigation facilities will be adjusted taking into account reasonable allowance for farmers' capability in water management even though the initial construction costs will be increased. It is supposed that this allowance will give the users sustainability and diversification of irrigation.

In the existing situation most of canals in the communities are unlined canals. As a result of monitoring of Shubi-Sombo area some members complained the shortage of water due to seepage, and it was also found that there are differences of pump operating hours and fuel cost between upstream and downstream farmers. Those problems might be caused by some water conveyance loss in the earth canals. In order to minimize that loss the canal length would be shortened as much as possible and OIDA/JICA team would consider adoption of canal lining in consultation with WUA members. Or as an alternative extension of delivery pipe can be also considered. In any case the type of water delivery facilities would be carefully decided with comparison of construction and maintenance cost and pumps operation cost.

3.4 Planning and Design Criteria

The following planning and design criteria were applied for the planning and design of small scale pump irrigation schemes in this program II based on the planning and design criteria, which are currently applied by OIDA taking the above concepts into consideration.

(1) Design Pump Discharge

The pump capacity is decided from the peak water discharge. It is taken as 4.32 l/s/ha based on the following calculation with the data from the study report of Abossa irrigation scheme[1].

[1] The detail feasibility study report for Abossa irrigation scheme, January 2003, OIDA central branch office
Abossa irrigation project is located around Ziway town about 30km from Meki and water source is lake Ziway.

- Peak crop water requirement (Etc) : 4.2 mm/day (Tomato)
- Irrigation efficiency : 27 % (Ea x Eb x Ec x 100)
  Conveyance efficiency（Ec） :0.7
  Field canal (Eb) :0.7
  Field application (Ea) :0.55
- Peak water requirement : 1.80 l/s/ha (4.2 mm/day / 8.64/ 0.27)
- Average pump operation time : 10 hours
- Required pump discharge : 4.32 l/s/ha (1.80 l/s/ha x 24 /10)
- Average design pump discharge (Q) : 21.6 l/s (4.32 l/s/ha x Irrigation area 5.0 ha)

In the case of 5.0ha of command area design pump discharge shall be 21.6 l/s as same as the one of Shubi Sombo schemes.

(2) Calculation of Required Pump Power

Required pump horse power is calculated by the following formula:

$$\text{A-BHP} = \frac{1000 \times Q \times H}{75 \times \eta_p \times \eta_g}(1+\alpha)$$

$$H = has + hfs + had + hfd$$

where,

A-BHP : actual break horse power (HP)
Q : design discharge (m3/s)
H : total delivery head (m)
has : actual suction lift head (m)
hfs : total head loss in suction pipe including friction loss, bend loss etc.
had : actual delivery lift head (m)
hds : total head loss in delivery pipe including friction loss, bend loss etc.
η_p : pump efficiency (0.60 ~ 0.70: for small pump)
η_g : motor efficiency (0.90)
α De-rate factor (0.28: determined by altitude, temperature and operation hours)

(3) Hydraulic Calculation for Canal

In case of small pump irrigation scheme a rotational irrigation system is adopted. Main and secondary canals shall be designed have enough capacity to flow the design pump discharge as mentioned above.

Dimension of the cross section of a canal is determined from the design discharge calculated by mean of velocity formula. The calculations of the uniform flow

velocity are to be made according to the Manning's mean velocity formula for an open channel type canal.

The discharge of the canal is calculated using the following formula:

$$Q = A \cdot V$$

where,

Q : design discharge (m3/s)

A : cross section area (m2)

V : mean velocity (m/s)

The mean velocity of an open channel type canal in the above formula is calculated according to the Manning formula as a rule.

$$V_2 = \frac{1}{n} \cdot R^{2/3} \cdot S^{1/2}$$

where,

V : mean velocity (m/s)

S : hydraulic gradient

R : hydraulic radius (m)

n : coefficient of roughness

The roughness coefficients used for design of the canals are follows:

Canal type	Roughness coefficient
Lining canal	0.015
Earth canal	0.025

3.5 Procedures of Community-based Irrigation Development

The community-based irrigation development under Program II was implemented according to the following steps.

Procedure of Community-based Irrigation Development

Step 1	Confirmation of member farmers of a applicant group and their attitude to the community-based irrigation development
Step 2	Proposal of farmers including water resource and layout plan
Step 3	Land ownership and holding size of farmers with proposals for land exchange among farmers
Step 4	Presentation of the premises by OIDA
Step 5	Basic agreement on farmers' responsibilities for operation and maintenance of pump and facilities
Step 6	Topographic survey
Step 7	Engineering study on basic irrigation plan on the basis of farmers' proposal
Step 8	Agreement on establishment of water users association (WUA)
Step 9	Procurement and installation of a pump including construction of a pump house
Step 10	Construction of irrigation canals and on-farm facilities
Step 11	Training for pump operation and maintenance
Step 12	Handing-over of irrigation facilities

3.6 Structure of PRA Field Report

The subsequent sessions deals with the PRA field reports, as immediate outcomes from a series of on-the-job trainings in PRA sessions, on each selected community. The PRA field reports contain information to highlight discussions and exchange views among stakeholders, i.e., JICA Study team, OIDA staff and WUA applicants, in a process to establish WUA.

The PRA field reports was also prepared to be used as field training materials in order accumulate as much as unified local developmental information of each community. The PRA reports of following established WUA (community) are presented as follows;

No.	Name of WUA	PA	Section on Report
1	Oda Chisa	Welde Mekdele	Section 4
2	Bade Gosa	Tuchi Dembel	Section 5
3	Oda Bilbila	Abono Gabriel	Section 6
4	Taticha Elan	Dodo Wadaraa	Section 7
5	Taticha Golba	Dodo Wadaraa	Section 7
6	Kenteri Michael	Dodo Wadaraa	Section 8

CHAPTER 4 PRA FIELD REPORT ON ODA CHISA WUA

4.1. Activities of PRA

The progress of establishment of Oda Chisa WUA and construction of their scheme facilities is summarized below.

14 May 2003	: Confirmation of WUA Applicant group intention
27 May 2003	: Site inspection
10 June 2003	: PRA1 for confirmation of WUA membership
13 June 2003	: PRA2 for preparation of layout map
14 June 2003	: Topographic survey
17 June 2003	: PRA3 for presentation of premises
24 June 2003	: PRA4 for draft agreement
1 July 2003	: PRA5 for agreement and exchanging opinions of farming plan
2 July 2003	: PRA6 for confirmation of the final plan (commencement of construction)
9 August 2003	: PRA7 for re-clarification on cost sharing
4 September 2003	: Installation of pump
8 November 2003	: Completion of construction
9 November 2003	: Trial operation
13 November 2003	: Handing-over

A series of the PRA sessions was smoothly performed. The construction was started on 2nd July 2003 and substantially completed on 8 November 2003. This means that all the development activities were completed for six (6) months. It is noted that the design of the main canal was modified from the original earth canal to the PVC pipe system. This design change provides important lesson for standardization learnt directly from the Oda Chisa case.

4.2 Background of Community

Oda Chisa WUA was organized in Welde Mekdele PAs (PA) located on the north shore of the Ziway lake at 11 km from the Meki town.

Through a series of PRA sessions, it is understood that local people in this locality known as Oda Chisa have been motivated to organize themselves into collective irrigation farming through the establishment of water users association (WUA). The main factors behind their motivation can be summarized into the following four basic

elements; (i) the presence of repeated drought or erratic rainfall; (ii) the presence of water source for irrigation farming; (iii) unfair and insufficient realization of benefit-making through contracted irrigation farming with a PPO; and, (iv) the presence of an opportunity to obtain a pump for collective irrigation farming purpose through OIDA in assistance of JICA.

(1) Drought and Chronic Human Insecurity:

Central among the four basic factors for initiation of collective irrigation farming is the presence of repeated drought or erratic rainfalls that destabilize their daily livelihood resulted in chronic food and human insecurity in the area. Like many other parts of rural communities, such chronic human insecurity have been prevailed in many forms such as high vulnerability to local famine, malnutrition, high mortality rate among infant and children under 5 year old, accelerated deforestation for immediate income through sales of firewood and the like.

(2) Presence of Water Sources Possible for Irrigation:

Contrary to the persistent problems of drought, the area is attractive for private sectors to be involved in irrigation farming in order to produce a variety of crops that have high commercial values in markets, especially market in Addis Ababa, owing to the presence of water sources for irrigation. Such water sources include the Meki river and the Ziway lake. Since the downfall of socialist regime in 1991, private sectors have been actively engaged in irrigation farming in the area by mobilizing a relatively small size pump.

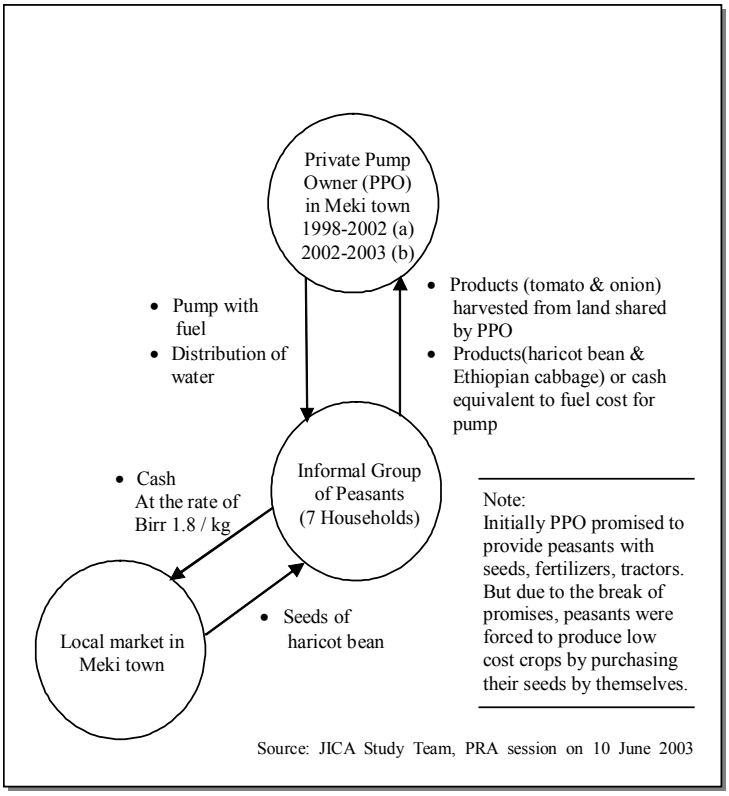
(3) Local Initiatives:

In response to the above two factors, local people in the area have been highly motivated to be involved in irrigation farming in general. In 1997, around ten household heads decided to voluntarily construct a lead canal with an approximate length of 500m in order to have water source from the Ziway lake accessible into the locality. The lead canal was thought to be a basic infrastructure attractive enough to invite private sector, especially PPO, into their locality, so that irrigation farming could be realized. As a result, a private pump owner approached to the Oda Chisa locality and succeeded in establishing irrigation farming in 1998 with seven household heads that formed an informal group with the main objective to make a contact agreement with PPO. Upon the agreement, PPO installed a pump for lifting water up from the lead canal that local people constructed.

(4) Insufficient Benefit-making:

Through PRA sessions, a basic feature of contact arrangement between the private pump owner and peasants can be illustrated in the figure shown below.

According to seven household heads, the core of contract irrigation farming is understood as land share agreement. So far two different PPOs reached contact agreement with the informal group of seven peasants. The first one started irrigation farming from 1998 and ended 2002, while the second PPO entered to contact from 2002 to be ended on November 2003. Basically, PPO provides the informal group with his own pump together with minimum operation inputs like fuel and lubricants. By using the pump, PPO lifted up waters from the lead canal to their farm plots of the informal group. Through the provision of water by PPO, the peasants of informal group were engaged in crop productions using a half area of their farm plots. In return, the PPO is given the rest half of farm plots of the informal group in which he produces high commercial value crops like tomato and onion.



Illustrated Relationships between PPO and Informal Group of Peasants

(Oda Chisa locality in Welde Mekdele PA)

It is disclosed that different types of facility for distribution of water have been used between two PPOs, mainly based on their strategic thoughts of peasants on utilization of their farm plots. The first owner used main and secondary canals that peasants of

informal group constructed, while the second owner could not use these canals but pipes to reach different allocated plots situated far from the plots that were used by the first owner. Reasons behind the change of water distribution facilities can be understood as utilization plan of farm plots located close to lead canal. It is obvious that every PPO has great interests to use these farm plots due to higher efficiency of water distribution. Cognizant of this, seven peasants of the informal group did not renew the contact agreement with the first owner. Instead, they changed the PPO into the second one. The second PPO, of course, wanted to use farm plots near to the lead canal, but the peasants of the informal group rejected to provide the owner with these plots. Peasants allocated their farm plots which are located in a bit far distance. Under such circumstances, the second PPO could not enjoy using existing main and secondary canals, but instead installed pipes to reach the plots in the distance. It is said that peasants of the informal group used farm plots near to the lead canal as a negotiation tool in order to increase in farm inputs or have more sharing from sales of products. Results from the contact agreement with the second owner became eventually contrary against their thoughts. Although the second PPO seemingly made a verbal agreement to provide peasants with farm inputs such as seeds of tomato and onion, fertilizers, and tractors for plowing, but he never kept this promises. In this condition, peasants were forced to purchase seeds of low cost crop of haricot bean and produce it in combination with other low cost crop of Ethiopian cabbage which could make far less profits than they expected. Eventually seven peasants of the informal group have lessoned two important things from this process. First, peasants recognized them in a way that they were always in weaker position with less accessibility and controlling power on management of irrigation farming than PPO. The other is related to a fact that low input crops bring low level of benefits that could not be suitable for irrigation farming as per their expectation.

(5) Necessity to Increase in the Number of Beneficiaries:

During the period when seven peasants were engaged in irrigation farming, drought attacked this area in two consecutive years of 1999 and 2000. These two locally observed drought called for at least an expansion of the informal group involving other households in the same locality, realizing two tangible results that shaped contrast each others; one was the reality that irrigation farming succeeded in agricultural productions even during the drought, while the other was found to be the other reality of total failure of rain-fed farming with no products deepening local poverty.

(6) The first application:

As consequences from the above, local people in Oda Chisa including seven household heads of the informal group made their first application dated 24 September 2001 to Wareda office for the provision of a pump for collective irrigation.

In this context, OIDA Meki office made interventions with assistance of JICA in respond to their request.

4.3 Focal points in PRA

4.3.1 Community's Self-preparation (1): Ownership of a Pump

As described earlier, a core project concept of the agreement is concerned with the ownership of a pump. Under the present arrangement reinforced by the nature of bilateral agreement, the OIDA should hold the ownership of the pump, while user community enjoys full range of usufruct right of the pump. This issue becomes the first subject to consent with user community.

The briefings and discussions during PRA session were started on two main issues;

1) Mutual understanding on an ultimate goal of project, i.e. attainment of food security; and,
2) Recognition of three basic stakeholders concerned with the common goal;
   i) OIDA on behalf of government for nation building;
   ii) PA on behalf of administrative village for rural integration; and,
   iii) WUA on behalf of individual households for their management.

Following the above discussions, an issue of effectiveness was highlighted on utilization of a pump for irrigation. Firstly, OIDA articulated that OIDA as government agent for irrigation had duties to maximize effects of pump irrigation by efficient use of pump for the attainment of ultimate goal. Secondly, an imaginary case was introduced for easier understanding. In case if a pump would be found to be idling by ineffective use of pump by water users, OIDA hold rights to take such idling pump from the WUA due to its poor performance and hand over it to the other water user association which would be anticipated to make better performance on the effective, efficient and sustained use of pump.

Through such imaginary cases, it is safely said that WUA applicants in Oda Chisa locality have been fairly aware of the issue concerned on ownership and usufruct rights, subsequently understanding that the agreement to be made between OIDA and WUA is in nature treated as contract lease arrangement. A pump, the use of which should be restricted for irrigation farming purpose, is also clearly understood as the single item subject to the contract lease agreement.

4.3.2 Community's Self-preparation (2): Farm Inputs

In relation with the issue of ownership as well as type of item for the contract lease agreement, WUA applicants should make consent with conditionality under which the provision of farm inputs should be out of the scope of agreement. It implies that individual households are responsible for securing farm inputs required.

(1) General Responses of Peasants:

All the WUA applicants expressed their strong views on this issue requesting OIDA/JICA to reconsider the conditionality in order to make the provision of farm inputs on the first crop season possible. Their views were also made in reference with the prior statement on ultimate goal of the project to attain food security. Views expressed by some of applicants were summarized as follows;

1) the provision of farm inputs for the first crop would be rational to make the first step to realize ultimate goal; and,
2) the provision of pump without farm inputs would not be understood as irrigation development.

In response to the above, however, the condition on no-provision of farm inputs was repeatedly explained. At last WUA applicants were asked to express their degree of agreement with this issue, since they were free of decision that included disagreement with the project premises that OIDA/JICA had. As a result, it was confirmed with one consent that all WUA applicants accepted the condition by which any farm inputs would never provided and supplied in the course of project implementation.

(2) Strategies of Peasants:

Within the above context, applicants were asked to present their ideas on how to make internal solutions to tackle this issue of no-provision of farm inputs. Through their internal discussions, the four main actions of solutions were presented.

Four Main Actions of Solutions

	Internal Solution	Vote	Propotion(%)
1	Low cost cropping	18	90
2	Off-farm income generation	6	30
3	Sales of livestock	4	20
4	Organization of informal credit	2	10

Source: JICA Study Team/PRA session on 17 June 2003

In relation with the first idea on low cost cropping, WUA applicants formulated this strategic idea in which crops are broadly divided into two; low cost crops and high cost but return crops like tomato and onion.

(3) Identification of Preferable Types of Crops:

In reference to their strategy to distinguish crops into the two, WUA applicants were further asked to present their preference on types of crops within the respective two categories of crops. In so doing, firstly preferable crops were presented at random basis and subsequently these crops were further classified in accordance with their ranking on their preference. Pair-wise ranking method was employed for this purpose. The results are presented as below;

1) Random preference:
   i) For low input crops: 5 types of crops
      Pepper, haricot bean, maize, western cabbage, Irish potato.
   ii) For high input crops: 4 types of crops
      Tomato, onion, papaya, Irish potato
2) Results through pair-wise ranking:
   i) For the case of low input crops

Ranking Result – Low Input Crops (Oda Chisa)

	Pepper	Halicot B.	Meize	W.Cabbage	Potato
Potato	6	3	18	3	x
W.Cabbage	17	2	19	x	16
Meize	1	0	x	0	1
Halicot B.	3	x	19	17	16
Pepper	x	16	19	2	13
Total	27	21	75	22	46

Source: JICA Study Team/PRA session on 17 June 2003

Result:

(1)Maize, (2)Irish Potato, (3)Pepper, (4)Western cabbage, (5)Haricot Bean

ii) For the case of high input crops

Ranking Result – High Input Crops (Oda Chisa)

	Tomato	Onion	Papaya	Potato
Potato	17	19	16	x
Papaya	11	15	x	2
Onion	17	x	5	0
Tomato	x	2	8	1
Total	45	36	29	3

Source: JICA Study Team/PRA session on 17 June 2003

Result: (1)Tomato, (2)Onion, (3)Papaya, (4)Potato

(4) Economic Variables as Peasants' Empirical Knowledge:

Following identification on preference on types of crops, applicants were asked to share their empirical knowledge on three types of information;

1) Average yield of the respective crops;
2) Farm gate prices (including estimation on farm inputs costs for high input crops); and,
3) State of livestock holdings per individual households and their sales prices
4) Yield and farm gate prices

i) Yield and farm gate prices for three main low input crops

Empirical knowledge on yield and farm gate price

Three main low input crops (Oda Chisa)

	Average Yield		Unit	Yeild per ha in quintal		Farm Gate Price in Birr per qts	
	Rained	Irrigated		Rained	Irrigated	Min	Max
Maize	8	12	qts/0.25ha	32	48	40	160
Irish Potato	not common	30	qts/0.25ha	n.a.	120	15	60
Chili	20-25	20	sack/0.25 ha	12-15	12	100	450

Source : JICA Study Team PRA session 17 June 2003
Note: 1 sack = 15kg

ii) Yield and farm gate price for two main high input crops

Empirical knowledge on yield and farm gate price : Two main high input crops (Oda Chisa)

	Average Yield		Unit	Yeild per ha in quintal		Farm Gate Price in Birr per qts	
	Rained	Irrigated		Rained	Irrigated	Min	Max
Tomato	no practice	80	qts/0.25ha	no practice	320	0.25	2.50
Onion	no practice	60	qts/0.25ha	no practice	240	0.30	4.00

Source : JICA Study Team PRA session 17 June 2003

With regards to costs of farm inputs for tomato and onion, they estimate them as follows;

For tomato: Birr 3,000 per 0.25 ha including cost of stick
For onion: Birr 1,500 per 0.25 ha

iii) State of livestock holdings per individual households and their sales prices

To assess feasibility to cover such farm input costs through sales of their livestock, applicant household were requested to provide with state of livestock holdings. The results are shown on Table 4.3.1.

4.3.3 Community's Self-preparation (3): Cost-Sharing

(1) Sharing Investment Cost

In case of Oda Chisa locality, this project implementation modality was well accepted by WUA applicants. In the PRA session, some of members expressed their views that they could provide a project with voluntary labor forces of more than 400

MD for 3 months as maximum. In parallel with the positive expression, there is one aged household representative who expressed his views that he became too old to provide with 20 day-work. His expression was well taken into consideration, however, keeping in mind that each one should work voluntarily for 20 days though. Types of physical works can be categorized in accordance with physical strengths of individual household members, and it was reached to the consensus that peasants among Oda Chisa WUA applicants would make suitable arrangement for such physically weak individuals.

(2) Collection of Seed-money for Operation and Maintenance of a Pump:

In relation with the formation of group fund to cover expenses of operation and management of a pump, WUA applicants suggests that they would make self-contribution to prepare necessary reserves for covering operation and maintenance cost at the rate ranging from Birr 10 to 25 that are subject to final consensus among all the household representatives. Detailed contents of discussions are described in the subsequent paragraphs 'Establishing group fund for operation and management of a pump.

(3) Preparedness to Sell their Livestock for Securing Farm Inputs:

With regards to coverage on farm inputs costs, it is recognized through the PRA session that some of WUA applicants are prepared to cover requirements of farm inputs by selling their assets of livestock. This preparedness is considered as expression basis for requiring monitoring individual household practices in irrigation farming after the completion of construction. When such sales of their assets would be put in practice, this will be considered as an integral part of cost sharing in the context of irrigation farm management.

(4) Consensus of Obligations of OIDA and WUA

Upon consensus on the condition on the provision of voluntary labor forces, obligations of OIDA and WUA were explained by OIDA and clarified in accordance with Guideline for WUA establishment (see Annex V).

No serious issue was raised by WUA applicants, except clarification on a few issues concerned with some sub-article or clause stated in the guidelines;

4-1) Obligation on construction of canal

The present guidelines may be understood in a way that both OIDA and WUA have an obligatory mandate to construct canals. In response to this, OIDA staff made it clear answering that OIDA would take a role to provide technical assistance and

advice, while WUA would be actively involved in physical construction of canals.

4-2) General clarification on sub-article 3.4 on non-transfer

OIDA staff made clarification by highlighting the use of pump in a way that pumps are not be transferred to be operated by any third parties. In addition to the pump, the use of land is also restricted not to be rented out or lease out. It reached easily fair understanding by WUA applicants.

4-3) One of conditions on withdrawal of the pump in sub-article 3.2 (2):

Applicants raised interesting questions on the sub-article statement as 'No cultivation is made during two consecutive years after installation of the pump'. They asked OIDA/JICA to clarify conditions more in this regard on how OIDA would react against the following imaginary example:

Case Used for PRA Exercise

Imaginary case:

Now WUA members consist of 20 households. Out of 20, 18 member households were strictly observing operational conditions actively engaging in crop productions, while 2 members were unfortunately unable to conduct cultivation for two consecutive years. So, how shall OIDA react to this case? Do we think that OIDA is still going to take the pump from WUA?

Answer made by OIDA:

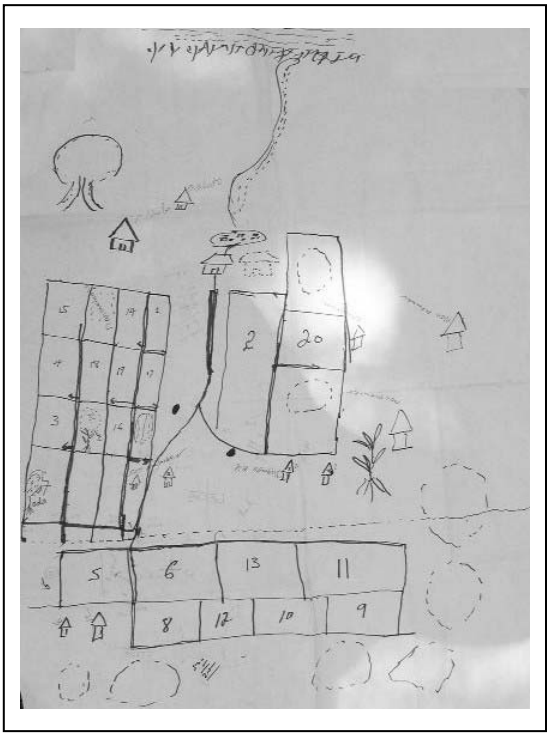
Several factors shall be considered in this case. But in any case, a degree of collectiveness and cooperation of WUA shall be firstly examined, since it is possible for WUA as community organization to take collective actions to avoid situation to be resulted in no cultivation among member household for two consecutive years. Strategies and methods can be formulated by WUA in consultation with OIDA wareda office.

4.3.4 Making Community-base Physical Layout

From the very initial stage of PRA session, Oda Chisa WUA applicants have been asked to draw their physical layout of a scheme that indicated at least the following components; namely, (i) source of water (i.e., the Ziway lake and lead canal); (2) desired location of a pump house; (3) main and secondary canals; (4) individual farm plots to be irrigated; (5) individual farm plots for rainfed farming; (6) location of houses; (7) numbering identical code of each applicant household; and (8) other landmarks.

Based on a series of practices, the physical layout was drawn by applicants as shown in the next page.

First-hand Physical Layout by Oda Chisa Applicants



4.3.5. Analyzing and Finalizing Memberships of WUA

The confirmation of WUA applicants is obviously basic for any innovative programs to implement it. In views of assessment on household's capacity of operation and maintenance of the pump for monitoring activities in the future, WUA applicants are broadly classified in terms of (i) blood-shed relationships among WUA applicants, and (ii) the presence of experiences on irrigation farming. In the case of Oda Chisa, the list of WUA applicants was finalized through a series of conformation sessions because of the occurrence of four cases of either withdrawal or new registration of membership. For easier understanding, comparative list of WUA applicants are presented as below.

Initial List of Applicants

	Applicant Household	Blood Relation	PPO	Ave.Min. Value/HH	Ave.Max. Value/HH
1	Applicant No.1		Yes		
14	Applicant No.14	Son of 1	Yes		
16	Applicant No.16	Son of 1	Yes	379.00	475.60
17	Applicant No.17	Son of 1			
19	Applicant No.19	Son of 1			
2	Applicant No.2		Yes	2,170.00	2,298.00
20	Applicant No.20	Son of 2			
3	Applicant No.3			1,015.00	1,186.00
15	Applicant No.15	Wife of 3			
4	Applicant No. 4			4,025.00	4,260.00
8	Applicant No. 8				
9	Applicant No. 9	Son of 8		456.25	465.00
10	Applicant No. 10	Son of 8			
12	Applicant No. 12	Son of 8			
11	Applicant No. 11		Yes		
5	Applicant No. 5	Son of 11	Yes	861.25	939.00
6	Applicant No. 6	Son of 11			
13	Applicant No. 13	Son of 11			
7	Applicant No. 7			0.00	0.00
18	Applicant No. 18			700.00	850.00
Average				1,200.81	1,309.20
				1,255.01	

Finalized List of Applicants

	Applicant Household	Blood Relation	PPO	Ave.Min. Value/HH	Ave.Max. Value/HH
1	Applicant No.1		Yes		
14	Applicant No.14	Son of 1			
16	Applicant No.16	Son of 1	Yes	818.33	919.00
17	Applicant No.17	Son of 1			
19	Applicant No.19	Son of 1			
15	Applicant No. 15				
2	Applicant No. 2		Yes	2,170.00	2,298.00
20	Applicant No. 20	Son of 2			
3	Applicant No.3			2,030.00	2,372.00
4	Applicant No.4			4,025.00	4,260.00
8	Applicant No. 8				
9	Applicant No. 9	Son of 8		711.00	726.40
10	Applicant No. 10	Son of 8			
12	Applicant No. 12	Son of 8			
21	Applicant No. 21	Brother 8	Yes		
11	Applicant No. 11		Yes		
5	Applicant No. 5	Son of 11	Yes	861.25	939.50
6	Applicant No. 6	Son of 11			
13	Applicant No. 13	Son of 11			
7	Applicant No. 7			0.00	0.00
18	Applicant No. 18			700.00	850.00
Average				1,414.45	1,545.61
				1,480.03	

(1) Main Findings for Confirmation of Memberships of WUA

1-1) Occurrence of changes of membership

For the case of Oda Chisa locality, it is found that WUA applicants, who were listed at the time of application to OIDA, are subject to change. It can imply that a degree of confirmation among the initial memberships for WUA may be loose for Oda Chisa case. In other words, interactions between OIDA and WUA through PRA session may motivate WUA applicants to change the composition of memberships in consideration of financial capacity of WUA management. Causes behind changes are hard to know by outsiders, since such changes are entirely internal matters among individual blood-shed group as well as WUA.

1-2) Substantial aspects of changes in memberships

1-2-a) Change of size of WUA

Out of 20 members in the initial list of applicants, it is found that two members are replaced by others, while one is added. Therefore, the size of final WUA applicants reaches 21 members.

1-2-b) New involvement of members

Both cases described as below have common feature of changes that can be interpreted as strengthening economic base of blood-shed groups through the involvement of new members.

Cases of New Memberships

Case of Applicant No. 15:
He replaces the previous applicant No.15, wife of applicant No. 3. He is found later to be a relative of Applicant No.1 whose blood-shed group has relatively insufficient size of livestock assets. However, it is also found that the involvement of a new membership somehow strengths economic base of the blood-shed group of Applicant No.1. Average values of livestock assets per household indicate a sharp increase from Birr 379 to Birr 818 for minimum values while from Birr 475 to Birr 919 for maximum values. The two values are reflected from minimum market price and maximum market price respectively.

Case of Applicant No. 21:
The case of a new applicant No.21 is found to be similar to the above case. Applicant No. 21 is a brother of Applicant No. 8). Through the WUA consensus on the acceptance of Applicant No.21 as membership, his involvement corresponds to sharp increase of average values of livestock assets per household from Birr 456 to Birr 711 for minimum values while from Birr 465 to Birr 726 for maximum values.

1-2-c) Flexibility of memberships among blood-shed group

It is also recognized that flexibility exists among family or blood-shed members for the formation of WUA or other types of interests group.

Incidents of Withdrawal from WUA

Incident of exchange among brothers:
In the PRA session held for the signing of agreement, there is an incidence of change within the same family members from younger to elder brother, both of whom are registered under the same number of No.14 in the list. The reason expressed by their mother is that elder brother could not be registered in the first application list because of absenc3 from village at the time of application. He was reported that he did not complete the process of remove from Meki town to the village where he has his.
house and land. He seems to live in Meki temporarily.

Since the change is entirely concerned with family's internal matters, it is decided that an external agency would not intervene the case because no conflicts of interests or confrontation exists within the family members.

Case of wife as an applicant household
Another incident exists regarding the case of application of both husband (applicant no. 3) and wife (applicant no. 15). Before our intervention to this issue, it was applicant husband (no.3) that made a proposal to withdraw W/o Shintae from membership of WUA. The reasons expressed by husband were two; (1) size of land that is relatively small with 0.12 ha; and (2) location of land that is situated in periphery area with low efficiency of water distribution.
The proposal was accepted during the session without any discussion

(2) Issues Concerned in the PRA Sessions

1) Operational definition of household for the case of polygamy

As described earlier, there is one case in which both husband and wife were

listed in application form that was officially acknowledged by the Executive Committee of PA. Handling the case of wife requires careful treatment in accordance with social practice of polygamy in the locality.

To deal with the case, OIDA/JICA team reaches a consensus that a household is an indivisible unit in which members live together with a singly financial account. Although defining the household in polygamous society is beyond the scope of this study, it may be safe to say that polygamous arrangement of household may have plural financial accounts by which each spouse could manage her home affairs. Within this understanding, OIDA/JICA would handle a case of application in which both husband and wife can be registered as applicant household independently. In other words, OIDA will not accept an application of both husband and wife who share a single financial account for household management.

2) Acceptance of dependant member of household

The Guideline for WUA Establishment, that is prepared by the Meki study team, clearly stated on page 12 that 'the membership of WUA is entitled for sons of the members over 18 years old as well as the head of household if the members of WUA approve that the children have membership'.

The statement becomes the subject to clarification for the case of Oda Chisa locality in which 6 WUA applicants are recognized as dependent household member without holding any lands. The statement of the guideline does not touch upon patterns of land holdings. In the rural context of Ethiopia, two types of households are normally recognized; the one is a household officially registered in the list of land tax payer by the PA that has been officially allocated farm lands. The other one is a household without official registration by PA. The latter household eventually does not hold any piece of land within geographical and administrative territory of a PA. It is a fact that landless farmers, who are over 18 years old, have been increasing in number, since rural land within a PA have been too fragmented to be re-distributed. Under such situation, Ethiopian authorities concerned occasionally issue a provisional rule and regulation to restrict re-distribution of rural land for anyone to avoid further fragmentation of land.

In reference to a monitoring and evaluation report on Shubi-Sombo WUAs (see Annex III), legal guarantee and security of land holding of individual member household of WUA are suggested for smooth realization of farming practices in the context of land exchange. An eligibility of dependent household member, who does not hold any piece of land but family title of son over 18 years old, is subject to clarification.

It is believed that clarification requires operational interpretation of various laws and official rules and regulations regarding rural land holding. To tackle this issue, a proclamation on rural land in 1975 is mobilized. The proclamation states that every men and women, who is over 18 years old, are entitled to rural land. In line with this, 6 household members are accepted as WUA applicants for the membership of WUA in official recognition of PA.

3) Optimum size of the same blood-shed group

With no reference to the study report or official guidelines, there is a serious concern by OIDA Meki office on the numbers of applicants who belong to the same blood-shed group. According to empirical knowledge, larger size of the same blood-shed group in collective land holdings through land exchange may face more financial deficiencies for procurement of farm inputs or coverage of operation and maintenance cost, to be resulted in low performance of irrigation farming.

For the Oda Chisa case, three blood-shed groups are identified at the initial stage. One group consists of 5 members headed by applicant household No.1 who share blood-relationship, while the other two groups headed by applicant

household No. 8 and 11 are comprised of 4 blood-shed members respectively. Such tendency is kept even at the finalization of membership, in which one group headed by No. 1 household consists of 6 blood-shed members, one headed by No. 8 is comprised of 5 members and one headed by No. 11 is with 4 members.

On the other hand, incompetence of irrigation farming may be related not only to size of blood-shed members but also to economic and financial capacity as well as organizational capacity.

Under this context, it is reached to a consensus that those blood-shed groups of households are accepted the initial stage but should be subject to close monitoring and evaluation in terms of performance of irrigation farming on each plot in every cropping seasons within 2 consecutive years. In other words, low performance of farming practices are be subject to reconsider membership for WUA.

4.3.6 Acknowledging Community's Internal Exchange of Land for Irrigation

As described earlier, the size of farm plot to be irrigated by each individual household is restricted by Oromia regional proclamation (no. 56/1994) with 0.5 ha per each household under a project implemented by public organs. Prior to this proclamation, it is determined in OIDA/JICA Study project that individual household is advised to hold a limited land with 0.25 ha per household as maximum size of land holding, owing to the three main reasons of (i) maximization of the number of memberships for WUA; (ii) equitable distribution of farm plots for irrigation; and, (iii) optimum performance and efficiency of irrigation farming by using a small pump with around 10 house power.

Consequently, more than 0.25 ha of lands held by a single applicant household member, which are situated along intended irrigation canals, are automatically subject to re-distribution through either exchange of land or transfer to dependant members.

(1) Practices of Land Exchange/Transfer in Oda Chisa

In the case of Oda Chisa, four WUA applicants are identified with households who hold farm lands with more than 0.25 ha along intended main and secondary canals. Those households have identically registered numbers of No. 1, No. 2, No.8 and No. 11 households respectively. Original land holdings among applicants before land exchange or transfer were shown in the figure in the next page. The size of land holdings by the four applicants was as follows;

No. 1 Applicant Household: 1.25 ha
No. 2 Applicant Household: 1.00 ha
No. 8 Applicant Household: 1.00 ha
No. 11 Applicant Household: 1.00 ha

Those four households were advised to re-distribute their lands into other households.

The results of their internal arrangements on land exchange or transfer are indicated the figure on present land holdings in the next page. Individual practices of land exchange or transfer are as follows;

1) Case of No.1:

From No.1 to No. 14: Exchange
From No.1 to No. 16: Exchange
From No.1 to No. 17: Exchange
From No.1 to No. 19: Transfer

2) Case of No.2

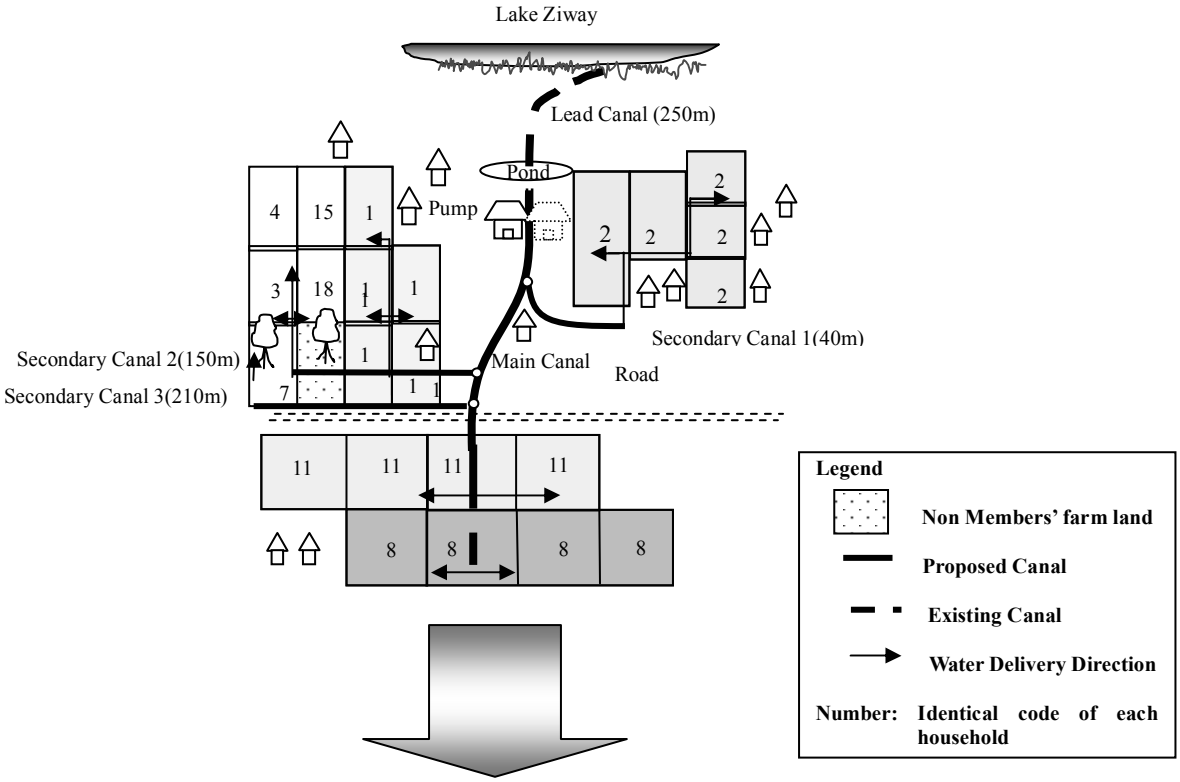
From No.2 to No.20: Transfer
From No.2 to No.21: Exchange

3) Case of No.8

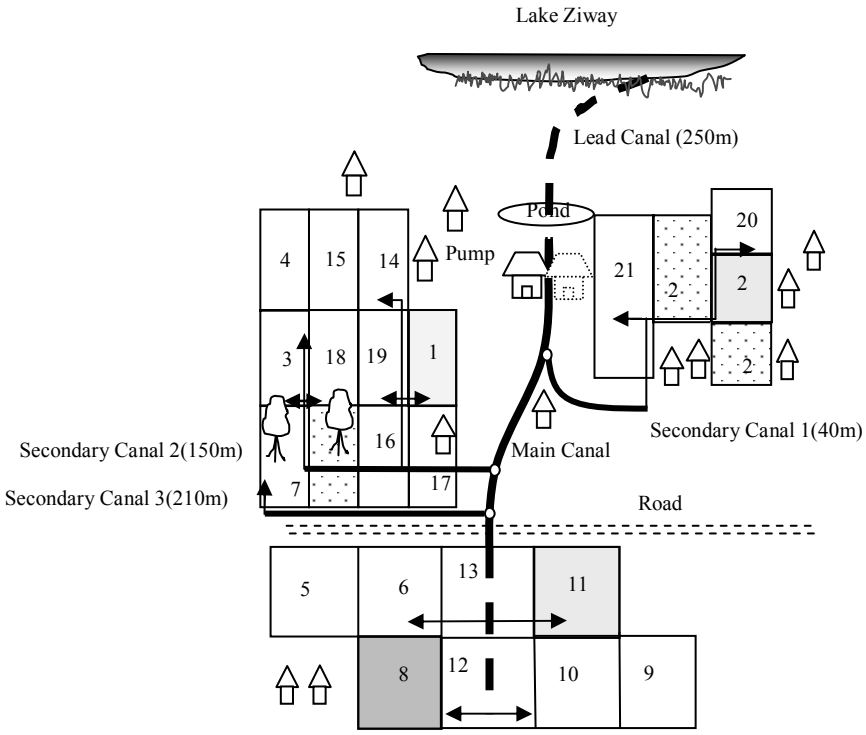
From No.8 to No.9: Exchange
From No.8 to No.10: Transfer
From No.8 to No.12: Exchange

4) Case of No.11

From No.11 to No.5: Transfer
From No.11 to No.6: Exchange
From No.11 to No.13:Transfer



Original land holdings before land exchange/transfer – Oda Chisa case



New land holdings after land exchange/transfer – Oda Chisa case

(2) Process of Official Acknowledgement of Internal Arrangement of Land Exchange/Transfer

It is recommended by the results from monitoring and evaluation on performances of Shubi-Sombo WUAs that the practices of internal arrangements of land exchange should be officially acknowledged by PA.

2-1) Attendance of PA official to PRA sessions

In reference to the above recommendation, in the case of Oda Chisa, one of the board member from PA is requested by OIDA wareda office to attend every PRA sessions, so that contents of consultation and discussions can be monitored in terms of legal aspects by PA. Actually Mr. Kassa Alficho has attended PRA sessions three times out of 5 PRA sessions, two sessions of which he was absent being engaged in officially designated activities of food distributions.

2-2) Preparation of internal agreement on land exchange/transfer in a written form

WUA applicants were requested to prepare a note for each internal agreement on land exchange/transfer. According to the instruction, a newly elected Secretary of Oda Chisa WUA prepared note memorandums for this purpose.

2-3) Sign and seal on note memorandum prepared by Oda Chisa WUA

Every note memorandums prepared by Oda Chisa WUA were signed by the Chairperson of Weldyia Mekdale PA with its official seal, after he examined each case.

2-4) Documentation and filing

Five sets of documents including original ones were prepared. Distribution for filing purpose is as follows;

1 copy : OIDA Head Office
1 original : OIDA Wareda Office
1 copy : Oda Chisa WUA
1 copy : Dugda Bora Wareda Office
1 copy : Weldyia Mekdale PA
1 copy : JICA study team

Separately from the above copies, one copy for each individual household concerned is handed over for their records.

(3) Operational Issues related to Land Exchange/Transfer of Oda Chisa Case

Internal mechanism of land exchange and transfer in Oda Chisa WUA applicant group contains relevant implications of operation and maintenance of the scheme in the future. Such implications include:

1) Optimum relations between size of one blood-shed group and economic capacity for irrigation farming
2) Roles of new members in management of irrigation farming by blood-shed group
3) Roles of dependant members in irrigation farming
4) Validation of the term of two years for review and reassessment of land exchange and transfer

4.3.7 Establishing Group Fund for Operation and Maintenance of a Pump

(1) Understanding Type of Costs Required for Operation and Maintenance of Pump

It is of vital importance for WUA to equip themselves with basic concepts of cost required for operation and maintenance of a pump, before the project agreement is made. In case if user community would be identified with the one that can not afford to cover operation and maintenance cost, they can seek other opportunity apart from the present form of OIDA/JICA project.

An exercise to think about types of costs for operation and maintenance of pump was undertaken for WUA applicants. Through the PRA session, it is found that WUA applicants are well familiar with operation cost including fuel and lubricant cost and salary for pump operator. However, none of WUA applicants succeeded in listing up cost for maintenance. Surprisingly, there is an only applicant who identified PRC as presenting that the pump should be replaced in some time when the pump cease function. He commented that users should cover cost to buy a new pump for replacement.

In the exercise, three types of cost, i.e., operation cost, maintenance cost and PRC, were introduced and well understood.

(2) Breakdown of each Operation, Maintenance and PRC

Through the exercise, it is understood that the following cost are required.

Operation cost(fuel, lubricant)	:	Birr 160.92 per HH per season
Maintenance cost	:	Birr 40.00 per HH per season
PRC	:	Birr 119.05 per HH per season
Total	:	Birr 319.97 per HH per season

(3) Formation of a Group Fund of WUA

Understanding and keeping the above figures of financial requirements per household in their mind, the third exercise was undertaken on how to meet this requirement by WUA applicants.

First of all, it was presented that around Birr 3,360 would be required to meet operation cost for the first crop season. It was also emphasized that this amount of money in cash should be prepared at hand at the time of operation without any delay. Otherwise, it was announced that OIDA would not be in a position to provide a group with the pump.

In response to this, WUA applicants were asked to present their idea.

3-1) WUA response: Self-contributions

It was presented that WUA applicants were ready to make contributions from each member household towards the formation of their collective fund. Some of applicant said that they could contribute Birr 10.00 per household, while the other said Birr 25.00. The amount of contribution per household is subject to internal decision among WUA applicants.

At the same time it was explained by JICA study team that a total amount of their self-contributions might not meet the requirement. As per the views by some of applicants saying that each household would contribute at the rate of Birr 10 for 5 months, a total amount of their contributions would account for only Birr 1,050 against the minimum requirements of Birr3,360. It was shown during the session that deficiency certainly would exist with an amount of Birr 2,310.

WUA applicants were asked to prepare their plans to tackle this issue of deficiency, but no concrete idea was presented, seemingly beyond their financial and organizational capacity.

However, it was reached to consent among WUA applicants on the necessity to form a group fund understanding that the presence of group fund would provide more possibility and opportunity to realize irrigation farming. Comparative views were shown in this exercise.

Comparative views for exercise on group-fund

Case	Result from the case	Implication
Case of no group fund	Birr 50 (Birr 10 x 5) shall be prepared at each household level	Non of household member can be fully engaged in irrigation farming
Case of group fund	Birr 1,050 (Birr 10 x 5 x 21) shall be collected	At least 6 households can be fully engaged in irrigation farming

Note : Through the above exercise, all the WUA applicants have shared a view on the necessity to create a group fund for the WUA operation.

3-2) JICA response: Assistance towards WUA's group fund

Having considered a positive intention of WUA applicants as well as insufficient capacity of WUA household members, JICA study team made a proposal by which the WUA's group fund would be assisted by JICA through the provision of financial support that would account for the equivalent of physical work volume by WUA applicants exceeding more than 400 MD of their contributions. It is presented that one (1) exceeded MD will account for Birr 10. This financial support is, however, never provided to individual household. Needless to say, the proposed idea encouraged WUA applicants into further self-organization to form the WUA's group fund by themselves.

4.3.8 Preparing Crop Production Plan for Individual Household Members of WUA

One of the main purposes of irrigation farming can be said to stabilize and increase in agricultural production by selecting type of crops for the attainment of ultimate goal of food security. Such agricultural production should be economically feasible for individual households to maximize the profits that provide also a basis for covering operation, maintenance and PRC used for irrigation, so that sustained use of pump can be realized. To attain the goal, the preparation of crop production plan by each household is of vital importance. In this context a group exercise on crop budget analyzed were conducted immediately after the signing of the project agreement.

A short exercise was conducted to identify main production costs for an intended type of crops. For the exercise purpose, tomato and maize were selected since these two crops were presented by WUA applicants as the first preferable crops for high cost crop and low cost crop respectively.

The following production costs for tomato in 0.25 ha of land were presented to indicate a degree of understanding of WUA members during the exercise.

Type of Crop: Tomato			
Size of Farm Land: 0.25ha			
	Item	Unit	Amont
(A) Basic Requirement			
A-1	Seed	0.25kg	50.00
A-2	Fertilizer		
	DAP	25 kg	69.00
	Urea	25 kg	59.50
A-3	Chemical		
	Malathion	2 litre	120.00
	Mancozeb	2 kg	140.00
	Redomine	0.5 kg	160.00
	Sprayer Rental Fee	8 times	16.00
A-4	Cost of Pumop	1 season	320.00
		Sub-total (A)	934.50
(B) Optional Cost			
	Stick for pole	Ballet	1,000.00
	Rope for pole		40.00
	Car Rental Fee		30.00
	Hired Labour	70 mandays	700.00
		Sub-total (B)	1,770.00
	Grand total		2,704.50

Exercise Result from a Crop Budget Analysis - Oda Chisa -

It should be noted herewith, however, that expense items should be carefully examined for the realization of actual production. For instance, WUA members of Oda Chisa stressed on the necessity of stick for pole making for tomato, although tomato product without stick and poles are practiced in the surrounding area of Meki.

At the end of exercise, each WUA member is requested to prepare and submit crop production plan on each plot to OIDA Wareda office for monitoring purpose.

In addition to the exercise on breakdown of production costs, WUA members were encouraged to conduct other exercises on the preparation of pricing curve as well as estimation of net-income of tomato.

However, it is found that discrepancy between actual market price and their estimation exists. For instance, WUA members estimated the lowest price of tomato at Birr 0.1/kg during months of August and September, while market price in commercial zone in Addis Ababa for these months would normally show the highest record. At the same time, WUA members estimated yield per ha presenting a range from 24 tons to 40 tons per ha, which indicates much higher than the yields in this area.

As a result, it is found that an amount of net income for tomato become much higher than the normal one.

4.3.9 Electing Board Members of Oda Chisa WUA

For the final preparation towards singing the project agreement between OIDA and WUA, WUA held a general assembly to elect by voting five Board Members consisting of (i) chairperson, (ii) secretary, (iii) treasure, (iv) cashier and (v) auditor/inspector. The minutes of meeting was prepared by the newly elected secretary.

4.3.10 Documentation of Project Agreement

The following sets of documents were prepared for the signing of the project agreement between OIDA and Oda Chisa WUA.

1) Project Agreement in Oromia language;
2) Finalized list of WUA members;
3) Measurement-result on individual farm plots to be irrigated;
4) WUA Minutes of Meetings on the selection of Board Members
5) WUA Minutes of Meetings on signatory member to operate a bank account

PRA sessions made the above progressive so far until the date of 1 July 2003

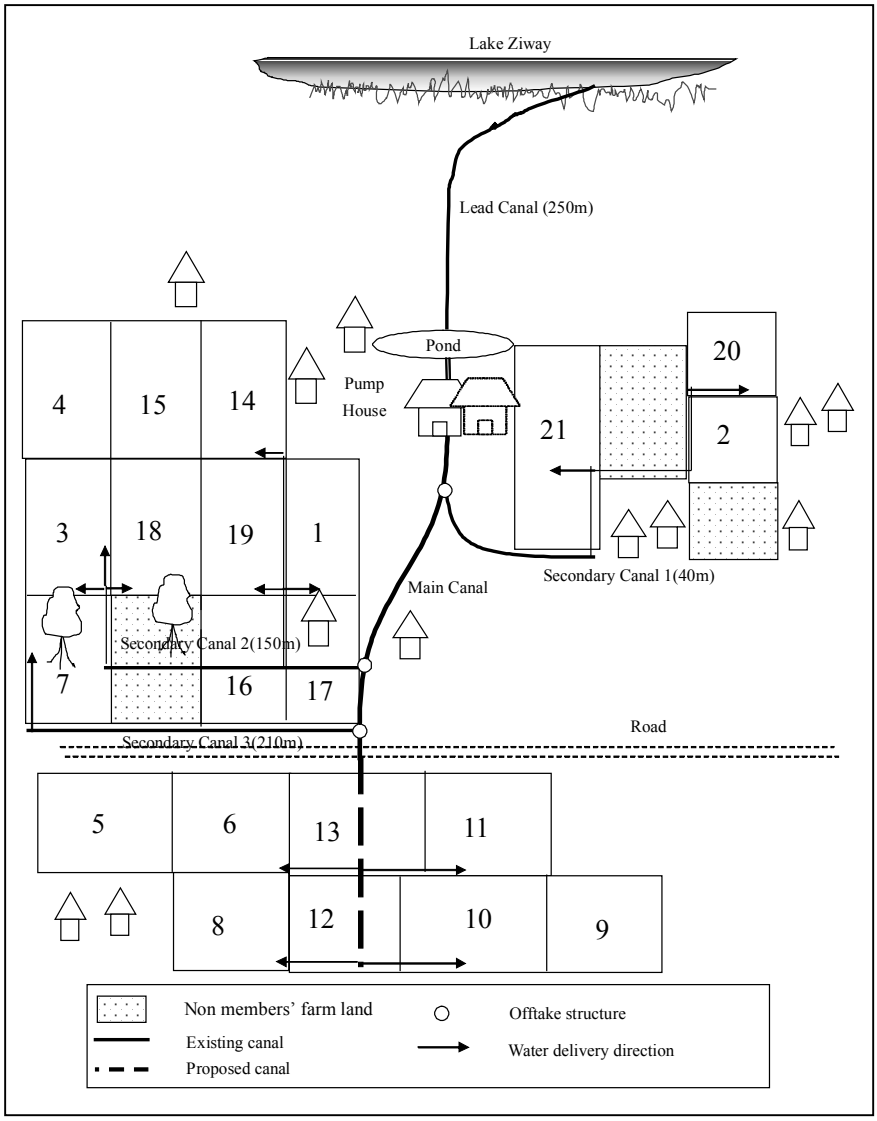
4.3.11 Physical Plan and Design

(1) The Basic Layout Plan Proposed by the WUA

The PRA approach facilitated a process of physical planning and designing through constant consultations between JICA/OIDA and WUA in construction. As a result, original irrigation engineering design had been subject to modification justified by engineering points of views. In the subsequent session, such process is presented.

The WUA members prepared their basic layout plan through discussion with the OIDA/JICA PRA Team. The basic layout plan is illustrated below:

Oda Chisa WUA Basic Layout Map



In this basic layout map the WUA utilize their own resources (i.e. existing canals, pond and knowledge of water distribution course to their farm plots). The facilities existing in this area and proposed by the WUA are listed below.

1) Proposed command area : 5.25ha (21 members x 0.25ha)
2) Existing facilities
   i) Lead canal : 250m
   ii) Pond : 1 unit
   iii) Main canal : 110m, earth canal
   iv) Secondary canals : 3 units, 400m in total, earth canal
3) Proposed facilities
   i) Pump : 1 unit, with suction and delivery pipes
   ii) Pump house : 1 unit.
   iii) Main canal : 130 m, extension from end of existing main canal
   iv) Related canal structures
   - Culvert : 1 place, the place crossing the road
   - Off-take structures : 3 no., the places diverting to secondary canals

- Outlet : 1 no, outlet of delivery pipe

(2) Engineering Aspects

2-1) Field survey

Base on the basic layout OIDA/JICA team conducted a field survey. The check items in the survey are listed below.

- Conditions of existing facilities
- Water level
- Ground elevation of proposed location of pump installation
- Elevation and length of existing canals, proposed canal
- Dimension of existing canals
- Farm land elevation

2-2) Conditions of existing facilities

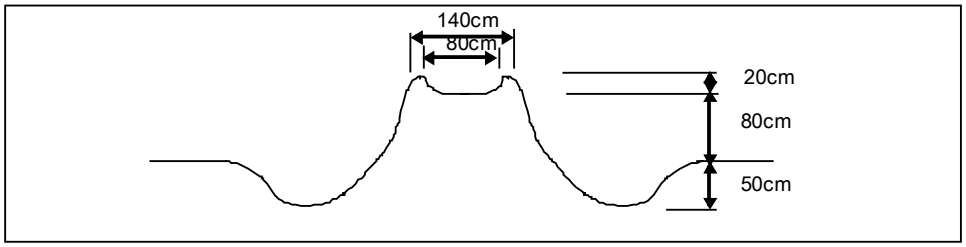
2-2-a) Lead canal and pond

At present lead canal and pond are in use of a PPO who have a contract agreement with other community members. He has been maintained the lead canal and pond every week employing ten (10) hired labors paid Birr 10 for labor charge per week by the owner. Lead canal and pond, therefore, are kept in good conditions at full function. With regards to rights of those facilities, these belong to the community not to PPO. In this context, it is confirmed that the community can use them at their own accord, but they should be prepared to maintain lead canal and pond by the community after implementation of construction work.

2-2-b) Main canal

The existing main canal is stretching from the pond to road in length of 110 m and was built in fill by the community members. The cross section of the canal at beginning point is shown in the following figures.

Cross section of the canal at beginning point



The scheme is located on the lakeshore of Ziway. The existing farm lands within the proposed scheme area are nearly flat to slightly undulating and decline with slope gradient of 1/300 to 1/500. A pump will be installed at about 200 m from the fringe of the lake, where the existing private pump is located, and deliver irrigation water onshore through the main canal of 240 m long traversing against the slope. Under this topographic condition, the canal bed is raised as high as 80 cm from the surrounding farm land at its beginning point, while 10 cm at the end of the canal.

This canal has not been used for past two years. The outer slope of canal embankment is steep but seems stable because it is fully covered by grasses. On the other hand, so many cracks are observed on canal bed and inner slopes of the embankment. This canal, especially of the first reaches, will suffer from serious leakage and piping when irrigation water flows. Therefore, either canal lining or use of delivery pipes will be required for the first 50 m from a pump as countermeasures to prevent from leakage and corruption of the main canal.

2-2-c) Secondary canals

There are three secondary canals. Farmers propose to use the existing secondary canals, too. The canal bed height from farm land is 10 cm. However, the embankment is deteriorated and partly demolished. Reinforcement or replacement of canals will be considered under the project.

2-2-d) Road

There are some routes from Meki to Welde Mekdele. Apart from footpaths, the most accessible road is the previous project road along the main canal of the Meki-Ziway scheme. The distance from Meki to the site is 10.7 km. Although no pavement is treated and maintenance work is not frequently done, the road is passable by 4WD vehicles. Lorries of 10 ton capacity can also be driven. A few kilometers before Welde Mekdele after branching off from the above-mentioned road, however, the roads are muddy after heavy rains. Leakage water from the existing canals running along the roads is another cause of poor accessibility.

It is recommended to include minimum road maintenance work for the last section of 1 to 2 km long before the site. Motor grading, gravel pavement and ditch construction are required especially muddy sections. It is also noted that the said road section is under the responsibility of PA. Therefore, further discussion will be required with farmers as well as the PA chairman. Since the main canal crosses this road, the project will include construction of a new culvert with reinforced concrete pipe.

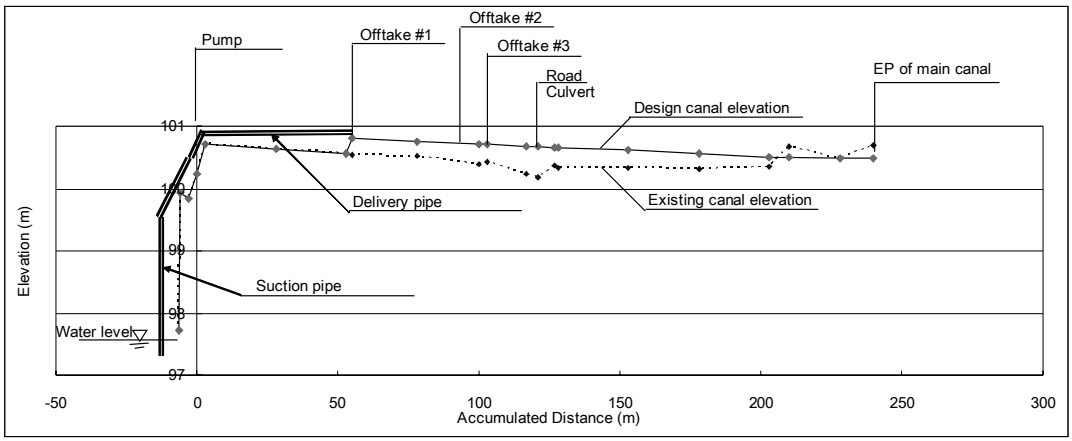
(3) Plan and Design

Based on the survey result and basic layout proposed by WUA, the OIDA design engineer started design works and to prepare the design drawings in consultation with the JICA engineer staff. The design considerations are mentioned below.

3-1) Main canal

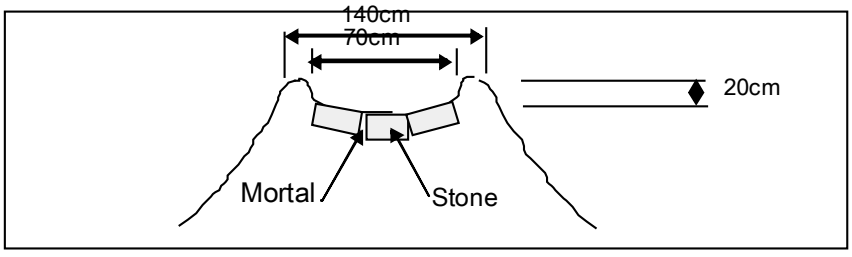
The profile of main canal is illustrated as below.

Profile of Main Canal



Existing as well as proposed canal should be additionally filled more 20 to 40 cm in order to deliver water efficiently to downstream, with the design canal gradient of 1/500. In order to reduce canal seepage and avoid high embankment structure, the delivery pipe would be extended from the pump to first off-take in total pipe length of 54 m and the canal portion between off-take No.1 and culvert in total length of 60 m will be lined by wet masonry. The method of lining canal and dimension of canal is considered as following figure.

Typical Cross Section of Lining Canal



3-2) Pump

The suitable pump capacity was estimated to be 14 HP, which is as same as one in Shubi-Sombo Schemes.

3-3) Pump house

The same design as one in Shubi-Sombo schemes is adopted. Floor area is 9 m2(3m x 3m).

3-4) Secondary canals

The existing secondary canals are used as there are with small rehabilitation where necessary.

3-5) Canal related structures

The WUA proposes the following structures.

- Off-takes : 3nos, wet masonry
- Culvert : 1no, steel pipe

3-6) Salient feature of scheme in PRA session

The salient feature of this scheme during PRA session was summarized as below:

Item	Description	
1. General Information		
1. Proposed command area	5.25ha	
2. No. of house hold	21 HH	
3. Required water discharge	22.0 lit/s	
2. Pump		
1.Actual water head	3.5m (Designed Canal Base E.L - W.L)	
2.Total water head	10.0m	
3. Required pump horse power	7 HP (e.g. Lombardini 4LD640, Rovatti FL816)	
4. Pipe	1) Suction pipe (PVC suction hose) Diameter: 100mm, Length : 6.0m 2) Delivery pipe (PVC) Diameter: 100mm, Length : 54.0m	
3. Canals and related facilities		
1. Main canal	Existing canal	110m
	Proposed canal	130m (Filling)
	Total	240m(Lining canal 60m)
2. Secondary canal	SC1(existing)	40m
	SC2(existing)	150m
	SC3(existing)	210m
	Total	400m
3. Field canal	Constructed by farmers	
4. Canal structure	1) Off-take	3nos.
	2) Culvert 1no.(6m)	
5. Lead canal	Existing canal	250m

Remark is made here as that the above salient feature was modified during construction and presented in Overview of this session.

(4) Preliminary Cost Estimate during PRA Session

The preliminary cost estimate is as summarized below.

Summary of Total Construction Cost

Item	Cost (Birr)
Pump (including pipe)	45,000
Pump house	5,000
Machinery work	10,000
Canal lining and structure	12,000
Earth work	4,000
Other work	4,000
Total	**80,000**

In accordance with the premises mentioned above WUA applicants has to share 5% of total cost which is 4,000 birr as labor. In this case the WUA has to supply 400 MD works during the construction period.

4.3.12 Procurement and Construction

After conclusion of agreement between OIDA and WUA on 1 July 2003, both parties held the meeting about the construction plan. At the meeting WUA promised to try to shift the existing pump which belongs to PPO to prepare the place for construction of pump house. OIDA agreed to procure materials for pump house, while WUA agreed to start construction of main canal under technical guidance by OIDA.

During a period of two months from July to September, the following construction and procurement works were carried out by demarcating roles and responsibilities between OIDA and WUA.

Main Demarcation of Construction works (as of 6 September 2003)

Work Item	Responsibility	
	OIDA	WUA
1. Construction work		
- Construction of pump house	○	○
- Survey for canal construction	●	
- Embankment of main canal (0+054-0+240)		●
- Excavation of main canal (0+054-0+240)		●
2. Procurement work		
- Procurement of construction material	●	
- Procurement of soil for embankment	○	○
- Procurement of pump and pipes	●	
- Procurement of pipe culvert	●	

Note: ● main responsibility, ○ shared responsibility

Under the above demarcation, procurements and construction were made as follows.

(1) Construction of Pump House

The engineer in OIDA Meki office procured materials for pump house on 5, 6 July and has started foundation works with WUA members. The WUA members discussed with PPO concerning shifting of the existing pump, and he shifted it.

The construction work for the pump house was completed on 20 July 2003.

(2) Main Canal

Firstly the WUA members started to fill main canal under the technical assistance of OIDA. After completion of pump house they concentrated on filling work of main canal. But due to difficulty to procure filling material the progress of construction works was behind the schedule. In September excavation work of main canal was carried out.

(3) Procurement of Pump

On 4 September a pump with suction pipes and delivery pipes was procured to Meki under supervision of OIDA Meki staff and two (2) WUA members (chairman and pump operator). The pump will be installed after completion of earth work of main canal.

(4) Canal Construction (1): Re-clarification of Cost Sharing

Despite consensus made during PRA sessions on a volume of voluntary physical contributions with 20 day-work per household, Oda Chisa WUA members approached to OIDA Meki office in order to clarify the issue on 5 August during a peak work on canal construction. The canal construction has been negatively affected by heavy rainfalls, resulted in difficulties to carry filling materials due to hard accessibility. Under such conditions, Oda Chisa WUA members began to express their views in which any piece of works within 400 MD might be equivalent to financial support to be provided by the Study team for formation of WUA's group fund. Such views are clearly understood as misunderstanding on the issue during PRA session. Responding to their expressed views, the Study team was requested to conduct a PRA session to re-clarify the issue. The session began to ask WUA members to list up any problems and issues that they faced. Those issues included (i) hard accessibility of any means of transportations to carry filling materials for canal construction; (ii) delay in construction of canal as per scheduled; and (iii) differences in understanding on a modality of 400 MD labor contributions. The third issue was firstly discussed by using written notes used during previous PRA session, and as result all the WUA members easily accepted their misunderstanding on the issue.

400 MD work was articulated to be voluntary physical labors to be considered as project cost sharing at 5 % of total investment cost. Assuming that WUA members raised this issue to combat against unfavorable conditions of construction works due to rainfall, OIDA and the Study team responded to the issue of hard-accessibility by facilitating a process of hiring a heavy vehicle to carry filling materials.

(5) Canal Construction (2): Change from Earth Canal to Pipeline System

5-1) Comparison between Earth Canal and Pipeline

In Oda Chisa WUA, a series of discussion with the farmers concluded to adopt a pipeline distribution system in the main canal. The distribution pipeline is made of P.V.C. pipe. The pipes are easy to join and split so as to make sure flexible water application to the farm plots. Further, in ground water irrigation schemes, a set of pump and pipes are also adopted.

Comparison between Earth Canal and Pipeline

Description	Earth Canal	Pipeline
Technical Aspects	1) Existing irrigation canals system can be re-used to the new system. 2) Construction materials are available *on situ* 3) Large extent of area should be reserved for irrigation canals. 4) There are considerable gaps between upstream and downstream farm plots in terms of fuel consumption and time for irrigation. 5) Canal route and commanding area could be restricted by topography. 6) Special attention shall be made for quality control for filling materials. 7) Current knowledge for open channel hydraulics can be applied to planning and design of schemes.	1) Less conveyance loss to save fuel cost for operation. 2) Procurement of pipe needs support by OIDA because it is available only in Addis Ababa. 3) Intensive land use plan can be realized by embedded pipeline system. 4) There is little gap between upstream and downstream farm plots in terms of fuel consumption and time for irrigation 5) Flexible canal alignment can be realized regardless of topographic condition of command areas. 6) It is possible to mitigate farmers' labor inputs during construction period. 7) It is necessary for the engineers to acquire knowledge of hydraulic calculation for pipeline.
Economic Aspects	1) Construction cost is lower than pipeline unless the much volume of hauling earth materials are required 2) High water seepage from canals may increase fuel cost for pump operation. 3) Maintenance cost is cheaper than pipeline system because most of the works will be carried out by manpower of WUA members. 4) In terms of total cost, consisting of construction and operation and maintenance, an earth canal has an advantage if total length of the canal is short and little soil transportation is required for filling materials.	1) Construction cost is rather higher than open channel system except that total length of canal is long. 2) Conveyance loss is less than open channels, resulting in less fuel costs. 3) Operation and maintenance cost is higher than open channels due to saving for pipe replacement. 4) In terms of total cost, consisting of construction and operation & maintenance, pipeline system has an advantage except that total length of the canal is short and little soil transportation is required for filling materials.
Operation and Maintenance	1) The farmers have an experience for construction and operation & maintenance of the canals.	1) Guidance to WUA members is necessary for operation and maintenance of pipes.
Social Aspects	1) Execution of land exchange and consolidation is prerequisite for efficient water management by WUA.	1) Execution of land exchange and consolidation is not needed strictly. 2) Less attention is necessary for selecting

Description	Earth Canal	Pipeline
	2) Between OIDA and farmers, discussion and consensus is necessary for selection of borrow area 3) The gap between upstream and downstream will be unavoidable in terms of water discharge and time for irrigation.	borrow area 3) The gap between upstream and downstream can be mitigated in terms of water discharge and time for irrigation.

5-2) Comparison of Distribution System from Economical Viewpoint

On the basis of the Oda Chisa WUA, a cost comparison study was attempted to optimize the scheme from economical viewpoint, taking into consideration the following cases:

Case - 1: P.V.C. pipeline

Case - 2: Earth canals without transportation of filling materials, and

Case - 3: Earth canals with transportation of filling materials.

The estimate cost summarized in the following table includes earth works, procurement and installation of pipes, and operation and maintenance of the scheme, including fuel cost, labor cost for maintenance, and replacement cost of pipe.

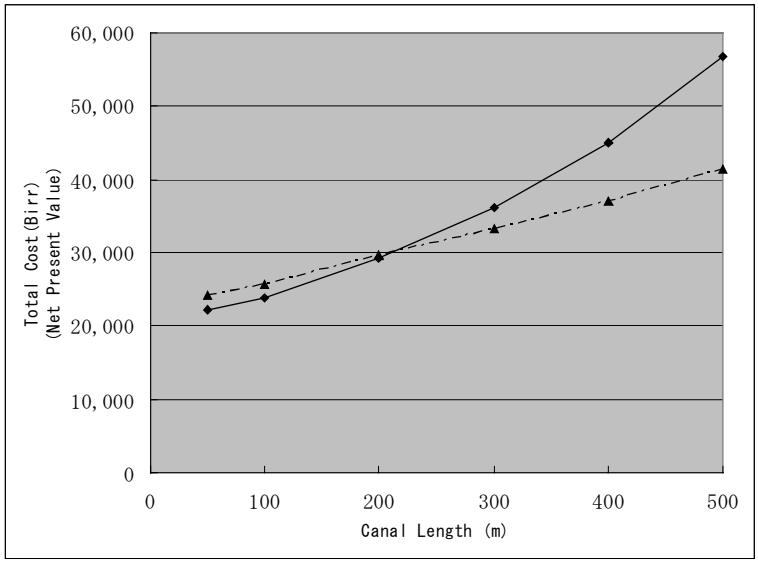
Cost Comparison of Water Distribution Systems

Case	Case - 1 P.V.C Pipeline	Case - 2 Earth Canal (without transportation of filling materials)	Case - 3 Earth Canal (with transportation of filling materials)
Total Cost (Net Present Value)	Birr 31,300	Birr 31,400	Birr 39,200

Remarks: Life of the project : 10 years.
Discount rate : 10 %
Life of P.V.C. pipe: 5 years (as per farmers' interview)

The results indicate that the cost of Case-1 is nearly equal to that of Case-2 although the cost of Case-3 is relatively higher than the others. It is advantageous, therefore, to adopt a pipeline distribution system in the case that filling materials for the canals shall be brought out of the project area.

Next, the relation between the costs and length of the canals are studies in both the Case-1 and Case-2.

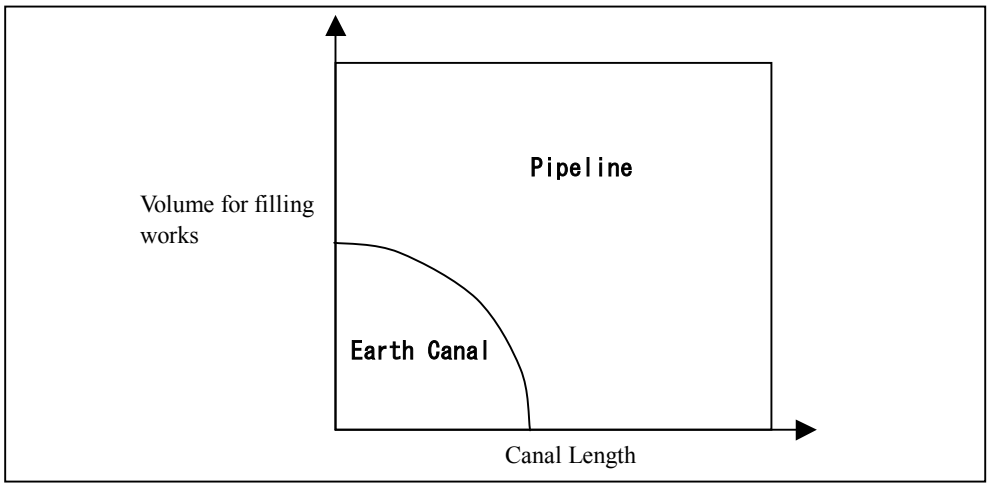


Relationship between Canal Length and Cost

The pipe distribution system has a clear advantage over the open channel earth canal system in such schemes that have, if anything, a long canal mainly caused by a failure of land exchange and consolidation. The approximate canal length in which the costs are balanced between the earth canals and the pipelines is some 200 m. In addition, the balanced length of canals increases by 200 m to 350 m, in the case the life of P.V.C. pipes is only 3 years.

(3) Summary

It can be said that the factors to select the water distribution type from economical viewpoint are earth volume for filling works as well as canal length. An earth canal has an advantage if the canal is not so long and little soil transportation is required for filling materials.



Selection of Water Distribution System

(6) Completion of Construction

All the construction was completed on 8 November, and subsequently on 9 November trial operation was made under the inspection of OIDA staff with the JICA Study team. After the inspection to confirm that the scheme was proof to be operational, WUA was handed over to a copy of general by-law of WUA that is subject to individual signature at the time of handing over the scheme to WUA.

4.3.13 Handing Over

The official handing over the pump to Oda Chisa WUA was held on 11 November 2003 before representatives from OIDA Headquarter, OIDA Central Branch office, OIDA Meki office, Dugda Bora Wareda office, Weldyia Mekdele PA and the JICA Study team as well as representatives from local church, elders and Idir (funeral association). A set of five handing over documents were prepared and signed between OIDA and WUA for one copy to OIDA Headquarter, one for OIDA Wareda office, one for Oda Chisa WUA, one for Dugda Bora Wareda office, and one for Welde Mekdele PA office.

4.4 Salient Feature of Scheme

The salient features of the original and the modified plans are summarized below:

Salient Feature of Oda Chisa Scheme

Item	Original Plan	Modified Plan
1. General Information		
1-1 Proposed command area	5.25ha	-
1-2 No. of house hold	21 HH	-
1-3 Required water discharge	22.0 lit/s	-
2. Pump		
2-1 Actual water head	3.5m designed canal base E.L - W.L	-
2-2 Total water head	10.0m	20.0m
2-3 Required pump horse power	7 hp	14hp
2-4 Pipe	1) Suction pipe (PVC suction hose) dia: 100mm, length : 6.0m 2) Delivery pipe (PVC) dia: 100mm, length : 54.0m	1) Suction pipe (PVC suction hose) dia: 100mm, length : 6.0m 2) Delivery pipe (PVC) dia: 100mm, length : 240.0m
3. Canals and related facilities		
3-1 Main canal	Existing canal 110m Proposed canal 130m(Filling) Total 240m (lining canal 60m included)	Pipeline(PVC) 240m
3-2 Secondary canal	SC1(existing) 40m SC2(existing) 150m SC3(existing) 210m Total 400m	SC1(existing) 40m SC2(existing) Not used SC3(existing) 210m Total 250m

Item	Original Plan	Modified Plan
3-3 Field canal	Constructed by farmers	
3-4 Canal structure	1) Offtake 3nos. 2) Culvert 1 no. (6 m)	1) Pipe outlet6 nos. 2) Pipe culvert 1 no. (6m)
3-5 Lead canal	Existing canal 250m	-

Remarks: "-" means no change from original plan

The major design changes and their reasons are summarized below:

Major Design Changes and Reasons

Original Plan	Modified Plan	Reason
Main Canal Delivery Pipe : 54 m Earth Canal : 186 m	Pipeline : 240m	1) Soil material for canal embankment is not available in the area 2) Transportation cost for soil material is higher than PVC pipe cost.

4.5 Cost Implication

The comparison between preliminary cost estimate and actual expenditures is as summarized below.

Cost Estimate and Actual Expenditure

Item	Estimated Cost (Birr)	Actual Expenditures (Birr)
Pump (including pipe)	40,000	40,000
Pipe	5,000	5,100
Pump house	5,000	4,500
Machinery work	10,000	15,750[1)]
Canal lining and structure	12,000	2,000
Earth work	4,000	2,000
Other work	4,000	2,000
Total	80,000	71,350

Remarks: 1) Rental fee of pickup truck for OIDA Meki Staff

CHAPTER 5 PRA FIELD REPORT ON BADE GOSA WUA

5.1 Activities of PRA

The progress of establishment of Bade Gosa WUA and construction of their scheme facilities is summarized below.

13 May 2003	: Confirmation of WUA applicant group intention
27 May 2003	: Site inspection
10 June 2003	: PRA1 Membership
13 June 2003	: PRA2 Layout map
14 June 2003	: Topographic-survey
20 June 2003	: PRA3 Premises
27 June 2003	: PRA4 Physical plan
1 July 2003	: Setting alignment of lead canal
2 July to 7 August 2003	: Excavation of lead canal by WUA applicant group
15 August 2003	: PRA 5 Land arrangement
27 August 2003	: PRA 6 Financial management
2 September 2003	: PRA 7 Draft agreement
6 September 2003	: PRA 8 Agreement
7 September 2003	: Commencement of construction
8 October 2003	: Installation of pump
10 November 2003	: Completion of construction
11 November 2003	: Trial operation
12 February 2004	: Handing-over

5.2 Background of Community

The project site is located on the western shore of the Ziway lake at 16 km south of the Meki town, the southern border of Dugda Bora wareda to Adami Tulu wareda, along the Meki-Awasa highway.

Local people who organize themselves into Bade Gosa WUA applicant group was motivated towards irrigation farming due to four main factors;

1) Designated area for food assistance by repeated drought or erratic rainfall,
2) The presence of irrigated farming by a PPO;
3) Learning experiences on irrigation farming with PPO; and
4) The presence of an opportunity to obtain a pump for collective irrigation farming.

(1) Drought and Chronic Human Insecurity

Drought or erratic rainfall led this area to situations in need of food assistance. At the time of the study in May, most of local people were observed to make lines to take food ration distributed through governmental channel. The situation in food insecurity in this area is one of core background to motivate local people towards irrigation farming.

(2) Presence of Irrigation Farming by a PPO

Through the construction of a lead canal from the Ziway lake, some of areas have been accessible to water source for irrigation farming. Bade Gosa WUA applicants hold collective farm plots at around 1.2 km from the Lake Ziway. Next to the collective farm plots, PPO has been engaged in irrigation farming to produce tomato by using five pumps, through which Bade Gosa members have been witnessing that the pump owner earned higher level of incomes. This situation motivates Bade Gosa household members.

(3) Local Initiative

In such circumstances, Bade Gosa members mobilized themselves in the year of 2000 to make an attempt to construct a lead canal, in an assumption that the presence of the lead canal with approximate length of 1.15 km could be attractive sufficiently enough to invite a PPO for start irrigation farming through sharing land. Despite their wishes, only around 250 m length of canal was constructed but not completed due to occurrence of drought and uncompleted.

(4) Learning Experiences on Irrigation Farming with PPO

Out of 20 WUA applicants of Bade Gosa, which was changed from the 19 initial applicants, 12 members have experiences on irrigation farming with PPO.

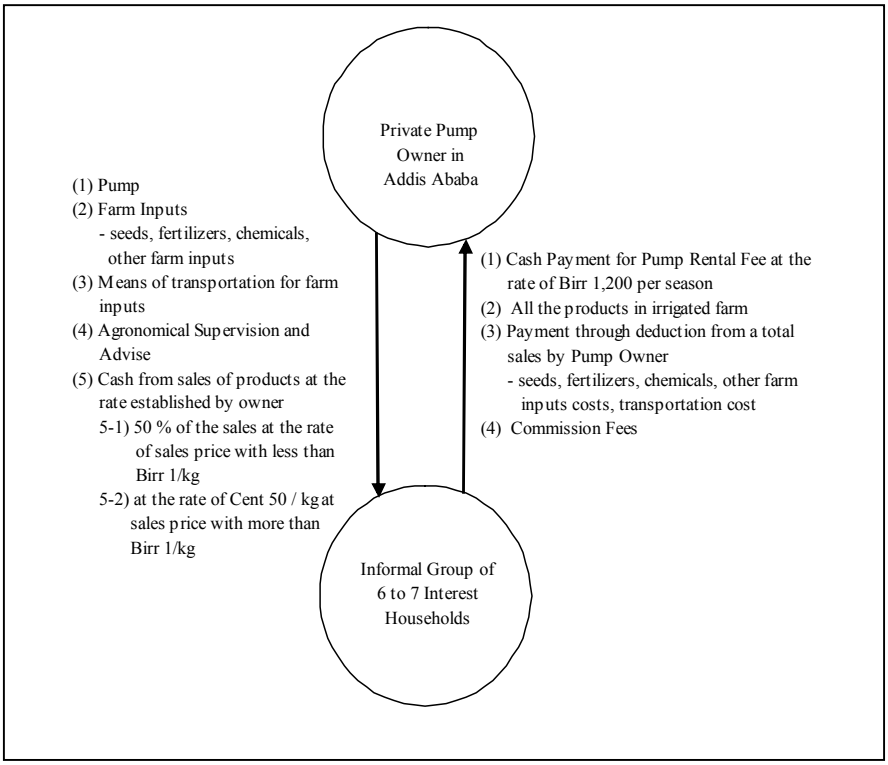
Through experiences, they have learnt negative aspects of private-led irrigation farming that provides a basis for the establishment of WUA as collective actions. The summary of their learning experiences is illustrated in the previous page.

For the Bade Gosa case, it is said that the present PPO stationed in Addis Ababa is engaged in irrigation farming through share agreement. In this share agreement, PPO provides an informal group of peasants with (i) pump, (ii) farm inputs, (iii) means of transportation, and (iv) agronomical advises. Upon the harvests, the owner is said to collect all the harvests to sell in Addis Ababa market, and in return the owner gives them back cash from sales by two pricing rates. At the time when market price of tomato is less than Birr 1.00 per kg, the owner make a payment to the peasant at the

rate of 50 % share. If the market price would incline at the rate of more than Birr 1.00 per kg, the owner is said to pay at the rate of 50 % of total sales amount. In views of peasant sides, peasants provide the owner with (i)their lands, (ii)cash for pump rental fees at the rate of Birr 1,200 per season per informal group of six(6) peasants, (iii) all the products at once for sales, (iv) cash to cover expenses of farm inputs and (v) commission fees for all the transaction.

Illustrated Relationships between PPO and Informal Group of Peasants

(Bade Gosa WUA in Tuchi Dembel PA)



Source: JICA Study Team through PRA session 10 June, 2003

Through the PRA session, Bade Gosa WUA applicants expressed their views that they are always in unprivileged position in such transaction. The main reason behind this is expressed as that peasants have no access to any piece of information on actual transaction, even with no access to actual sales price of tomato in Addis Ababa. Inaccessibility to market transaction discourages those who are involved in irrigation farming with PPO to continue the present contract.

5.3 Focal Points in PRA

Due to favorable access conditions from Addis Ababa, commercial and contract farming of high value crops is prevailing in Tuchi Dembel PA. Through PRA,

however, the WUA members expressed their views that they are always in unprivileged position in the transaction of product sale. They have no access to any piece of market information on actual transaction, even with no access to actual selling price of tomato in Addis Ababa. Inaccessibility to market transaction discourages those farmers.

A special attention was paid to risk of future intervention by PPOs to the project area even after the farmers will obtain their own pump from the Study. The intention of the WUA members on how to improve the relationship with PPO and middlemen was carefully listened to through the PRA sessions.

Furthermore, their attitude to the construction of a lead canal is also an important issue in the PRA. The total length of a lead canal was estimated to be 1.12 km requiring labor input of 350 man-days. As mentioned above, construction of a lead canal from the Ziway lake to the site is under the responsibilities of the WUA members. The farmers' intentions to this requirement were confirmed.

5.3.1 Community's Self-preparation (1): Water Resource Development

Bade Gosa WUA applicant groups were asked in a meeting held on 1 July to clearly understand one of premises by which Bade Gosa WUA applicant group should develop a source of water for irrigation. Eventually Bade Gosa WUA applicant group was requested to determine their attitudes either to withdraw their application or to keep application continued by constructing a lead canal with 1.12 km length. They chose to construct a lead canal by them within two month time. The Study Team with OIDA accepted their commitment in assumption of that construction work would enhance a sense of ownership on a scheme. Accordingly, PRA session was once discontinued for a while until the lead canal would be reported to be completed.

The construction of a lead canal with around 1.12 km of length had been completed by 9 August, much earlier than their committed work schedule. Bade Gosa WUA applicant group adopted a household-based work arrangement in consultation with OIDA office, in which a total length of lead canal was divided by each 50 meter length, each of which was given to the responsibility of an individual household. Such working conditions were certainly contributed to a creation of competitiveness among WUA applicant group member households, resulted in faster pace of construction. In return the period of lead canal construction was obviously considered as a break of PRA session for one and a half months.

5.3.2 Community's Self-preparation (2): Ownership

In the third session of PRA, a basic concept was briefly explained to only 7 attendants out of 19 applicants. With regards to the issue of ownership of the pump that OIDA holds, no clarification and objections were made from WUA applicants. Since the attendance rate was too low, 7 attendants were requested to hold a WUA applicant group meeting in which they were also asked to discuss the issue among themselves. As a result, no comment on ownership issues was reported to be raised and made during their meeting.

On the fifth session of PRA on 15 August, all the applicant members expressed their views of consent with the issue of ownership by which OIDA would hold.

5.3.3. Community's Self-preparation (3): Farm Inputs

(1) General Responses of Peasants

Contrary to the ownership issue, 7 WUA applicant members expressed their views on the issue of no-provision of farm inputs by OIDA/JICA side, strongly requesting OIDA/JICA to change its condition, by which the supply of farm inputs could be made possible for the first cropping season.

Explaining the position that OIDA/JICA is in, Bade Gosa WUA applicants were given an opportunity to make their collective decision either to accept this condition or withdraw their application to OIDA. Through their internal meeting held after the third session of PRA, it is reported that they reach to their own consensus to accept this condition expressing their views that by any mean the opportunity to obtain a pump for irrigation this time could not be missed.

After re-starting PRA session, the issue on non-provision of farm inputs become subject to re-consent with applicants on the sixth session of PRA on 27 August. By this time, it was expressed by WUA applicant members that all of them discussed the issue and made consent with this condition.

(2) Strategies of Peasants

Based on the above confirmation of their consent with the issue, applicant members were further asked to clarify their ideas and strategies in order to secure farm inputs. The following collective ideas on their actions were presented during the PRA session.

Six Main Actions for Solution

No	Strategies
1	Cultivation of low cost crops
2	Cultivation of high income generating crops with other partners to supply inputs (such partners include middlemen)
3	Involving middlemen to procure and supply farm inputs
4	Obtaining informal credits from relatives
5	Sales of rainfed farming products
6	Sales of livestock

Source: JICA Study Team/PRA session on 27 August 2003

It is found that the presence of private sector like middlemen is thought by farmers to be one of important partner, since they may be expected to play a role to supply farm inputs through contract agreements. Within farmers perspective, those private sector is expected to function as safety net. In fact some of Bade Gosa WUA applicant members expressed their views that middlemen might provide peasants with a sort of guarantee by which they would buy agricultural products to be sold within their market channels.

(3) Identification of Preferable Types of Crops

In relation with cropping strategies, elaboration on their preference on types of crops was made in order to provide them with a forum to share their views as much as collectively.

The first step was to list up preferable crops at random that were categorized into two; (i) low cost crops; and (ii) high income generating crops. After identification of types of crops, those types of crops were further ranked in accordance with their degree of preference. For this, pair-wise ranking method was employed. Those results of preference are presented as below;

1) Results from random preference on types of crops

i) Preferable types of low cost crops: 4 types of crops were identified.

Maize, Ethiopian Cabbage, Chilly and *Fasolia* (in local name)

ii) Preferable types of high income generating crops: 4 types of crops were identified.

Onion, Tomato, Western Cabbage and Sweet Pepper

2) Results from ranking types of crops by a degree of preference

i) Ranking among low cost crops

Ranking-Result – Low Cost Crops (Bade Gosa)

	Maize	Eth. Cabbage	Chili	*Fasolia*
Fasolia	7	10	10	x
Chili	2	9	x	4
Eth. Cabbage	2	x	5	4
Maize	X	12	12	7
Total Score	11	31	27	15

Source: JICA Study Team/PRA session on 27 August 2003

Ranking result: (1) Ethiopian Cabbage; (2) Chilly; (3) *Fasolia;* and, (4) Maize

ii) Ranking among high income generating crops:

Ranking Result – High Income Generating Crops (Bade Gosa)

	Onion	Tomato	West. Cabbage	Sweet Pepper
Sweet Pepper	14	13	11	x
West. Cabbage	12	13	x	3
Tomato	9	x	1	1
Onion	X	5	2	0
Total Score	35	31	14	4

Source: JICA Study Team/PRA session on 27 August 2003

Ranking result: (1) Onion; (2) Tomato; (3) Western Cabbage; and, (4) Sweet Pepper

(4) Economic Variables as Peasants' Empirical Knowledge

4-1) Less market valued crops

During the session on identification of preferable types of crops, WUA applicant members explained us about types of crops that are thought to be less market valued crops based on their empirical perspectives on market. Those crops included; (i) water melon; (ii) potato; (iii) carrot; (iv) cucumber; and (iv) beat root.

4-2) State of livestock holdings

For assessment on feasibility to cover such farm input cost through sales of their livestock, applicant households were requested to provide the Study Team with their state of livestock holdings. The result is indicated in Table 5.3.1

5.3.4 Community's Self-preparation (4): Cost-sharing

Low rate of attendance to the third session of PRA on 20 June 2003 eventually provided Bade Gosa WUA applicants with an opportunity to reconsider a degree of significance on a irrigation project as well as to strengthen a degree of collectiveness

among the WUA applicants.

An issue of physical contributions with 400 MD works was raised in the fourth PRA session, as one of premises of the project intervention. Contrary to the previous PRA session, it is expressed that 19 Bade Gosa WUA applicants are ready to make a commitment to provide the project with voluntary work.

(1) Sharing Investment Cost

Although Base Gosa applicant households were devoted to construct a length of 1.12 lead canal by using family labor forces, they did not express any tiresome and reluctance to accept the issue of provision of voluntary labor contributions towards construction works. It was found in PRA session that all the members were not only prepared to provide a project with their labor contributions but also show a fair understanding on the modality formulated by ESRDF.

(2) Formulation of Seed-money for Operation and Maintenance of a Pump:

In the context of the formation of group fund for operation and management of a pump, Bade Gosa WUA applicant group reached their own collective consensus on the creation of a revolving fund to cover fuel expenses of one gallon (approximately 200 liter) and container of gallon itself. It implies that each household will make a contribution with around Birr 42.00.

(3) Preparedness to Sell their Livestock Asset for Securing Farm Inputs

With regard to coverage of farm input cost, it was expressed in PRA session that sales of livestock can be one of internal action to procure farm inputs required for irrigation farming. Such preparedness to sell their livestock can be considered as one of cost-sharing for an entire process of irrigation development.

(4) Consensus of Obligations of OIDA and WUA

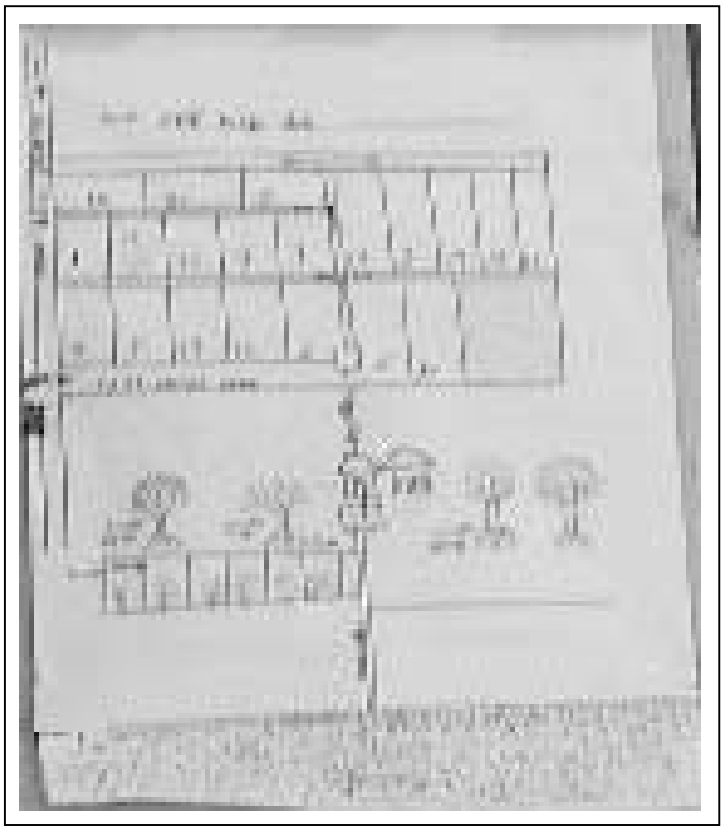
Upon their consensus on premises as well as operation conditions designated by the project, obligations of OIDA and WUA were explained respectively in accordance with a draft project agreement. Demarcation of roles and duties between OIDA and WUA was clarified and no objections were raised.

5.3.5 Making Community-based Physical Layout

(1) Presentation

Exercises to prepare a physical layout were conducted two times on the second and fourth PRA sessions respectively in order to finalize their physical layout. The

layout that Bode Gosa WUA prepared is presented as below.



Physical Layout Drawn by Bade Gosa WUA

(2) Intended Norms of Water Distribution

In PRA session to finalize physical plan based on their community's layout, a discussion was made on method of water distribution and management. The following ideas were shared among Bade Gosa WUA applicants and OIDA staff in consultation with JICA study team;

1) Experience-based approach to water management: 2 to 3 plots per day based on their experiences
2) Block approach: one block by one block is to be irrigated.
3) Canal rotation approach:
4) Making far plot in canal first norm
5) Plot by plot norm

The above suggested norms are subject to finalization at the time when bylaw shall be developed.

5.3.6 Analyzing and Finalizing Memberships of WUA

As described earlier, the rate of attendance to the third PRA session was so low at 39 % in which no collective decision could made in the PRA session.

(1) Building Development-oriented Community's Attitude

In response to the low rate of attendance, the JICA Study team found it necessary to address to attendants on an issue of basic attitude to be required for community-based development. An exercise session was organized asking the Bade Gosa WUA to choose one of the two communities as follows;

i) A type community: A community member shall always make positive response to external organs saying 'yes' and 'yes' without making tangible commitment to keep any promises made by both parties.
ii) B type community: This type community shall challenge an issue addressed to the community, together with clarification through questions, but eventually make positive response with making actual commitment realized as per the premises.

The 7 attendants of Bade Gosa WUA were asked to select one of the two communities as an ideal community. Without any discussions, they chose B type of community. However, they were also explained by OIDA/JICA team that the Bade Gosa WUA unfortunately was categorized as A type of community due to two consecutive incidents that incurred in the past, implying lower performance of commitment.

(2) Eligibility of Membership Raised by Bade Gosa WUA Applicants

In the course of the above discussions, some of Bade Gosa WUA applicants began to make consultation with OIDA/JICA team concerning eligibility of membership. It was disclosed that one of applicant household owned 3 pumps for irrigation purpose.

OIDA/JICA team made clarification on principal issue of the project explaining that the project should be intended for those who did not own any pump for irrigation farming but were prepared to organize a WUA through which they could undertake collective actions to use pump. It was emphasized in the session that the project should be formulated to encourage such organizational process of agricultural productions. The principal issue was well understood by 7 WUA applicants, and as a result one of WUA members who own pumps is to be excluded.

The PRA session is found to be an educative opportunity for local people in the context of the formulation of plan for a project.

(3) Change of Applicants

During the period of construction of lead canal, it was reported to OIDA Wareda office that one of applicant members decided to withdraw from the membership, due to the same reason of the above. One of the applicants bought a pump becoming a pump owner, and therefore lost eligibility to membership. In return, Bade Gosa WUA applicant group presented a request for the replacement of two members. Having considered financial capacity of the WUA applicant group with an optimum size of 20 households, the replacement request was admitted. As a result, two applicant households were accepted to join Bade Gosa WUA applicant group.

The above changes of membership were immediately subject to acknowledgement of offices including OIDA wareda office as well as Tuchi Dembel PA executive committee.

(4) Social Characteristics of WUA Applicant Group

During PRA sessions, it was found that 12 applicants were residing not in a geographical territory of Tuchi Dembel PA but in towns near to PA. Such towns include Meki town, Abossa town and even Ziway town. According to officials of PAs, they are still registered as PA member holding lands in PA's territory with a confirmation of their future intentions to remove back to the PA, although such intension was found to be questionable. They moved into these towns as their own actions to cope with critical conditions in household management due to serious drought, PA officials said. It was also said that such loose organization among PA membership has been related to a pattern of settlement formation in Tuchi Dembel. According to PA officials as well as applicant household members, many of PA members were migrants to resettle in this area during a period that dates back to 1960s. This pattern of settlement might contribute to loose organization of memberships among PA. In other words, Tuchi Dembel PA in general and Bade Gosa WUA applicant groups in particular can be categorized into a network-oriented society in more tight connection with local market rather than geographical-oriented society.

5.3.7 Acknowledging Community's Internal Exchange of Land for Irrigation

Bade Gosa WUA applicant group participated in a series of discussions and exchange of views during PRA session on a land issue in irrigation development. They were provided with information of importance to restrict 0.25 ha per household by the three main reasons; (i) maximization of the number of members of WUA; (ii) even distribution of farm plots for irrigation; and (iii) optimum size of operation of a

small-pump irrigation based on the present self-organizing capability of local people in the Meki area.

Consequently, more than 0.25 ha of land holdings by a single applicant household member, located along with an intended canal, were subject to re-distribution through either exchange or transfer. Due to this, however, no exchange case existed for Bade Gosa case, except one case. This case was incurred that one of plots in command area had been registered by PA by two members, one of whom become eventually non-applicant member since he was found not to be eligible for membership due to holding a pump. Under such conditions, a practice of land exchange was subject to preparation of internal agreement between two households concerned as well as acknowledgment by PA.

Besides, since an entire command area had been leased out to a commercial sector in the past, clearance procedure from the commercial sector became subject to documentation for ensuring project sustainability, that indicates officially the present command area have no lease contract with any third party, confirming that direct usufruct rights of land are entirely vested by applicant household heads only.

5.3.8 Establishing Group Fund for Operation and Maintenance of a Pump

(1) A Degree of Understanding on Types of Cost

A degree of their understanding on types of cost has been changed. At an initial stage of PRA session, it was found that a concept of PRC was not well recognized although an issue of cost recovery was repeatedly discussed. In comparison with this, fair understanding on three types of cost; namely, (i) operation cost; (ii) maintenance cost; and, (iii) PRC, has been reached. This was indicated by their proposal to create a revolving fund.

(2) Breakdown of Cost

Through an exercise on financial management, Bade Gosa WUA applicant group reached the following understanding on the breakdown of cost:

Operation cost (fuel, lubricant)	: Birr 312 to 490.70 per HH per season
Pump maintenance cost	: Birr 71.80 per HH per season
Canal maintenance cost	: Birr 210.00 per HH per season
PRC	: Birr 132.00 per HH per season
Total	: Birr 725.80 to 904.50 per HH per season

2-1) Estimation of fuel cost based on farmers' empirical knowledge

Fuel cost per crop per season = fuel buying price x fuel consumption per one time x 30 day/month / interval day x planting duration

2-2) Estimation of lubricant

Lubricant cost = lubricant buying price x consumption per time x frequency of change

2-3) Estimation of pump maintenance

Regular maintenance cost = buying price of fuel filter + air filter + mechanic fees
Irregular maintenance cost = 5 % of pump

2-4) Estimation of canal maintenance

Canal maintenance cost = rate of daily labor fees x duration required x labor input per day

2-5) Annual reserve of PRC

Annual reserve of PRC = total price of pump / service period in year

(3) Formation of a Group Fund of WUA

3-1) Preparation of money to cover fuel cost

It was clearly understood that a sum of money should be prepared by the WUA applicant group before the operation of pump. In respond to this, Bade Gosa applicant group members made their own proposal to create a revolving fund to procure one gallon of fuel at first. For this, each member reached to consensus to pay around Birr 42 per household.

3-2) How to control and safeguard a group fund

Bade Gosa WUA applicant group expressed that it might be possible to control and safeguard only revolving fund of group resource at the hand of a treasurer. At the same time the WUA applicant group was asked on how to control PRC. In replying to this, it is recognized to be difficult for them to control the entire group fund including PRC at hand. As a result, an opening bank account is suggested and agreed them in order to control and safeguard the group fund effectively.

5.3.9 Electing Board Members of Bade Gosa Water Users Association

Having agreed with premises and all operation conditions during PRA session, Bade Gosa applicant group held their first general assemble to elect executive members consisting of (i) chairperson, (ii) secretary, (iii) treasurer; (iv) cashier; and (v) inspector/auditor. The minutes of meeting was prepared by the newly elected secretary.

5.3.10 Documentation of Project Agreement

The project agreement was reached by signing between OIDA and Bade Gosa WUA on 6 September 2003 by using the following sets of documents.

1) Project agreement in Oromia language
2) Clearance document on the previous land lease contract
3) Internal agreement on land exchange acknowledged by PA
4) WUA minutes of meeting on the election of executive committee members
5) WUA Minutes of Meeting on signatory member to operate a bank account

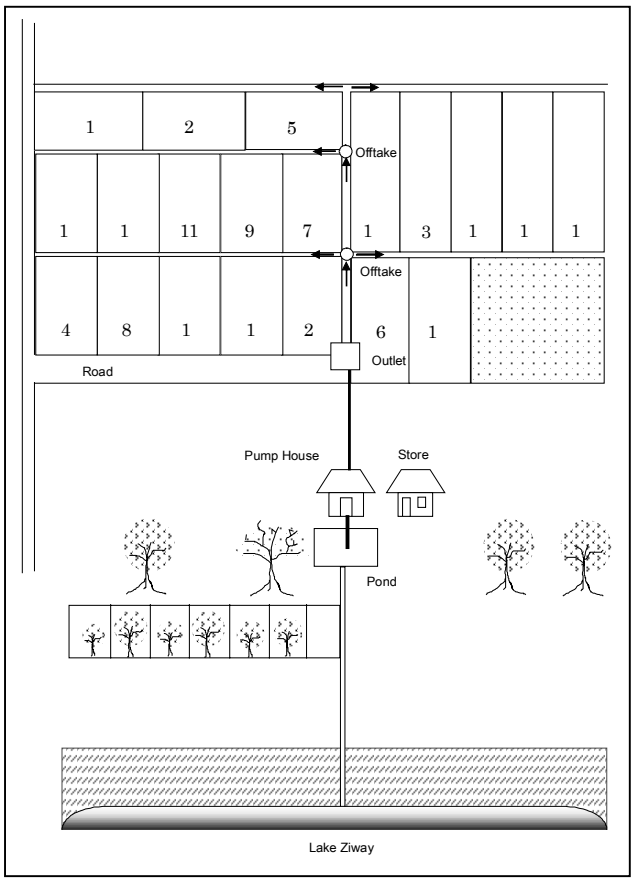
5.3.11 Physical Plan and Design

(1) The Basic Layout Plan Proposed by the WUA

The WUA members prepared basic layout plan through discussion with OIDA/JICA team. The basic layout plan is illustrated in the next page.

In this community there is no existing irrigation facility even lead canal and pond. The facilities proposed by the WUA are listed below.

1) Proposed command area : 5.00ha (20 members x 0.25ha)
2) Existing facilities There is no existing facility.
3) Proposed facilities
    1) Pump : 1 unit, with suction and delivery pipes
    2) Pump house : 1 unit
    3) Lead canal : 1,150m
    4) Pond : 1 unit
    5) Main canal : 100m
    6) Secondary canals: 5 units
    7) Related canal structures
        a) Off-take structures: 2 units, the places diverting to secondary canals
        b) Outlet : 1 unit, outlet of delivery pipe



Bade Gosa WUA Basic Layout Map

(2) Engineering Aspects

2-1) Field survey

In accordance with the premises of the agreement the water source should be developed by the WUA. During PRA discussion WUA applicants agreed with this issue to excavate a lead canal and pond by themselves. OIDA/JICA team and WUA applicants jointly set the alignment of lead canal on 1 July 2003 together. The dimension of lead canal is listed below.

- Length : 1,150m
- Depth : 1.0 ~ 1.5m
- Width : 1.0m

2-2) Field survey

Base on the basic layout OIDA/JICA team conducted a field survey. The check items in the survey are listed below.

- Conditions of existing facilities
- Water level
- Ground elevation of proposed location of pump installation

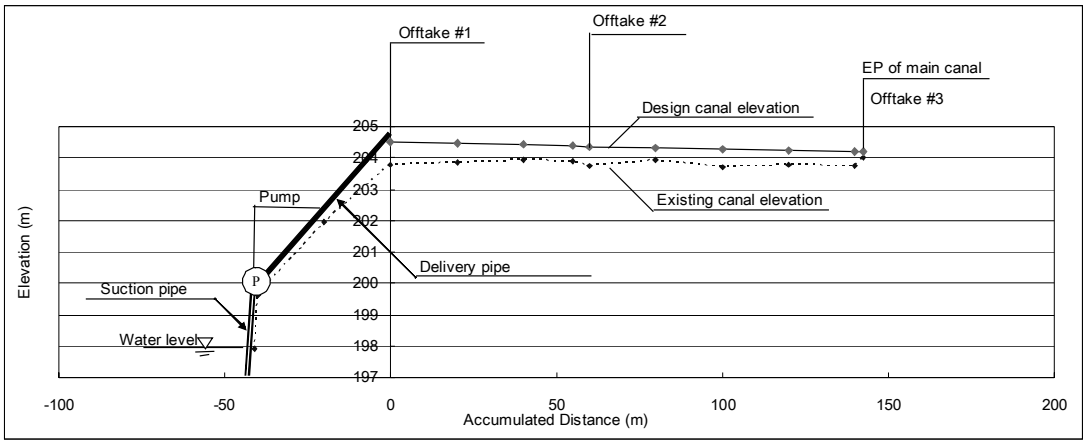
- Elevation and length of existing canals, proposed canal
- Dimension of existing canals
- Farm land elevation

(3) Plan and Design

Based on the survey result and basic layout proposed by WUA, the OIDA design engineer started design works. The design considerations are mentioned below.

3-1) Main canal

The profile of main canal is illustrated as below.



Profile of Main Canal

Existing canal should be additionally filled more 20 to 80 cm in order to deliver water efficiently to downstream, with the design canal gradient of 1/500. According to the experience of earth canal construction in Welde Mekdele it is difficult to procure enough soil around this area. Therefore during construction period extension of delivery pipe can be considered as a alternative plan through discussion with WUA members.

3-2) Pump

The suitable pump capacity was estimated to be 12 horse power (HP), which is as same as one in Shubi-Sombo schemes.

3-3) Pump house

The same design as one in Shubi-Sombo schemes is adopted. Floor area is 9 m2 （3m x 3m）.

3-4) Secondary canals

The existing secondary canals are used as there are with small rehabilitation where necessary.

3-5) Canal related structures

The WUA proposes the following structures.

- Off-takes : 3nos, wet masonry
- Outlet : 1no

3-6) Salient feature of scheme

At present the feature of this scheme is summarized as below:

Item	Description
1. General Information	
1. Proposed command area	4.75 ha
2. No. of house hold	19 HH
3. Required water discharge	21.0 lit/s
2. Pump	
1.Actual water head	7.0 m (Designed Canal Base E.L - W.L)
2.Total water head	13.0m
3. Required pump horse power	9 HP (e.g. Lombardini 4LD640, Rovatti FL816)
4. Pipe	1) Suction pipe Diameter: 100mm, Length : 6.0m 2) Delivery pipe Diameter: 100mm, Length : 42.0m
3. Canals and related facilities	
1. Main canal	Existing canal 143m (Filling)
2. Secondary canal	SC1(existing) 300m SC2(existing) 300m SC3(existing) 300m Total 1,043m
3. Field canal	Constructed by farmers
4. Canal structure	1) Off-take 3nos. 2) Outlet 1no.
5. Lead canal	Newly constructed by farmers 1,150m

(3) Preliminary Cost Estimate

The preliminary cost estimate is as summarized below.

Summary of Total Construction Cost

Item	Cost (Birr)
Pump	40,000
Pump house	5,000
Machinery work	16,000
Canal lining and structure	1,700
Delivery steel pipe	5,260
Earth work	4,440
Other work	7,600
Total	**80,000**

In accordance with the premises mentioned above WUA applicant has to share 5% of total cost which is 4,000 birr as labor. In this case the WUA has to supply 400 MD works during the construction period.

5.3.12 Procurement and Construction

After setting alignment the WUA applicants with their family members have already stated the excavation work of lead canal under the technical assistance of OIDA Meki office staff. Around the ed of July they completed to those work, and the PRA workshop was re-started.

The next day after agreement between OIDA and WUA on 6 September 2003 they commenced first the construction of a pump house and completed on 8 October. Following the installation of a pump, Base Gosa WUA started construction of main canals and according to physical design, the construction of canals was completed on 10 November 2003. Since 11 November 2003, the trial operation was commenced.

5.3.13 Handing Over

The official handing over of the pump to Bade Gosa WUA was held on 12 February 2004 at the presence of representatives from OIDA Central Branch office, OIDA Meki office, Dugda Bora Wareda office, Tuchi Dembel PA and the JICA Study team. The delay of handing over was due to overloaded work of OIDA wareda office. A set of five handing over documents were prepared and signed between OIDA and WUA for one copy to OIDA Headquarter, one for OIDA Wareda office, one for Oda Chisa WUA, one for Dugda Bora Wareda office, and one for Tuchi Dembel PA office.

5.4 Salient Feature of Scheme

The salient features of the original and the modified plans are summarized below:

Salient Feature of Bade Gosa Scheme

Item	Original Plan	Modified Plan
1. General Information		
1-1 Proposed command area	4.75ha	-
1-2 No. of house hold	19 HH	-
1-3 Required water discharge	21.0 lit/s	-
2. Pump		
2-1 Actual water head	7.0 m designed canal base E.L - W.L	-
2-2 Total water head	13.0m	-
2-3 Required pump horse power	9 hp	-

Item	Original Plan	Modified Plan
2-4 Pipe	1) Suction pipe (PVC suction hose)	-
	dia: 100mm, length : 6.0m 2) Delivery pipe (PVC) dia: 100mm, length : 42.0m	-
3. Canals and related facilities 3-1 Main canal	Existing canal 143m(Filling)	-
3-2 Secondary canal	SC1(existing) 300m SC2(existing) 300m SC3(existing) 300m Total 1,200m	
3-3 Field canal	Constructed by farmers	
3-4 Canal structure	1) Offtake 3nos.	1) Offtake 1 no.
3-5 Lead canal	Newly constructed by farmers 1,150m	-

Remarks: "-" indicates no change from original plan

5.5 Cost Implication

The comparison between preliminary cost estimate and actual expenditures is as summarized below.

Cost Estimate and Actual Expenditure

Item	Estimated Cost (Birr)	Actual Expenditures(Birr)
Pump	40,000	40,000
Pump house	5,000	4,900
Machinery work	16,000	15,750
Canal lining and structure	1,700	400
Delivery steel pipe	5,260	6,800
Earth work	4,440	1,000
Other work	7,600	2,000
Total	80,000	70,850

CHAPTER 6 PRA FIELD REPORT ON ODA BILBILA WUA

6.1 Activities of PRA

The progress of PRA and construction in Oda Bilbila WUA is summarized below.

13 May 2003	: Confirmation of WUA applicant group intention
15 October 2003	: PRA1 Premises
18 October 2003	: PRA2 Confirmation of Successors and Layout map
22 October 2003	: PRA3 Physical plan, topographic survey
28 October 2003	: PRA4 Land arrangement
5 November 2003	: PRA5 Financial management for sub-group A and B and land re-arrangement for sub-group C
15 November 2003	: PRA6 Financial management, Re-physical plan for sub-group C
16 November 2003	: Commencement of construction
12 February 2004	: Installation of pump
27 February 2004	: Completion of construction
28 February 2004	: Trial operation
July 2004	: Handing Over

6.2 Background of Community

The project site is located in Abono Gabriel PA about 14 km south of the Meki town and 3 km from the Meki-Awasa highway towards the Ziway lake. The PA situates immediate north of Tuchi Dembel PA. The members expressed the following justifications for their application.

1) Recurrent droughts
2) Less availability of land and water resources as well as human resources
3) Ample experience in pump irrigation with PPO

In 1988, the wareda administrator provided each of 10 members with a farmland of 1.5 ha. Each member cultivated 0.5 ha under contract farming. But this arrangement was operational only for one season and terminated. In 1989 to 1991, the farmlands were kept as fallow. In 1992, they made an agreement with a private company called Inter Alliance African Group for annual land lease at the rate of Birr 180 per plot of 0.25 ha. This arrangement lasted for about four (4) years. From 1996 to 1998 another private entrepreneur made a contract with farmers at the same rate. In 1999 to 2002, the members made land lease contracts with another private company at the annual land lease rate of Birr 250. In April 2002, due to low profits from land lease, farmers terminated this agreement. Besides at that time they had known the OIDA's

pump project in Shubi-Sombo areas and started preparing the project proposal to OIDA.

In addition to the above, as seen in Bade Gosa WUA of Tuchi Dembel PA, the commercial and contract farming is quite prevailing. There is the existing lead canal from the Ziway lake to the project site although the canal is quite old and needs some maintenance. This existing canal is a great asset of the WUA, which was inherited from previous generation. Currently, the canal is used by PPOs, who contract with some of the WUA members for vegetable production. The members have been motivated to have their own pump so as to embark on production of high-value crops.

List of Applicants and Attendances in PRA

No. Member	Position	Applicant	Sex	Age	Holding(ha)	Education	Hamlet	Attendance					
								15/10/03	18/10/03	22/10/03	28/10/03	05/11/03	15/11/03
1	head	yes	M	64	5.00	4th	Abono	o	o	o	o	o	o
2	head	yes	M	50	5.00	AE	Abono	o	o	o	o	o	o
3	head	yes	M	55	3.50	AE	Abono	o	o	ϕ	o	o	o
4	head	yes	M	64	4.00	AE	Abono	o	o	o	o	o	o
5	head	yes	M	53	3.00	AE.	Abono	o	o	o	ϕ	o	o
6	head	yes	M	43	1.50	AE	Abono	o	o	o	o	o	o
7	head	yes	F	50	4.00	-	Abono	o	o	o	o	o	o
8	head	yes	F	52	3.75	AE	Abono	o	o	o	o	o	o
9	head	yes	M	48	4.75	3rd	Abono	o	x	o	x	ϕ	o
10	head	yes	M	58	6.25	AE	Abono	o	o	x	o	o	o
11	head	yes	M	62	5.00	AE	Abono	o	o	o	o	o	o
12	head	yes	M	62	4.50	AE	Abono	o	o	o	x	o	o
13	head	yes	M	49	5.00	3rd	Abono	o	x	o	o	o	o
14	head	yes	M	43	6.00	5th	Washe	o	o	o	o	o	o
15	head	yes	M	40	5.00	3rd	Abono	o	o	o	o	o	o
16	head	yes	M	40	3.50	AE	Abono	o	o	o	o	o	o
17	head	yes	F	35	3.75	-	Abono	o	o	ϕ	o	x	o
18	head	yes	F	45	4.00	AE	Abono	x	ϕ	ϕ	o	o	o
Average				50.7	4.30								
Attendance (%)								94	89	94	89	94	100

Note: "o" presence, "ϕ" Representative appeared, "x" Absence"AE" Adult Education: Adult education was provided during 'Derg' and most of these members can only write their name in Sabian letters.

6.3 Focal points in PRA

6.3.1 Community's Self-Preparation (1): Ownership of Pump

No serious argument was arising from the 11 conditions in the premises except an issue of non-provision of farm inputs in the project. Others were raised for clarification of (i) responsibilities for constructing a pump house, (ii) expansion of individual land holding to more than 0.25 ha, (iii) provision of pump accessories, and (iv) water source. OIDA explained that a pump shall be provided together with its accessories and a pump house will be constructed through active involvement of

beneficiary farmers with materials to be provided by OIDA.

The WUA members agreed that the useful lifetime of small pump is estimated to be 5 to 10 years and the members should be responsible for its replacement. They also underlined to save for replacement in bank account after every harvest.

Some members requested to allow them to hold more farmland over 0.25 ha per HH. It was recommended by the JICA Study Team not to expand the scheme area and to give equal chances to other members taking the limited water resources into consideration. Besides, it was agreed among the 10 members to provide 250 m^2 per member to the PA chairperson, who does not have a farm plot within the scheme area. Blood related membership is not common as other similar WUA established so far.

6.3.2 Community's Self-Preparation (2): Arrangement of Successor

It was verified through the first PRA session that most of the WUA members are quite aged. Out of 18 members, four (4) are over 60 years old resulting in an average of 50.7 years old. Since the candidate communities under Program II should be future leading communities organized mainly by youths, in a majority, who can accept modern farming technologies. Besides, irrigation scheme sustainability is highlighted with a focus on coverage of PRC by WUA. This also requires main compositions of youths in WUA. In response to the request from the JICA Study Team, the members agreed to take their successors, who could be the majorities of WUA in future.

The successors of the members were introduced in the second PRA session as below.

List of Successors

No.	Age	Relation	Remarks	No.	Age	Relation	Remarks
1	28	2nd son	1st female and also not alive	10	23	2nd son	Elder female
2	19	4th son	Elders married	11	19	3rd son	Elders not alive
3	17	3rd son	Elders are females	12	18	6th son	Elders are females
4	20	5th son	Elders married	13	17	1st son	
5	22	1st son		14	23	1st son	
6	19	1st son		15	17	1st son	
7	25	1st son		16	21	1st son	
8	30	1st son		17	20	1st son	
9	21	1st son		18	21	5th son	Elders are students & married

The successors were asked to explain their views and the reasons why they attend this PRA session. Accordingly they forwarded the following comments and suggestions in PRA sessions.

1) Currently they work and support their family everyday.
2) They are also interested in the OIDA project, i.e. provision of a pump for their

families in which they can take part in physical activities.

3) They expect improvement of food security for their families.
4) They expect that the project would supply irrigation water not only to the planned plots but also to other plots to be transferred from their families.

6.3.3 Community's Self-preparation (3): Farm inputs

An argument against the premises was the issue about no support for farm inputs and other operation expenses. Hence the applicants were asked to list their internal solutions. Some of the internal strategies suggested are listed below

1) Changing of consumption patterns i.e. (i) Shifting income obtained from other plots and (ii) renting out other plot to generate cash for irrigation plot
2) Sale of livestock
3) Getting farm credit from relatives
4) Managing low input crops for the first seasons

Maize, local cabbage, chili and potato were identified as low input crops, while tomato, onion, western cabbage and carrot need high initial cost but were identified as more income generating crops, which would be suitable for local conditions. Crop preferences of the members and their successors were assessed through pair-wise ranking. Accordingly the following findings were discovered. Successors were also assessed through pair-wise ranking. Accordingly the following findings were discovered.

Pair-wise Ranking in Crop Preference

(a) Low input Crop

	Maize		Local cabbage		Chili		Potato	
	Peasant	Successor	Peasant	Successor	Peasant	Successor	Peasant	Successor
Potato	16	8	16	8	16	8		
Chili	11	8	6	0			0	0
Local Cabbage	5	0			10	8	0	0
Maize			11	8	5	0	0	0
Total	32	16	33	16	31	16	0	0
Rank	2nd	1st	1st	1st	3rd	1st	4th	4th

(b) High input Crop

	Tomato		Onion		Western Cabbage		Carrot	
	Peasant	Successor	Peasant	Successor	Peasant	Successor	Peasant	Successor
Carrot	16	6	16	4	16	0		
Western Cabbage	15	9	16	5			0	9
Onion	15	5			0	4	0	5
Tomato			1	4	1	0	0	3
Total	46	20	33	13	17	4	0	17
Rank	1st	1st	2nd	3rd	3rd	4th	4th	2nd

(c) Livestock

Livestock possession of the members was also surveyed as stipulated in the following table in order to assess the capacity of self-preparation to acquire farm inputs for irrigation farming.

Farm Land and Livestock holding by Members

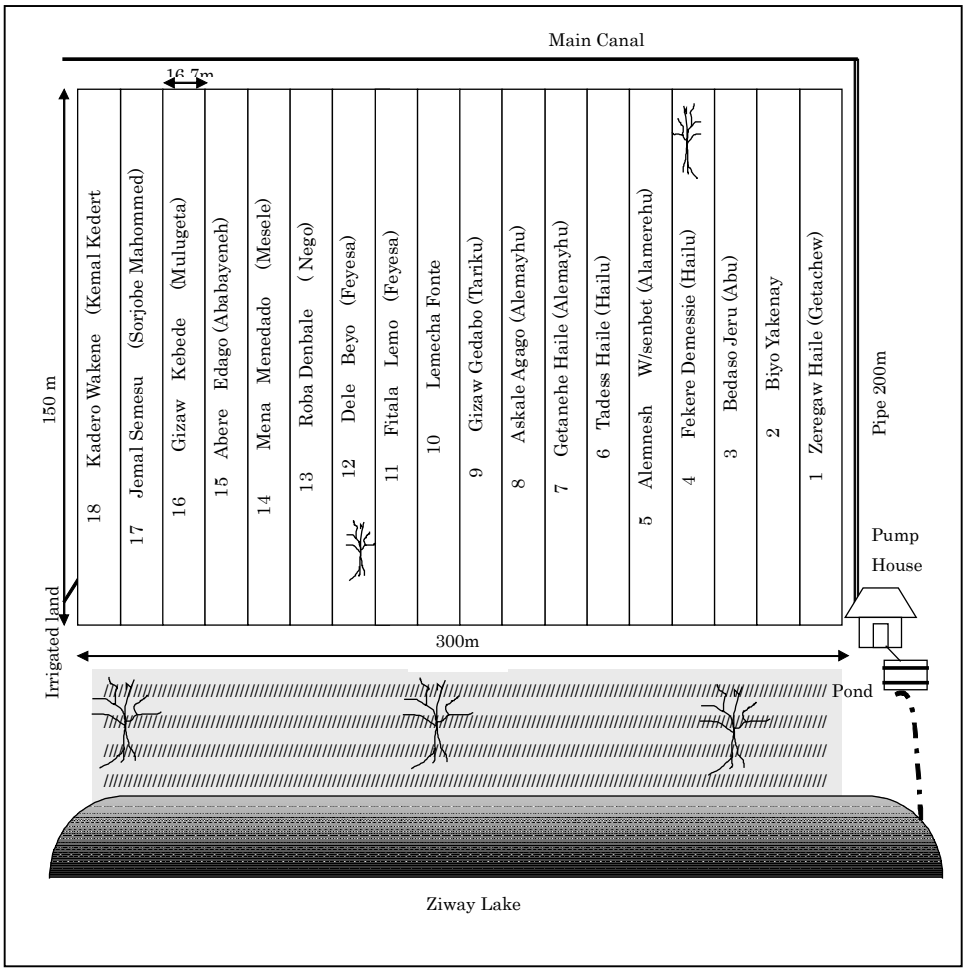
No	PPO	Livestock Holdings (Head)								Monetary value of Livestock (Birr)		No. of Farm Plots	Total Size of Farm Land
		Chicken	Ox	Veal	Cow	Heifer	Sheep	Goat	Donkey	Min. Value	Max. Value		
1	yes	4	2	1	0	0	5	0	1	1,916	4,548	6	5.00
2	No	8	0	0	0	0	0	0	0	32	96	9	5.00
3	yes	10	1	0	1	0	1	0	0	920	1,920	5	3.50
4	yes	6	2	0	1	0	0	0	0	1,324	2,272	6	4.00
5	yes	4	0	0	0	0	0	0	0	16	48	4	3.00
6	yes	4	0	0	0	0	0	0	0	16	48	3	1.50
7	yes	5	0	1	0	0	0	0	0	320	560	5	4.00
8	yes	1	0	0	0	0	0	0	0	4	12	4	3.75
9	yes	0	0	1	1	0	0	0	1	800	1,500	7	4.75
10	yes	4	2	0	0	0	0	0	1	1,216	2,048	7	6.25
11	No	5	2	1	1	0	2	0	0	1,780	3,560	7	5.00
12	yes	2	0	0	2	1	0	1	0	868	1,974	4	4.50
13	yes	5	1	1	1	0	0	0	0	1,120	1,960	5	5.00
14	yes	15	2	1	1	0	0	3	0	1,840	3,780	4	6.00
15	No	5	3	1	2	0	0	15	4	4,120	10,260	4	5.00
16	yes	4	2	0	0	1	2	0	1	1,576	3,298	7	3.50
17	No	5	0	0	0	0	0	0	1	220	460	6	3.75
18	yes	0	2	1	1	0	0	0	2	2,000	3,500	7	4.00
Min Price		4	500	300	300	200	80	60	200				
Max Price		12	800	500	600	450	400	300	400				

Remarks: POO : Experiences of contract farming with PPO.

6.3.4 Making Community-based Physical Layout

In the 2nd PRA session on 18 October 2003, the communities presented the layout map, which showed the entire command area and plots held by each member. The members were asked to give their comments on the plan. All the members agreed with the layout.

Actually part of the lead canal was found in another PA. There should be mutual agreement in using the lead canal especially during driest conditions.



Layout Map of Oda Bilbila WUA

6.3.5 Finalization of WUA Members and Land Exchange/Transfer

On the 3rd PRA on 22 October 2003, confirmation of physical layout was made. The internal agreement on land exchange issue was checked by getting an approval from local leaders. It was identified that one of the members, who was the PA chairman, did not have a plot within the command area and each of 10 members gave him a plot of about 250 m^2.

6.3.6 Establishing Group Fund for Operation and Maintenance of a Pump

Following confirmation of physical layout and finalization of WUA applicant members as above, PRA session was moved to discuss financial issues of pump management including group fund formation/

(1) Economic Feasibility Assessment

The pump operation expenses including fuel, oil, guard and operator, pump maintenance, replacement of pump and pipe were considered and compared with

benefits of selected crops. It was agreed that canal maintenance was to be covered by their participatory work and excluded from the cost.

The farm budget analysis was made as follows.

Crop Budget Analysis

Item	Crops		
	Maize	Onion	Tomato
Yield (quintal/0.25ha)	10	30	45
Price/quintal (Birr)	75	150	75
1. Gross benefit	750	4,500	3,375
2. Costs			
2.1.Pump operation	317	371	416
2.2.Pump maintenance	19	19	19
2.3.Pump replacement	140	140	140
2.4.pipe replacement	17	17	17
Total Costs	493	547	592
Net return (Birr)	257	3,953	2,783

(2) Group Fund Formation

To create ownership sentiment the involvement of the target group in project cost sharing is getting emphasis these days. Some international lending agencies require a minimum of 10% contribution from the beneficiaries.

The total project cost was estimated to be Birr 80,000. In principle, communities were required to contribute Birr 8,000 which was 10 % of initial cost. Most of the time community share cost in terms of free labor. It was recommended by the JICA Study Team that the members were to provide free labor that amounts 5% of the total project cost. Community labor contribution above 5% would be valued at the rate of Birr 10/MD and converted into group fund for WUA.

Free labor contribution by each HH was estimated as follow

Total Project cost : Birr 80,000
5% of total project cost : Birr 80,000 x 5% = Birr 4,000
Wage rate/MD : Birr 10/MD
Free labor in terms of MD : Birr 4,000 / Birr 10 = 400 MD
Contribution by each HH : 400 MD/18 members = 22MD

So each family would be required to contribute 22 days for the physical activities of the project. This was discussed with the participants and consensus was reached. The need for opening bank account by WUA was also discussed.

6.3.7 Community's Obligations for Establishment of WUA

(1) Issues Prior to Internal Arrangement of Documentation

Based on outcomes obtained from the previous PRA sessions, the main topic for the 4th PRA session on 28 October 2004 was to discuss about obligations of the stakeholders, i.e. WUA and OIDA. However, in addition to finalizing the internal agreements, the following issues were discussed on the basis of the requests from the JICA Study Team.

1) Internal agreement for transfer of irrigated plot from parents to descendents
2) De-silting and reshaping of the existing lead canal by the WUA members before signing the agreement
3) Agreement of the WUA members to do soil conservation on the command area particularly at the bottom so that the erosive effect of irrigation can be minimized

Regarding future rights of successors on the irrigable plot it was discussed and consensus was reached with the members. Four (4) members made a sort of change of successors after discussing the issue in detail.

(2) Discussions on Obligations

The contents of the obligation of OIDA and the WUA members were explained and discussed. One of the questions raised was whether they could change the planned command area for the purpose of land improvement. It was discussed that this seemed impossible since similar procedures required in designing similar scheme. In other words all applicants could not have the physical resources and this could lead to inefficient management.

(3) Collective Work to De-silting and Re-shaping the Existing Lead Canal

About 27 people participated in lead canal clearing before the PRA was conducted on 5 November 2003. All of them participated in the PRA.

(4) Arrangement of Internal Agreements

According to the assignment given to finalize the internal agreements in relation to land and successors, it was confirmed that the members having full right on the command area has been submitted to the OIDA Meki office. While the case of plot provision for the PA Chairmen was not finalized since one provider did not sign on agreement document. The reason was said to be absence from the meeting. His son represented him.

The other topic of discussion was finalization of internal agreement on successors.

This issue was also not finalized because of need to change successors.

Lessons were learnt from continuous change in successors .

1) Applicants decide to change their possible successors when asked to provide signed agreement showing that written witness being powerful device than oral proposition.
2) Land as the main economic asset for rural people, any change in entitlement of it is a sensitive issue.
3) Males are privileged than women to inherit parent's holdings in rural areas.

6.3.8 Re-finalization of Physical Layout with Land Exchange

Despite the progress on arrangement of internal agreements as above, the result of survey on the canal layout based on the recommendation of the applicants was presented to WUA applicant members on 5 November 2003, indicating that hardship would be required to fill the main canal to irrigate all proposed command area. Accordingly the following options were presented for the WUA for their decisions.

Option 1) It was found out that the elevation difference between reservoir and headwork (outlet) being 6m that demand filling the main canal by WUA. The dimension of fill work to be done: 2-3 m wide, 2 m (average) high and 400 long.

Option 2) Construction of a new lead canal or extension of the existing lead canal to the opposite side of reservoir.

Option 3) Extending of the proposed canal layout to higher elevation.

With regard to the option 2, the WUA members accepted neither construction of a new lead canal nor extension of the existing lead canal to the opposite side of the original reservoir. They said that the level of lake water is very low and also there is rocky peak in the suggested direction of new canal. On the other hand, the extension of the existing canal has also a drawback in that there can be shortage of water especially during worst cases.

One of these options was that main canal would be constructed diagonally where it start irrigating after certain meters. There would be also possibility of losing plot without irrigation in addition to in efficiency in terms of loses because of long travel. The second option would be similar but it would require rearrangement of holding because of consolidation of the command area.

After all these alternatives provided the WUA applicants requested separate short meeting. Finally they agreed to rearrange & provide written agreement for possible transfers & exchanges being choosing the last option under 3.

The communities were requested to finalize all internal agreements in relation to land and successors cases before signing the agreement with OIDA.

6.3.9 Documentation of Project Agreement

All applicants appeared in the 6th PRA session dated 15 November 2003, since it was actually date of agreement signing between OIDA and WUA. Accordingly all internal agreements were checked and submitted. These included:

1) Confirmation of local leaders regarding the right of the applicants on the command area implying no contractual arrangements especially with PPO
2) Gift of 0.25ha plot for the PA Chairperson by 10 WAU applicants
3) Confirmation on the applicants land (irrigation) plot transfer for the descendents
4) Confirmation on the new physical plan & layout

It was found that in the new command area four applicants did not have plot and it was re-arranged that the other 13 members excluding Mr. F would provide them plot with actually by exchanging. In this way four applicants could get 1.0 ha land in common.

After agreement signing completed the following issues were additionally discussed

1) How to go on construction work by identifying type of activities since it was harvest time, participating by rotation was underlined
2) Whether to construct permanent or temporary guardhouse. Most of the members suggested constructing permanent guardhouse made of hallow block from mud and other locally available materials. The guardhouse was considered to be separate from pump house so as to be saved from fire hazards.
3) Opening bank account: the communities agreed to open bank account by contributing Birr 10 Birr per HH as initial WUA saving.

6.3.10 Procurement and Construction

The construction of pump house was firstly started on 16 November 2003,and completed on 11 February 2004. Then following day the pump was installed in the pump house.

The construction of canal had been also commenced and was completed on 27 February 2004. Due to harvesting works, the construction work required a longer period of time as compared with other cases. On 28 February 2004, trial operation was launched.

6.3.11 Handing Over

The Process of handing over had been commenced at the time when trial operation was resulted in confirmation on proper water distribution into command area. Despite of its commencement, a whole process to have signatories on the documents have been delayed due to unavailability of OIDA Meki office staff who have been mobilized into a region-wide program of water harvesting. By the month of June 2004, it was re-confirmed that OIDA wareda office was quite aware of this process to be finalized in the near future.

6.4 Salient Feature of Scheme

The salient features of the original and the modified plans are summarized below:

Salient Feature of Oda Bilbila Scheme

Item	Original Plan	Modified Plan
1. General Information		
1-1 Proposed command area	4.50ha	-
1-2 No. of house hold	18 HH	-
1-3 Required water discharge	21.0 lit/s	-
2. Pump		
2-1 Actual water head	8.5 m designed canal base E.L - W.L	-
2-2 Total water head	22.0m	-
2-3 Required pump horse power	14 hp	-
2-4 Pipe	1) Suction pipe (PVC suction hose) dia: 100mm, length : 6.0m 2) Delivery pipe (PVC) dia: 100mm, length : 200.0m	- -
Item	Original Plan	Modified Plan
3. Canals and related facilities		
3-1 Main canal	Earth canal 200m(Filling)	-
3-2 Secondary canal	SC1(existing) 50m SC2(existing) 150m SC3(existing) 150m Total 350m	- - -
3-3 Field canal	Constructed by farmers	
3-4 Canal structure	1) Offtake 1nos.	-
3-5 Lead canal	Existing 1,200m	-

Remarks: "-" means no change from original plan

6.5 Cost Implication

The comparison between preliminary cost estimate and actual expenditures is as summarized below.

Cost Estimate and Actual Expenditure

Item	Estimated Cost (Birr)	Actual Expenditures (Birr)
Pump	40,000	37,000
Pump house	5,000	4,700
Machinery work	6,400	15,750
Canal lining and structure	1,700	1,500
Delivery pipe	5,540	5,400
Earth work	16,360	1,000
Other work	5,000	3,000
Total	80,000	68,350

CHAPTER 7 PRA FIELD REPORT ON TATICHA ELAN AND TATICHA GOLBA WUAs

7.1 Activities of PRA

The progress of PRA and construction in Taticha Elen WUA is summarized below.

23 May 2003	: Confirmation of WUA applicant group intention
20 June 2003	: Site inspection, pumping test
27 June 2003	: PRA1 Premises
2 June 2003	: PRA2 Layout map
8 August 2003	: PRA3 Physical plan, topographic survey
15 August 2003	: PRA4 Land arrangement
26 August 2003	: PRA5 Financial management for sub-group A and B and land re-arrangement for sub-group C
5 September 2003	: PRA6 Financial management, Re-physical plan for sub-group C
9 October 2003	: PRA 7 Agreement (Group A and B)
10 October 2003	: Commencement of construction
1 November 2003	: Installation of pump
5 November 2003	: Completion of construction
11 November 2003	: Trial operation

The land exchange was not successful among Group C. So far, no internal agreement is made (program II was not implemented). The agreement was made only for Group A, which was named Taticha Elen, and Group B, Taticha Golba, on 9 October 2003.

7.2 Background of Community

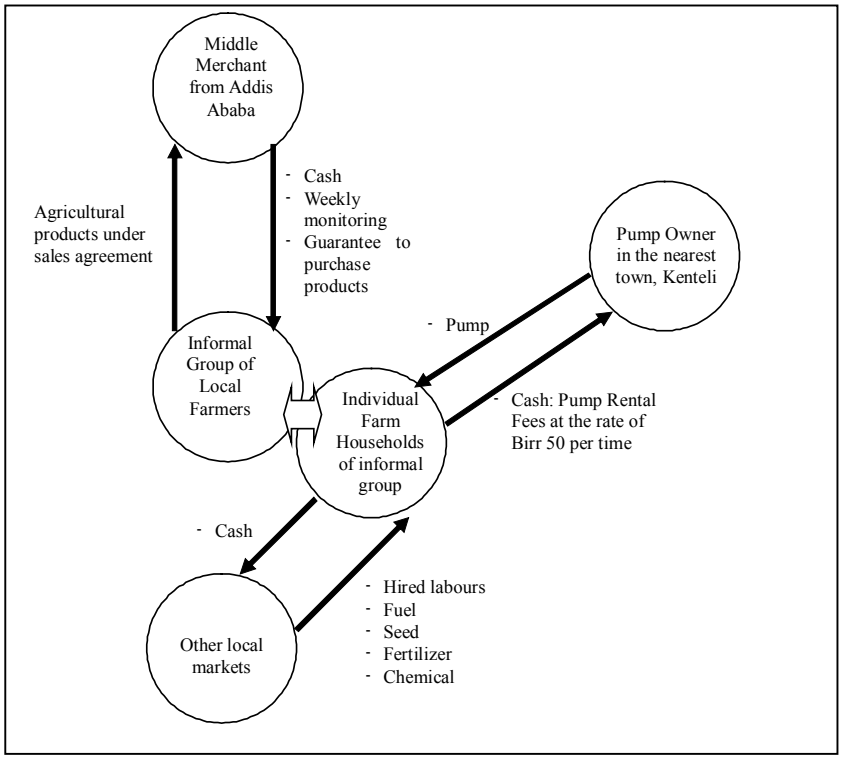
Taticha Elan is situated in Dodo Wadara PA about 3.1 km from a small town of Kenteri, 28 km far from Meki town.

Similar to surrounding areas, repeated occurrence of drought and persistent food insecurity are central among causal factors to motivate people in Taticha Elan locality towards organization into WUA applicant group.

Taticha Elan local area is located near to the Elan lake, from which local people acquire water for drinking purpose. In hydrogeological connection with the Elan lake, it has been found through sporadic but locally initiated efforts that groundwater can be available through hand-dug wells. Empirical knowledge on availability of groundwater forms the second factor for the motivation.

Illustrated Relationships between PPO and Informal Group of Peasants

(Taticha Elan and Taticha Golba locality in Dodo Wadara PA)



Source: JICA Study Team, PRA session on 23 May 2003

The above two factors become combined by the third factor that is the involvement of PPO who reside in the nearest town of Kanteli, 3km distance from Taticha Elan. In addition to PPOs, this area become attractive for middle merchants in Addis Ababa for productions of tomato, green paper and maize. Through such active interactions with external actors of private sectors, new area characteristics in terms of commercial values are eventually known to local people in Taticha Elan.

Through PRA session, however, it is understood that local people in Taticha Elan starts analyzing their patterns of the present transaction with private sectors in which they find it necessary or desired to deduct cost of rental fee.

Presently interested group of local people are involved in irrigation farming through (i) contract farming on the one hand and (ii) rental arrangement of pump on the other hand. Individual farm households organize themselves into a informal group for irrigation farming. Such informal group elects their leader to whom middle merchant from Addis Ababa contact and make agreement of production of certain crops for sales to them. Within an arrangement of agreement, the middle merchant provides the informal group with money to be used for renting pump, hiring labors, purchasing seeds and fuel and other related production expenses. The middle merchant normally

contacts with the informal group weekly for monitoring each progress of production with their recording. Under such arrangement, it can be observed that agricultural production cost are somehow secured through the middle merchant, although it might be anticipated that individual farmer might sometime have debts in some seasons of crop failure or less selling prices. It is also said that farmers could have security to sell out their products to the contracted middle merchant.

Concerning pump rental arrangement, PPOs in Kentali town rent out their pumps to interested individual peasants at an locally established rate of Birr 50.00 per time. According to informal group members, cost for having rental pump shall be described as follows;

Rental fee of pump	: Birr 50.00 per one time
Type of Crop	: Tomato
Size of farm plot	: 0.25 ha
Frequency of rent	: 1 time per week
Period of harvesting	: 3 months
Pump rent fees	: Birr 50 x 4 times /month x 3 months = Birr 600
Duration of pumping	: 2 hours for the case of informant
Type of Fuel	: Gasoline (benzene)
Consumption of Fuel	: 6 liter per one time
Total Fuel Cost	: Birr 4.5 /lit x 6 lit x 12 times = Birr 324
Total Expenses for pump	: Birr 924 per one crop season

As a result from local perspectives on this transaction, interested group of people expressed their views concluding cost reduction of pump rental fee is an immediate focus with an expectation of more economic gains. In this context, Taticha Elan local people who have mostly experiences in irrigation farming made an application for the provision of pump by organizing themselves for establishment of WUA.

7.3 Focal Points in PRA

7.3.1 Community's Self-preparation (1): Ownership

(1) General

A PRA session was conducted on 27 June to discuss the project premises. With regards to principle behind an ownership of pump, no serious comment was made by WUA applicants, except two issues raised for clarification. The one is concerned with the presence of lease fee to be paid to OIDA under contact lease agreement. The other is related to disposal right of pump upon the completion of service period on whether the allocated pump would be taken by OIDA or by WUA. These two

questions were answered by OIDA/JICA team. With regard to the issue of lease fee, no such lease fee exists. Instead of the payment of lease fee, however, it was emphasized that WUA should be responsible for saving PRC under cost recovery policy. Concerning the second issue, OIDA would purchase a new pump at the end of service period by using accumulated PRC that WUA would save The ownership of the new pump would be held by OIDA, while in return the old pump that would finish service period would be given to WUA. WUA applicants understood and accepted the above answers.

(2) Local Characteristics of a Pattern of Ownership

A pattern of individual household-based resource utilization and management is seen to be predominant pattern in this area, resulting in a less degree of collectiveness among a group. Means of agricultural productions, e.g. land, water, draught animals, are handled by individual household, while shallow well has been developed on individual household basis for drinking purpose as well as irrigation.

Based on the pattern of individual ownership prevailing in the locality, WUA applicants proposed that three groups should be organized separately to manage pumps independently by each group that consisted of 12 applicant members. Their reasons were expressed as follows;

a) to easily handle a pump under group responsibility by separation into three groups; and,
b) to minimize internal conflicts of management among members of three sub-groups that they forecast to happen.

Their proposal was immediately subject to (i) principle of utilization of study budget and (ii) technical justification on capacity of water discharge of shallow well. However, the original form of WUA group consisting of 36 members has been observed in the PRA to be artificial one with less necessity and capability on collective management. Through consultation of stakeholders concerned, their proposal was accepted in this Study to form three distinct WUA groups under in order to use and manage three pumps separately. At the end, sub-group A is named Taticha Elan, while sub-group B is called Taticha Golba.

7.3.2 Self-preparation (2): Farm Inputs

With regards to an issue of non-provision of farm inputs as the project implementation modality, no serious comment was made, except an expression of their desire to have minimum requirements of farm inputs like seed for the first cropping season.

OIDA/JICA team explained the position in which no provision of farm inputs would be possible. In response to this, WUA applicants expressed their common views that benefits to be earned from the present cultivation in irrigation faming should be mobilized for meeting requirements of farm inputs. WUA applicants were also asked on how to respond to this condition of no-provision of farm inputs. Their responses were presented as follows.

1) Possible mobilization of earning from irrigation farming presently practiced through contract farming;
2) Selection of low input crop for the first crop season including Maize and Green Pepper;
3) Sales of livestock for securing farm inputs
4) Mobilization of traditional credit system of Eqobo into collective farming to raise fund for purchase farm inputs.

(1) Mobilization of Eqobo

With regard to their fourth solution, WUA applicants were asked to elaborate it more in PRA session. It was found that the Shubi-Sombo scheme management had an impact on local peasant. According to them, peasants in Taticha Elan had an access to local information that Sombo Genet had started mobilizing Eqobo into agricultural productions.

Eqobo is local credit system commonly practiced in rural area. Normally local people, who has similar level of income, assemble each other who decide a certain monthly rate of amount of money to be contributed to a credit club of Eqobo. Each member contributes the same amount of money to Eqobo, and through this, collective money is once formed. At the end of a month, this collective money is given to one or two Eqobo members. These members who are entitled to receive collective money of Eqobo are rotating every month in circulation through which every member can receive collective money for a certain period. Such collective money, that forms bigger amount of money than individual available money, is used to buy some items that individual member could not afford to purchase individually. For regulating and monitoring this circulation, it is oftentimes observed in rural Ethiopia that Eqobo forms loose organizational structure in which chairperson and secretary are nominated.

It was heard in PRA session in Taticha Elan that the Sombo-Genet WUA members mobilized this Eqobo into farming practices. Members obtain a piece of farming plot in lease agreement with a land holder in PA, and collectively they practices farming in this plot. At the end, they collectively make harvests of products and sell them. In return one or two members in rotating schedule receives money from sales, and

mobilizes these money into purchase farm inputs required for irrigation farming.

(2) Preference of Crops for Irrigation Farming

In the same PRA session, WUA applicants presented their preference list of crops for irrigation farming. The results are presented as below.

Pair-wise Rankling of Preference of Crops (Group A)

Crop	Result of Vote			
	Tomato	Chili	Maize	Onion
Onion	8	7	12	X
Maize	1	0	X	0
Chili	12	X	12	5
Tomato	X	0	11	4
Total of Vote	21	7	35	9
Ranking	2	4	1	3

Pair-wise Rankling of Preference of Crops (Group B)

Crop	Result of Vote			
	Tomato	Maize	Chili	Onion
Onion	8	8	8	X
Chili	7	8	X	0
Maize	0	X	0	0
Tomato	X	8	1	0
Total of Vote	15	24	9	0
Ranking	2	1	3	4

It was found that both groups had an intention to choose low input crop of Maize for irrigation farming that eventually needed monitoring of crop productions in terms of benefit-making.

7.3.3 Community's Self-preparation (3): Cost-sharing

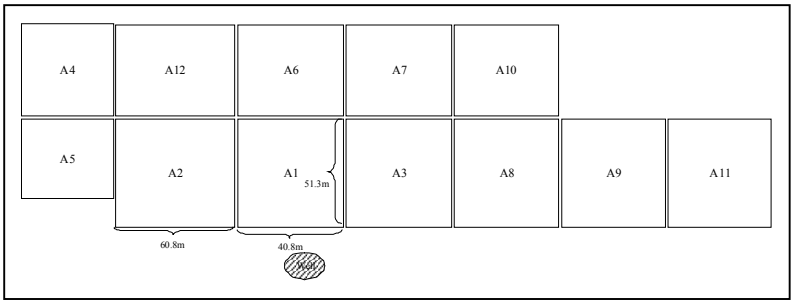
In PRA session, no serious comment has been made on an issue of cost-sharing, especially the issue of sharing investment cost by the provision of physical labor forces with 400 MD.

7.3.4 Making Community-based Physical Layout

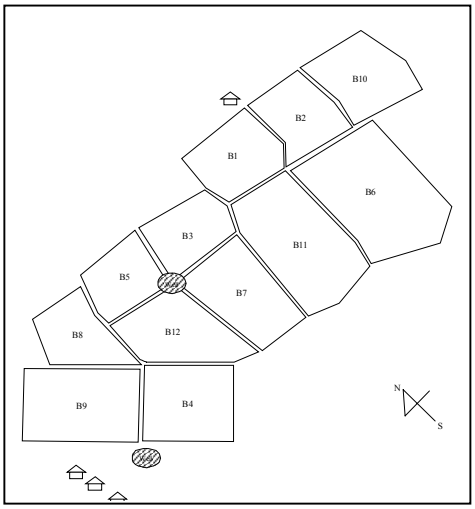
On the first PRA session on 27 June, WUA applicants divided into three sub-groups, each of which consists of around 12 applicant members, were asked to draw their intended physical layout in a paper. They were given one week time to draw it.

On the second PRA session on 2 July, they have presented physical layouts indicating locations of each farm plot to be irrigated, dug-well, canals, houses and other landmarks. It was found through transect walk, however, that placing each farm plot in the layout was not correct. Therefore, the respective layouts of three

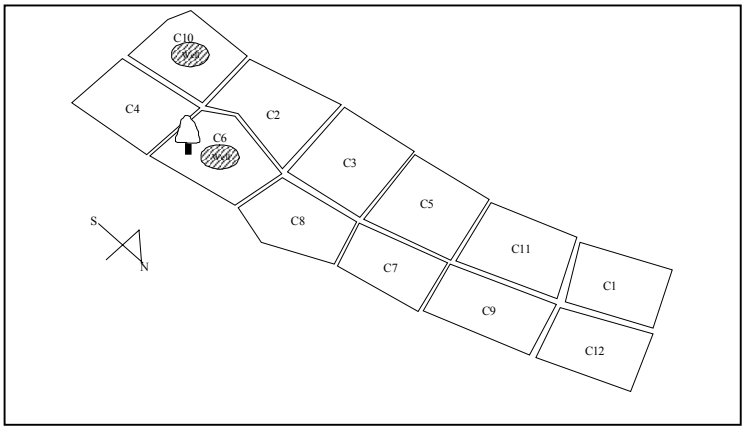
groups were subject to correction requiring another one week time for drawing. Through transect walks, WUA applicants were given a minimum advice of techniques so as to place individual farm plots in order referring to actual situation. Results of exercises to draw physical layout are shown in figures as below.



Layout of Farm Plots (Sub-Group A : Taticha Elan)



Layout of Farm Plots (Sub-Group B: Taticha Golba)



Layout of Farm Plots (Sub-Group C)

In the next PRA session, it is expected that each sub-group would draw physical layout taking into consideration the above exercises.

7.3.5 Acknowledgement of Land Exchange or Transfer

The PRA session had been started since 27 June and continued until 2 July 2003. Since then rainfalls made access hard to the area, resulted in discontinuity of PRA sessions. PRA session was re-started on 8 August. During about a month of break, drastic changes incurred within WUA applicant members, especially on land issue intended command area.

(1) Conflict of Land Use caused by PPO

Land issues become crucial issue in two WUA applicant sub-groups. Some pieces of plots in intended command areas were found to have been so attractive for PPOs. The involvement of PA officials in a process of land exchange or transfer implies to great extent the official fixation of land holdings on a piece of plots in command area. This fixation of land holdings certainly restricts actions of farm households to lease out their lands to PPOs. A formation of water users association, as collective pump owner, would eventually be seen as obstacle against interests of PPOs. In this context, some of PPOs residing in the same Taticha Elan locality started very actively disturbing a process of land acknowledgment by their attempts to keep lease contracts with WUA applicant members on some of plots in intended command areas. It is obvious that such interference of PPOs negatively affects a process of consensus building among applicant household members in PRA session. Such interference by PPOs was accelerated based on a pattern of production and consumption in this area. Means of main agriculture productions are handled by individual peasant, while

shallow wells are developed by individual household for drinking purpose. Besides, with regard to an irrigation development, a source of water for irrigation is a shallow well without any physical structure that needs collective utilization and management like lead canal. Furthermore, a limited availability of source of water is currently recommending using a mobile type of a pump with less house capacity around 5 HP. The mobile type of pump also dose not require collective utilization and management. To sum up, a pattern of individual household-based resource utilization and management is seen to be predominant pattern in this area, resulting in a less degree of collectiveness among a group. This basic socio-economic condition may allow PPO to interfere the process of official acknowledgement of land exchange by PA, resulted in slower pace of internal agreement on land exchange process.

(2) Land Insecurity of Sub-Group C

Apart from general factors studies as above, an immediate factor, that caused radical interference by PPO, was found to be the presence of one WUA member who was initiated by PPO to keep land lease agreement by taking an opportunity of private

affairs of the household management. At the time of WUA application, this land lease agreement was confirmed to be terminated. However, due to unexpected financial constraints that particular household head faced, this applicant member decided to continue land lease agreement, resulted in further requirements to settle land arrangement of command area of sub-group C. It was also found that the PPO was ex-PA executive committee member who initiated continuation of land lease agreement. This discloser became a serious subject to confirm an official position of PA concerning a process of land exchange or transfer for irrigation development as an integral part of PA development projects. The position of PA was re-confirmed to be firm to officially support the formation of WUAs. The settlement of land disputes caused by PPO eventually invited official involvement of Dugda Bora Wareda administration, especially Natural Resources and Land Administration Wareda Desk.

Although PRA sessions had been negatively influenced by interference of PPO, two sub-groups reached to a final stage where consensus building on the issue of land exchange and transfer was made. These were Group A and B.

(3) Cases of Land Exchange/Transfer

At the end of PRA sessions, the cases of land exchange or transfer were confirmed and officially acknowledge by PA officials.

3-1) Group A (Taticha Elan): one case of land exchange, and four cases of land transfer.

3-2) Group B (Taticha Golba): four cases for land exchange and three cases for land transfer.

7.3.6 Analyzing and Finalizing Memberships of WUA

(1) General

At first, a total 36 applicant members were recorded to form three sub-groups in Taticha Elan. The reason why OIDA could accept the number exceeding 20 households was related to different means of technical intervention that was determined by source of water. It is technically suggested that a pump with around 10 HP is over capacity of water lifting for hand-dug well that is the source of water in Taticha Elan locality. Because of such hydrogeological conditions, a smaller pump with around 3 – 5 hp that is mobile type is popular in use for contract irrigation farming practice in the area. Using the pump, a size of one WUA group might be suggested around 10 to 12. In this condition, Taticha Elan applicants were divided into three sub-groups, each of which was to be provided a pump for irrigation farming.

(2) Negative Influence over Memberships by PPO

Although Taticha Elan group have already submitted application attached by the list of applicant members that was even officially acknowledged by Dodo Wadara PA, composition of their members in Group B and C were changed through a series of PRA sessions due to negative influence by PPO.

(3) Influence over Memberships by Polygamy Practice

The other factor for a change of membership was found specifically in Group B. The factor was related to a certain member who is in polygamy marriage. He has three wives, and he intended to transfer a farm plot to the second wife for using this opportunity. In the middle of a series of PRA sessions, however, he fell in a situation of conflicts of interests among his wives. The first wife and the third wife were said to bring another proposal through which their sons should be given a piece of land through transfer, instead of the second wife. Certainly this incidence gave influence upon composition of members of Group B. The JICA/OIDA team kept the same position of the previous cases in a way that the second or third wife were accepted in polygamy case and their sons would be accepted if they were confirmed to be over 18 years old. By meeting these conditions, it was confirmed in the PRA sessions that his case was recognized as internal affairs of his household management, calling for his own solution and decision. No collective discussions were found not to be necessary in PRA sessions. The decision was left to the man. At last it was reported to PRA session that the second wife decided to withdraw the member, and sons of the first and second wife were decided to be members.

(4) Withdrawal from Original Applicant Members

Two original applicant members were recorded to withdraw from membership in Group B. One case was related to negative influence by PPO. He decided to keep lease contract with the PPO, eventually resulted in an arrangement of command area. The other case was that one of members was reported to lose his willingness to continue to be member. This case incurred in a course of discussion on polygamy case.

Eventually the finalization of membership of WUA was continued for Group B before the last session of PRA 6 just prior to the project agreement.

7.3.7 Establishing Group Fund for Operation and Maintenance of a Pump

(1) A Degree of Understanding on Types of Cost

At an initial stage of PRA session, it was found that a concept of replacement cost

was not recognized at all although an issue of cost recovery was repeatedly discussed and seemingly agreed. In PRA sessions, educative discussions on three types of cost; namely, (i) operation cost; (ii) maintenance cost; and, (iii) replacement cost, had been needed for creating fair understanding among WUA applicant members.

(2) Type of a Pump – Diesel use, Gasoline Use or Kerosene Use

PRA session was held in the middle of main rainy season (Meher). Accordingly, open field was not appropriate. Eventually one of Group A members kindly provided his guest house for PRA session assembling two groups together to discuss the issue on types of cost.

In discussions, one of applicant brought an issue on types of pumps in accordance with types of fuel, i.e., diesel, gasoline, or kerosene. Eventually this discussion became hot debate among them, resulting in no conclusion at all. In reference with information of pump specifications available in catalogues of three types of pumps, JICA/OIDA team led discussion to seek social solution among them. The catalogues that the team referred were Kubota pump for gasoline use, Robin pump for diesel use, and Yamaha pump for kerosene use. Market studies of availability of those pumps had been conducted prior to PRA session in terms of (i) price; (ii) popularity of use; (iii) availability in stock; (iv) availability of spare parts. According to this studies, the above three specific pumps were introduced to WUA applicant members in PRA session.

For leading the discussions, five factors were identified to review discussions concerning advantage and disadvantage of three pumps for their selection. Five factors included (i) mobility of pump– mobile type or fixed type; (ii) size of command area with 3 ha; (iii) yield of well – determining capacity of a pump on 5 hp; (iv) price of pump eventually connecting with amount of PRC; and, (v) type of fuel directly connecting with operation cost.

2-1) Mobility of pump:

This discussion directly connects location of a pump house, construction cost of pump house, and management modality of each WUA. At the same time their preference should be listened to accommodate it as much as possible in consideration of project sustainability. Explaining the above matters in PRA, WUA applicant members were asked to vote for selection. The result of voting indicated all the applicants preferred mobile type rather than fixed type. Their reason was popularity in use of mobile type of pump that directly connected the second and third factors as below. Especially yield of well fluctuate due to occurrence of drought and erratic rainfall.

2-2) Size of Command Area:

Finding from the study was presented suggesting that 3 ha of command area is justified for irrigation management by using around 5hp of pump and shallow well.

2-3) Yield of Well:

Results from pumping tests were also presented confirming that yield of groundwater from shallow well is suitable for small pumping discharge around at 6 l/s, and eventually small-scale irrigation is appropriate around 3 ha of command area. Also portability of pump is taken into considerations in response to unexpected fluctuation of groundwater level due to occurrence of drought in the area.

2-4) Price of Pump

Market price was introduced as Birr 6,000 to Birr 7,000 for Kubota Gasoline pump, Birr 12,000 (18,500 including spare parts) for Robin Diesel pump; and Birr 7,000 for Yamaha Kerosine.

2-5) Type of Fuel

Fuel price was confirmed at first as Birr 4.4 per liter for gasoline; Birr 2.72 per liter for diesel; and Birr 2.1 per liter for kerosene. PRA sessions moved to clarify operation cost of pump taking an example of maize since they had experiences to produce. Based on their farming experiences, 4 months of crop season was taken for maize, while 7 days of irrigation interval was taken. As a result irrigation frequency was calculated as 17 time. On the other hand 1.1 liter per hour was taken as average fuel consumption, while around 4 hours per time was found to be enough for maize production.

Comparison of Operation Cost for Maize Production per season per HH

Type of Fuel	Calculation	Result
Gasoline	Br 4.4 x 1.1 x 4 x 17	Birr 329.12
Diesel	Br 2.72 x 1.1 x 4 x 17	Birr 203.46
Kerosine	Br 2.1 x 1.1 x 4 x 17	Birr 157.08

Accordingly Kerosine type of pump was suggested in terms of operation cost. However, in terms of current popularity, diesel had been found more popular than kerosene type resulting in more availability of spare parts for diesel type. Other matter was found that diesel fuel has been more easier availability than kerosene in those area. Therefore, as a conclusion, diesel pump was decided.

(3) Pump House

3-1) Security Issue on Mobile Type of Pump

The conclusion to have a mobile type of pump led the groups to discuss about issues on security and proper use of pump. The JICA/OIDA team emphasized on security issue. As a result groups reached their consensus to assign a guard to safeguard a pump. At the same time proper handling of a pump was also stressed. Two applicant groups were shared with an official instruction by OIDA in a way that a pump might be taken away from WUA if OIDA observed improper use of a pump including leasing out it to non-members, and using it for other purpose.

3-2) Number of Pump House

Based on the above conclusion, WUA applicant group first preferred individual pump house for each group to one collective pump house. However, discussion moved to operation cost of guard salary. In the case of individual pump house, certainly each group was needed to have at least one guard. According to this discussion, two groups easily reached to their conclusion that one collective pump house was proposed.

3-3) Store of pipe

The use of a pump house was also discussed resulting in that pipes should be stored in a pump house properly.

(4) Pipe

In PRA session, lengths of pipe was discussed and resulted in that 150 meter of pipes were necessary to cover command area.

(5) Breakdown of cost

Through an exercise on financial management, two applicant groups of Taticha Elan and Golba reached the following understanding on the breakdown of cost.

5-1) Irrigation frequency

Irrigation Frequency per Season (PRA in Taticha Elan)

Crop	Crop season	Irrigation Interval	Frequency
Tomato	3 months	4 days	23 times
Chili	4 months	5 days	24 times
Maize	4 months	7 days	17 times
Onion	4 months	4 days	30 times

5-2) Cost for Tomato Production per Season per Household

Operation cost		
- Fuel & Lubricant	:	Birr 317 per HH per season
- Guard (Br 120 salary)	:	Birr 30 per HH per season
Maintenance cost		
- Pump maintenance	:	Birr 90 per HH per season
- Pipe maintenance	:	Birr 21 per HH per season
Replacement cost	:	
- Pump Replacement	:	Birr 97 per HH per season
- Pipe Replacement	:	Birr 21 per HH per season
Total	:	Birr 576 per HH per season

Remark
Pipe replacement cost:
service period: 5 years; lengths required: 150 m; no. of pipes required (6 m per each): 25 pieces; unit market price of pipe: Birr 100)

5-3) Comparative study between WUA operation and Contract with PPO

In reference with the above discussions on cost requirements for WUA management, comparative study was made to know any differences and similarity between WUA operation and contract farming with PPO. The results is presented as below.

Comparison of O/M Cost between WUA and Contract Farming with PPO

Cost Category	WUA Operation	Contract with PPO
1) Operation Cost (Fuel)	Birr 317	Birr 317
2) Maintenance Cost	Birr 111	Birr 0
3) Replacement Cost	Birr 118	Birr 0
4) Rental Cost		Birr 1,150
Total	Birr 546	Birr 1,467
Difference	(+) Birr 921	(-) Birr 921

Remark:
Rental cost: Birr 50/time; 23 times per season for tomato;

Through the above discussion in the PRA, it was found that WUA operation could succeed in reduction of cost at Birr 921 per season per HH for tomato production, if WUA could secure market channel to sell their products and proper agricultural extension services in order to keep marketable quality of products.

(6) Group Fund Formation

In order to safeguard collective money, especially replacement reserves to be accumulated at a total amount of Birr 18,500 at the end, all WUA applicant members reached to their consensus to open and hold a bank account in assistance of OIDA

Meki office.

7.3.8 Electing Board Members of Taticha Elan and Taticha Golba WUAs

Having agreed with premises and all operation conditions during PRA session, Taticha Elan and Taticha Golba applicant groups held their first general assemble to elect board members consisting of (i) chairperson, (ii) secretary, (iii) treasurer; (iv) cashier; and (v) inspector/auditor on 9 October 2003. The minutes of meeting was prepared by the newly elected secretary.

7.3.9 Documentation of Project Agreement

The project agreement was reached by signing between OIDA and Taticha Elan WUA and Taticha Golba WUA on 9 October 2003 by using the following sets of documents.

1) Project agreement in Oromia language
2) Clearance document on the previous land lease contract
3) Internal agreement on land exchange acknowledged by PA
4) WUA minutes of meeting on the election of executive committee members
5) WUA Minutes of Meeting on signatory member to operate a bank account.

7.3.10 Physical Plan and Design

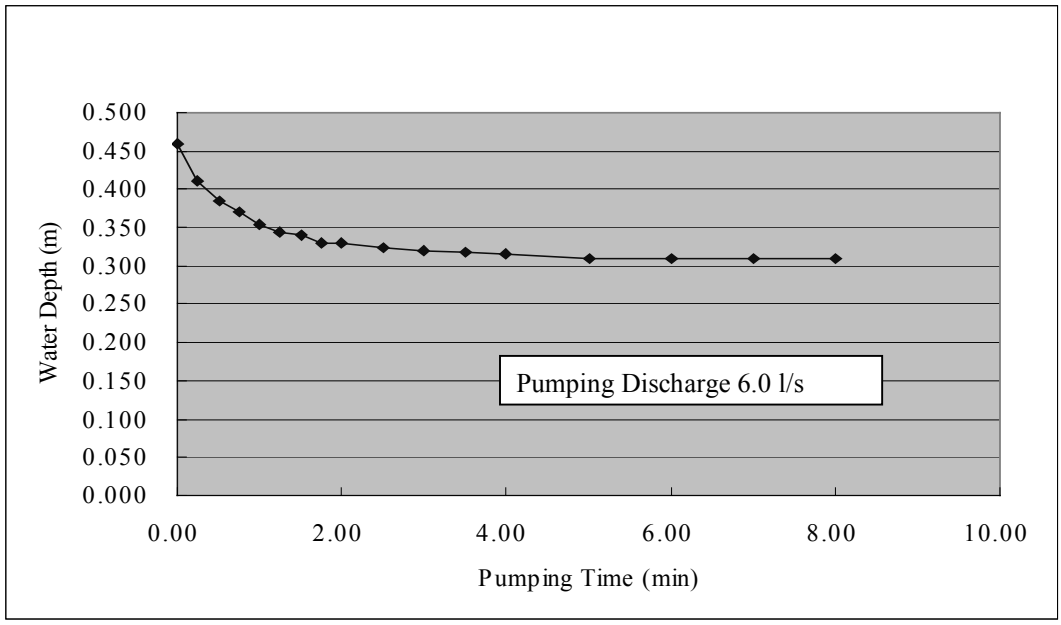
(1) The Basic Layout Plan Proposed by WUA Applicants

In this area the water source for irrigation is groundwater. The members proposed to organize themselves into three sub-groups using dug-well and requested OIDA to provide them with three small pumps.

(2) Engineering Aspects

On 27 July 2003, in a parallel with PRA workshop OIDA/JICA team carried out a preliminary pumping test of one dug-well in the community area, which is one of the proposed well, to check the yield of water. The result of pumping test is shown in the following graph.

Results of Pumping Test



The pumping test was carried out using the existing pump with 5 HP. The water level rapidly went down after pumping, and the speed of level down became slow and after 6 minutes water level was almost balanced in depth of 31cm. As a result of the pumping test the following findings were confirmed.

1) The yield of ground water was justified to be enough for small scheme irrigation with small pumping discharge.
2) A small capacity pump is suitable for groundwater irrigation taking portability and the groundwater level during dry season into consideration. The design pumping discharge are applied around 6.0 l/s.

7.3.11 Progress of Procurement and Construction

Upon the project agreement on 9 October 2003, .construction of the pump house was immediately commenced on 10 October 2003 together with procurement of necessary construction materials as well as two pumps and pipes.

Two pumps were installed on 1 November 2003, and the construction of the pump house was completed on 5 November 2003. Trial operation of the pumps were started on 11 November 2003.

7.3.12 Handing Over

The Process of handing over had been commenced at the time when trial operation was resulted in confirmation on proper water distribution into command area. Despite of its commencement, a whole process to have signatories on the documents have been delayed due to unavailability of OIDA Meki office staff who have been

mobilized into a region-wide program of water harvesting. By the month of June 2004, it was re-confirmed that OIDA wareda office was quite aware of this process to be finalized in the near future.

7.4 Salient Feature of Scheme

The salient features of the original and the modified plans are summarized below:

Salient Feature of Taticha Elan Scheme

Item	Original Plan	Modified Plan
1. General Information		
1-1 Proposed command area	3.00ha	-
1-2 No. of house hold	12 HH	-
1-3 Required water discharge	13.0 lit/s	-
2. Pump		
2-1 Actual water head	6.0 m designed canal base E.L - W.L	-
2-2 Total water head	11.0m	-
2-3 Required pump horse power	5 hp	-
2-4 Pipe	1) Suction pipe dia: 80mm, length : 6.0m 2) Delivery pipe dia: 80mm, length : 200.0m (Maximum)	- -

Salient Feature of Taticha Golba Scheme

Item	Original Plan	Modified Plan
1. General Information		
1-1 Proposed command area	3.00ha	-
1-2 No. of house hold	12 HH	-
1-3 Required water discharge	13.0 lit/s	-
2. Pump		
2-1 Actual water head	6.0 m designed canal base E.L - W.L	-
2-2 Total water head	11.0m	-
2-3 Required pump horse power	5 hp	-
2-4 Pipe	1) Suction pipe dia: 80mm, length : 6.0m 2) Delivery pipe dia: 80mm, length :200.0m (Maximum)	- -

7.5 Cost Implication

The comparison between preliminary cost estimate and actual expenditures is as summarized below.

Cost Estimate and Actual Expenditure

Item	Estimated Cost (Birr)		Actual Expenditures (Birr)	
	Taticha Elan	Taticha Golba	Taticha Elan	Taticha Golba
Pump	18,500	18,500	18,500	18,500
Pump store house	12,000		8,500	
Machinery work	8,400	8,400	7,800	7,800
PVC pipe	3,700	3,700	3,900	3,900
Other work	1,200	1,200	1,000	1,000
Dug-well improvement work	2,200	2,200	1,500	1,500
Total	40,000	40,000	29,150	29,150

CHAPTER 8 PRA FIELD REPORT ON KENTERI MICHAEL WUA

8.1 Activities of PRA

The schedule of PRA and construction in Kenteri Michael WUA is summarized below.

13 May 2003	: Confirmation of group intention
17 October 2003	: PRA1 Confirmation of application and Premises
23 October 2003	: PRA2 Members and land arrangement
30 October 2003	: PRA3 Land exchange and cost sharing
6 November 2003	: PRA4 Physical plan
14 November 2003	: PRA5 Financial management
20 November 2003	: PRA6 Election of WUA board members
22 November 2003	: PRA 7 Agreement
23 November 2003	: Commencement of construction
5 January 2004	: Installation of pump
10 January 2004	: Completion of construction
12 January 2004	: Trial operation

8.2 Background of Community

The proposed area is situated some 30 km north of the Meki town along the main highway from Mojo to Meki. The area is characterized by higher groundwater table in most of places within a range between 5 m and 10 m at depth, which is probably related with the water level of the Koka lake and the Elen lake.

With this favorable condition, small-scale groundwater irrigation by using handy pumps of around 5 hp has been prevailing in the area. PPOs and middlemen have promoted contract farming with local farmers for marketing horticultural crops of high values and have played significant roles in introducing relevant farming technologies. However, majority of local farmers never took part in most decisions related to benefit sharing and could not obtain rational benefits under contract farming. Although most of farmers realized their unfavorable positions in contract farming, it has been highly difficult for individual families to own their pumps without financial assistance. Because of the above reasons the member farmers organized a group and submitted their application for provision of a handy pump to the OIDA Meki office.

The site was selected being one of the potential sites among 52 applicant groups. The selected group called Kanteli Michael was organized by 32 members. The JICA

Study Team requested to split the group into two (2) sub-groups in order to adjust the capacity of a pump to the acreage to be irrigated by one pump.

List of Applicants and Attendances in PRA

1) Attendance Record of Kenteri Michael - Group A

No	Position	Sex	Irrigation experience	Blood relation	Farm Land holding		Attendance					
					No. plot	Size (ha)	17/10/03	23/10/03	30/10/03	6/11/03	14/11/03	20/11/03
1	Head	M	PPO	Husband of 7	3	3.25	o	o	o	o	o	o
2	Head	M	Rental of Pump	Brother of 12	3	1.50	o	o	o	o	o	o
3	Head	M					x	x	o	x	x	x
4	Head	M	No	Brother of 5	3	1.75	o	x	x	x	o	o
5	Head	M			3	2.75	x	o	x	o	o	o
6	Head	M	Rental of pump		6	3.50	o	o	o	o	o	o
7	Wife	F		Wife of 1								
8	Head	M	PPO		3	1.25	o	o	o	o	o	o
9	Head	M		Brother of 12	1	0.25	x	x	o	o	o	o
10	Head	F			4	3.25	o					
11	Head	F	No		2	1.00	o	o	o	x*[1]	o	o
12	Wife	F	No		2	2.00	o	o	o	x*[2]	o	o
13	Head	M		Brother of 1	1	0.25	x	o	o	o	o	o
14	Head	M		Brother of 3	3	3.00	x	o	o	o	o	o
15	Son	M		Son of 6	1	0.25	x	x	o	o	x	x
							8	9	11	9	11	11

Remark : o represents Presence, x is absence
*1 and *2 No 11, 12 are not attended during 6/11/03 Discussion session; because Death of one member of their family.

2) Attendance Record of Kenteri Michael - Group B

No	Position	Sex	Irrigation experience	Blood relation	Farm Land holding		Attendance					
					No. plot	Size (ha)	17/10/03	23/10/03	30/10/03	6/11/03	14/11/03	20/11/03
1	Head	M	PPO		3	2.5	o	o	o	x	x	x
2	Son	M	No		1	0.5	o	o	o	o	o	o
3	Head	F	No	Wife of 7	2	5.0	o	o	o	x	o	o
4	Head	M	No		2	2.375	o	o	o	o	o	o
5	Head	F										
6	Head	M	No rented pump	Brother of 9 and from group A12	2	2.5	o	o	o	o	x	o
7	Head	M			2	0.75	o	o	o	o	o	o
8	Head	F	PPO		2	2.625	o	o	o	o	o	o
9	Head	M		Brother of 10								
10	Head	M										
11	Head	M										
12	Head	F			2	1.25	x	o	o	o	o	o

No	Position	Sex	Irrigation experience	Blood relation	Farm Land holding		Attendance					
					No. plot	Size (ha)	17/10/03	23/10/03	30/10/03	6/11/03	14/11/03	20/11/03
13	Head	M		Son of 4	1	0.25	x	o	o	o	o	o
14	Wife	F		Daughter of 8	1	0.25	x	o	o	o	o	o
15	Head	M		Brother of 1	1	0.25	x	o				
16	Head	M			2	3	x	o	o	o	o	o
17	Head	M			3	3	x	x	o	o	o	o
							7	12	12	10	10	11

Remark : o represents Presence, x is absence

8.3 Focal Points in PRA

8.3.1 Community's Self-Preparation (1): Premises

(1) Confirmation of Applicants

In the 1st PRA session held on 17 October 2003, only eight (8) members of Group A and seven (7) member of Group B attended the session, as per a fact that 15 members of Group A and 17 members of Group B were originally registered as applicants, respectively. There was a need to reconfirm the WUA applicants through each PRA session since it was found to be lack of homogeneity as a group.

(2) Understanding Community Rationale for Application

Both applicant groups raised the following as reasons in requesting pump for irrigation

- Shortage of rainfall amount and erratic distribution patterns
- Pump irrigation experience and availability of shallow groundwater
- Low benefit from different arrangements with PPOs and marketing middlemen specially those coming from Addis Ababa

(3) Explanation on the 11 points of the Premises to Agree or Disagree

An explanation was given about the premises. No objections to the premises were raised from the members.

(4) Repeated Re-confirmation of Applicants and Discussion on Premises

4-1) Reconfirmation of Applicants

The 2nd PRA was held on 23 October 2003. Nine (9) members including two (2) new members attended the 2nd PRA for Group A, while 12 members including five (5) new members for Group B. About 21 members from both groups attended the meeting.

There were dropouts from previous applicants as there were also new applicants. The following table summarizes the cases of dropouts and new members in both groups to finalize the list of applicants resulted in decrease in number from 15 to 12 in Group A.

Group A

No	Name of dropout	Sex	Reason for resign	New applicant	Sex
1		F	Husband is a member and based on agreement reached in defining a household		M
2		F	Lack of willingness or may be other reasons economic reasons		M
3		M	This applicant did not attended all the PRA even though the reason for his not appearing not identified		

In-Group B there was about 16 original applicant members, 5 of whom dropped out due to the reasons tabulated as below. The members invited another new applicant. Asked for why he did not included in the original application one of new applicants responded that having personal conflict with the previous acting group leader who passed away and also has no sufficient information.

Group B

No	Name of dropout	Sex	Reason for Resign	New applicant	Sex
1		F	Her plot is flooded		M
2		M	Passed away and his successor is not willing		
3		M	Brother of No 2 and unable to get plot		
4		M	Unable to get plot in the command area		
5		M	Unable to get plot on exchange basis		

4-2) Premises

The premises to be explained to and understood by WUA applicants. No objections were made.

8.3.2 Community's Self-Preparation (2): Land Exchange / Transfer

(1) Presentation of Physical Layout

In the 2nd PRA session, presentation of physical layout map by WUA applicant was made.

The group representatives presented physical layout map indicating individual holdings for 0.25 ha/HH. The participants gave comments and suggestions. The command area was found to supply two sources (wells) for Group A. One of the issues raised was raised as that an intended canal from one well should cross the plot

of other non-member. Farm road was also found to be a problem. Group A and the PRA team agreed to seek for alternative designs. Moreover, the PRA team together with the groups made physical observation of the proposed irrigation site. This group was asked to modify the layout map in order to solve the problems raised. No serious comments raised on the layout map of Group B since water source is promising with feasible topographic feature. But because of issues related to land they are also requested to come with improved layout map.

(2) Land Arrangements

Within Group A, no land exchange case was encountered, while three (3) cases of land transfer were observed. Within Group B, five (5) land exchange cases were settled, while two (2) cases of land transfer were observed. These arrangements were to be confirmed through the PA Chairperson.

8.3.3 Community's Self-Preparation (3): Farm Inputs

(1) Internal Strategy for Non-Provision of Farm Inputs

According to the premises, OIDA only provide pump but the WUA member should be responsible for securing the operating expenses required for practicing irrigation. In the 3rd PRA on 30 October 2003, detailed discussion was made and the members were asked to list their internal strategies. Out of 19 members, only one (1) member was in a position to procure farm inputs by his own budget, while 16 members expressed to their preference for credit services available by middlemen from Addis Ababa. It was followed by allocation from non-farm income and informal credits.

It can be understood that the majority of the members preferred or planned working with marketing middlemen as strategy to secure expenses related to irrigation development. The PRA team tried to elaborate obligations of WUA in relation to transferring the right of using a pump as a member for outsider. After explanation some of the members were convinced and tried to seek for alternatives like cultivating low input crops and sale of livestock.

From their experience with PPOs and middlemen, they attempted to categorize marketing middlemen as follows

Type of Middlemen

No	Type of Middlemen	Type of services	Advantage	Disadvantage
1	Middlemen from Addis Ababa	Credit service as cash or in kind (input provision) Market service	Provision of credit and in put Market security	Buy at lower farm gate price Violation of agreement Postponement of market service
2	Middlemen from Methehara / Jijiga	Regular market service	Buy all products at current market prices	Market is not secured No credit service
3	Local middlemen	Regular market service	Purchase low quality product. Available during lowest price period Relatively better price Low amount of product is purchased	Balance is not used and measurement is based on judgment Not regularly available

The WUA members raise the following paths in dealing with horticultural crops marketing middlemen.

1) Access made through broker
2) Farmer-middlemen direct interaction
3) Formal agreement through involvement of local leaders PA in this case.

(2) Identification of Low and High Value Crops

Being convinced that dependency on middlemen needs to be limited, cultivation of low in input crops under the general objective of household food security was agreed and crops were also categorized into low costing and high initial cost but more income generating.

Crop Selection

High input crop	Low input crops
1. Tomato	1. Papaya
2. Onion	2. Ethiopian cabbage
3. Cabbage (Western)	3. Pepper
4. Potato	4. Maize

(3) Crop Preference

The participant's preferences on the above crops were analyzed through pair wise ranking between the two categories of crops as tabulated below.

Pair-wise Crop Selection

a) Low input Crops

Crop	Local cabbage	Pepper	Papaya	Maize
Maize	1	0	2	
Papaya	11	13		18
Pepper	4		7	20
Local cabbage		15	10	19
Score	16	28	19	57
Rank	4th	2nd	3rd	1st

b) High input crops

Crop	Tomato	Onion	Potato	Western Cabbage
Western Cabbage	14	9	8	
Potato	13	8		12
Onion	20		7	10
Tomato		0	7	5
Score	47	17	22	27
Rank	1st	4th	3rd	2nd

Moreover the PRA facilitator has tried to investigate the reasons behind selecting or not selecting among the categories. Accordingly the following findings are tabulated.

c) Maize (1st) and Local Cabbage(4th) among low input crops

Crop	Favorable	Unfavorable
Maize	- Early harvested (2-3month) - Staple food in area - High production in irrigation (20 qt /0.25 ha) - High return compared to other when sold at early stage - By product used as cattle feed, fire wood and even for construction Purpose	- Low return and difficulty to cover pump operation expenses
Ethiopian Cabbage	- Frequently harvested (6 month) - Early harvest long irrigation frequency (low water consumption)	- Low market price and low return - Less is consumed at home as compared to maize

d) Tomato (1st) and Onion (4th) among high input crops

Crop	Favorable	Unfavorable
Tomato	- High in come - Relatively low seed cost - Relatively low chemical (cost) - High experience in tomato cultivation - Simple to use at house hold consumption - Early harvest (3 month)	- Low risk prone (being perishable) - Need intensive management - Considerable damage by predators
Onion	- One time harvest. -Can be stored for long time at field (harvesting time can be delayed) -Can generate good income	- Labor intensive - Late harvest (2 month for seeding, 4 month for harvests) - High cost - Difficult to manage (Specially women)

8.3.4 Community's Self-Preparation (4): Cost-Sharing

Cost sharing was discussed. The contents of discussion were different from the other WUAs. They said that cost-sharing should be according to size of holding. Some members insisted that there must be equal sharing of cost even though the plot is less. At this junction one woman member decided to resign her membership rather than paying equal amount for smaller plot than others. Finally it was agreed among the members that cost sharing should be made according to plot size particularly in this case since it is difficult to obtain more plot area through exchange.

8.3.5 Making Community-based Physical Layout

(1) Continued Internal Arrangement of Land Exchange or Transfer

The discussion was continued since the 2nd PRA to confirm land exchange and transfer internal agreement. However, land transfer and exchange cases were not finalized.

(2) Emphasis on Stabilization of Membership

PRA started by emphasizing on stability of membership within WUA applicant group. Accordingly the contributing factors suggested by WUA applicant group for instability were:

1) Low level of awareness toward land issue
2) Most members consider transfer and exchange of land as temporary and having the same ownership right as before.
3) Variations of land quality between exchangeable plots
4) Husband and wife applicant and definition of household: Consensus has been reached at other PRA sites by JICA and OIDA team regarding necessity of considering one applicant either husband or wife from single household as WUA applicant
5) The case of death of one initial applicant
6) There is who withdraw having heard the contents of the premises as there are also who joins as new applicants.

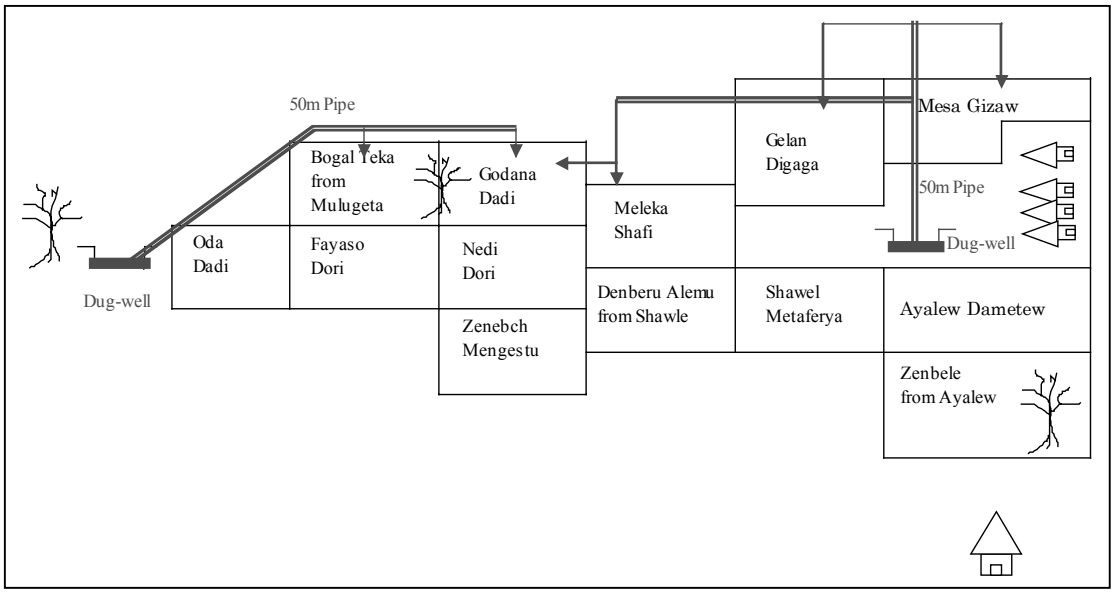
It was agreed that stability of membership should be maintained to finalize all the procedures required and attain the desired goal of irrigation development.

(3) Presentation of Community-based Physical Layout

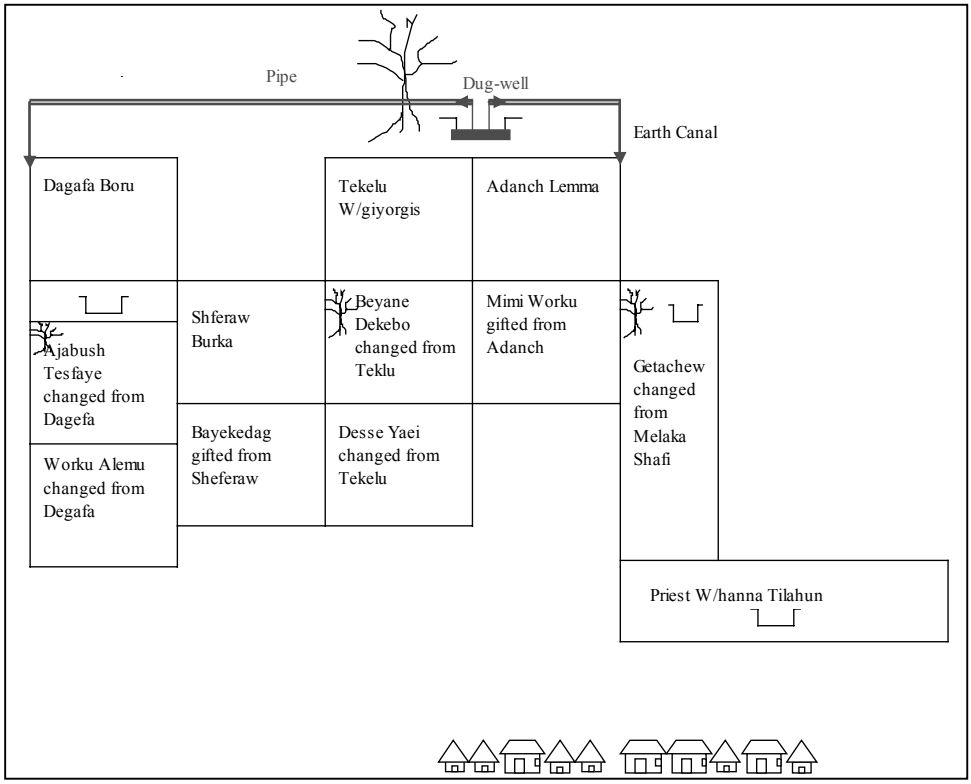
Following the emphasis on stability of membership, finalized layout maps were presented by both sub groups and agreed on by all participants except the case of sub group A considering a necessity to have farm road for vehicles that deliver their

products. The majority agreed with the following presentation:

3-1) Group A:



3-1) Group B:



8.3.6 Establishing Group Fund for Operation and Maintenance of a Pump

(1) Assessment of Livestock Asset Possession by each Group

In the 4th PRA session on 14 November 2003, to study the internal preparedness of the WUA members in securing farm inputs and their capacity to cover pump operation expenses, livestock holding was assessed for each applicant.

Livestock holding by Members

1-1) Group A

No	Chicken	Ox	Veal	Cow	Heifer	Sheep	Goat	Donkey	Average value
1	5	2	2	1	2	1	0	1	4,375
2	3	1	0	0	0	6	0	0	1,430
3									0
4									0
5	2	2	1	1	0	0	2	1	3,135
6	3	2	1	2	1	3	0	0	3,780
7									0
8	0	0	1	1	1	0	11	0	2,120
9	0	0	0	0	0	0	0	0	0
10									0
11	4	2	1	2	0	2	0	1	3,265
12	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0
Min. Price	5	600	300	400	300	70	60	350	
Max. Price	15	1000	600	600	500	130	80	500	
Average	10	800	450	500	400	100	70	425	

1-2) Group B

No	Chicken	Ox	Veal	Cow	Heifer	Sheep	Goat	Donkey	Average value
1									
2	0	1	1	0	0	0	0	0	1,250
3									
4	0	2	1	1	1	0	0	1	3,375
5	0	2	0	0	0	0	0	0	1,60
6	2	0	1	1	0	1	0	0	1,040
7	1	0	0	0	0	0	0	0	10
8	0	0	1	1	1	0	7	0	2,050
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
11	1	1	1	0	0	0	0	0	1,260
12	0	3	1	2	1	5	5	1	5,525
Min. Price	5	600	300	400	300	60	70	350	
Max. Price	15	1000	600	600	500	80	130	500	
Average	10	800	450	500	400	70	100	425	

No data were available for members absent during the enumeration.

(2) Discussions on Operation, Maintenance and Replacement Cost

2-1) Cost for Pump Operation

This topic was made to create awareness for WUA members so that they could make self-preparation and start the business knowing the cost associated with pump irrigation. This cost estimation did not include production costs. The costs of fuel, guard and operator were considered in this category of expenses. The quantity of fuel required on 0.25ha plot by three selected crops was summarized in the following table.

Irrigation Interval and Frequency

Type of crop	Irrigation Interval (days)	Frequency	Fuel expense per seasons/ HH
Maize	7	13	Birr 139
Tomato	4	26	Birr 339
Pepper	5	24	Birr 312

2-2) Cost for Guard and Operator

In relation to guard two alternatives were mentioned by the WUA applicant members; (i) regular guard with fee (salary); and, (ii)the other is that each member should be responsible to keep the WUA property turn by turn. The second system (keeping by WUA member) was found to be difficult for women member and also it was recognized as complicated to manage and delegate responsibility for each member. Because of the above mentioned shortcoming the participants decided to employ a guard by paying salary and hence the second alternative was rejected. On the other hand the two sub-groups have decided to form one pump house and hence to guard and operator in common.

It was discussed and agreed to employee two individuals who can serve as both guard and operator. Moreover they decide to pay 120 Birr/month for each. The expense for guard and operator for each household was estimated as follow assuming one cropping season being 4 month and 24 members in each group. (120Birr/month/employee x 2 employees x 4month)/24HH = Birr40/HH

Following the previous session, the 5th PRA was held on 14 November, 2003 to continue financial issues of operation and maintenance of irrigation scheme with high attendance rate for each sub group is 91.6% for A and 83.3% for B sub groups. The session started by revising cost-benefit aspect proceeding from the previous one.

2-3) Cost estimation for pump maintenance

The maintenance cost of pump is discussed as follows.

Pump Maintenance

Item	Total cost /per group	Frequency/maintenance interval	Cost per season per group	Cost per season per House hold	Remark
Regular maintenance					
- Oil fuel filter	200	Season	200	17	
- Oil	80	Season	80	7	
- Fascia	300	3 year	50	4	
- Technician	100	3 year	17	1.4	
- Antino	60	2 year	15	1.25	
- Ring	200	2 year	50	4	
- Mechanical Service (Spear parts etc..)			462.5	38.5	5% of a pump cost a year
Total			874.5	73.15	

2-4) Pump and Pipe replacement Costs

The second issue of pump related cost was PRC. Over through a series of PRA sessions, the issue has been discussed and all the WUA applicant members have agreed to pay the PRC. Other replacement cost is pipe replacement.

These costs are estimated as follow.

No	Item	Quantity	Cost	Total	Life span	Replacement cost per season per group	Replacement cost per-season per-Household
	Group A						
1	Pipe	25	100	2,500	5 year	250	20.80
2	Connecter	24	20	480	5 year	48	4.00
3	Pump	1	18,500	18,500	8 year	1,156	96.30
	Total			21,480		1,454	121.1
	Group B						
1	Pipe	8	100	800	5 year	80	7
2	Connector	7	20	140	5 year	14	1.2
3	Pump	1	18,500	18,500	8 year	1,156	96.3
	Total			19,440		1,250	104.5

2-5) Summary of Operation and Maintenance Expenses

No	Expense Type	Amount in range by Sub groups (Birr)			
		Group A		Group B	
		Minimum	Maximum	Minimum	Maximum
1	Pump Operation	179	379	179	379
2	Pump Maintenance	73.15	73.15	73.15	73.15
3	Pump & pipe replacement	121.10	121.10	104.50	104.50
	Total	373.25	573.25	356.65	556.65

2-6) Cost-Benefit Analysis of Irrigation Production

No	Particulars	Crop type			
		Maize	Pepper	Tomato	Cabbage
1	Yield/0.25ha	18	20	30	50
2	Selling Price/quintal (mean)	60	100	62.5	50
3	Gross Benefit (1*2)	1080	2000	1875	2500

No	Particulars	Crop type			
		Maize	Pepper	Tomato	Cabbage
4	Pump operation Cost	179	179	378	378
5	Maintenance cost	73.15	73.15	73.15	73.1
6	Replacement cost	121.10	121.10	121.10	121.10
7	Total costs (4+5+6)	373.25	373.25	572.25	572.25
8	Returns (3-4)	706.75	1626.75	1302.75	1927.75

(3) Group Fund Formation

3-1) Collective fuel Use and Revolving Fund Formation

During fuel cost estimation, the WUA applicant group had decided strategies to purchase fuel. They agreed to purchase in-group like one barrel at once. The next issue was how to secure initial revolving fund towards collective fuel management. It was agreed to contribute initial revolving fund for purchase of fuel by each member. Birr 35 per individual member was estimated as initial revolving fund for fuel purchase.

3-2) Free Labor Contributions and Group Fund

As far as this project is concerned, the communities are required to contribute 5% of total investment cost and above 5% contribution to be saved as group fund in terms of Birr 10 per man day. This arrangement was explained with an emphasis on the issue of project sustainability. The following estimates were exercised with the WUA applicants.

Total Project cost per group : Birr 40,000
5% of total cost : Birr 2,000
Wage rate : Birr10/man day
Total man days : Birr2000/Birr10/man day=200 man days
No of days required/individual : 200man day/12 HH =17 days

Each WUA applicant agreed to contribute 17 days free labor for the project. They were also glad in hearing to have a possibility to get group fund by supplying additional labor.

3-3) Financial Management of Group Fund

The PRA facilitator has tried to examine the strategies devised by the applicants in managing group fund. The participants forwarded the following points as far as financial transaction concerned.

i. Cash for fuel purchase including contingency should be reserved on the hands of the treasurer.

ii. The other fund including replacement cost should be reserved at a bank account.

An issue as to whether to have a common or separate bank account by each group was also discussed in detail and finally determined through votes. Actually as a single WUA it was preferable to have single bank account. Whether to open bank account at Mojo or Meki were also raised since both towns are located at the similar distance from the project location. It was agreed to open a bank account at Meki branch of the Commercial Bank of Ethiopia for administrative and other similar reasons.

The vote result was as follow.

No.	Ways of bank account devised	Vote by each group		
		Group A	Group B	Total
1	Common bank account	9	8	17
2	Separate bank account	0	2	2
	Total	9	10	19

WUA applicants reached to group consensus to operate and manage one bank account. Moreover the name of WUA was decided to call it as Kenteri Michael Irrigation Water Users Association'. Having common guard (operators), common bank account, and being one WUA, it reached to consensus to construct common pump house and store. The location for pump house was proposed by WUA applicants to be around the compound of PA office and the PA leaders accepted their request in PRA session.

8.3.7 Community's Obligations for Establishment of WUA

Before the PRA session was started, the JICA Study Team, OIDA team and WUA applicant group members observed an intended command area. It was proposed that some tree species would be planted around the command area and water wells for windbreak. This issue was also discussed with the general assembly and consensus was reached. The participants also suggested tree species, i.e. Acacia, Mila, Truman tree, Mango, Casmir and Avocado

Then The 6th PRA was held to discuss an issue of WUA obligations and a draft contents of project agreement. The session was started as usual by checking the attendance. 22 applicants were recorded to attend the session from both groups and the attendance rate as gross was about 91.7%. In this PRA session it was decided by WUA applicants to exclude one WUA applicant in Group A with his name of Mr. OD who attended only one day in the past.

The facilitator made explanation of draft obligation agreement. Detail discussion was made on each article of the draft agreement with the participants. Moreover, before

discussing the draft agreement the premises were revised in a form of question and answer.

8.3.8 Electing Board Members of Kenteri Michael WUA

Eight (8) members were nominated as candidates for WUA board members, and five (5) members were elected through voting. Group leaders and operators were also elected on democratic way at the same time. Finally all selected members explain their willingness and promised to take all responsibility.

8.3.9 Documentation of Project Agreement

The project agreement was reached by signing between OIDA and Kenteri Michael WUA on 22 November 2003.

8.3.10 Progress of Procurement and Construction

Upon the project agreement on 22 November 2003, .construction of the pump house was immediately commenced on 23 November 2003 together with procurement of necessary construction materials as well as a pump and pipes.

The pump was installed on 5 January 2004, and the construction of the pump house was completed on 10 January 2004. Then trial operation of the pump was started on 12 January 2004.

8.4 Salient Feature of Scheme

The salient features of the original and the modified plans are summarized below:

Item	Original Plan	Modified Plan
1. General Information		
1-1 Proposed command area	6.00 ha (3.00ha x 2 groups)	-
1-2 No. of house hold	24 HH (12HH x 2 groups)	-
1-3 Required water discharge	13.0 lit/s x 2 groups	-
2. Pump		
2-1 Actual water head	6.0 m designed canal base E.L - W.L	-
2-2 Total water head	11.0m	-
2-3 Required pump horse power	5 HP x 2 sets	-
2-4 Pipe	1) Suction pipe (PVC suction hose) dia: 80mm, length : 6.0m x 2 2) Delivery pipe (PVC) dia: 80mm, length : 50.0m (Group A) 200.0m (Group B)	

8.5 Cost Implication

The comparison between preliminary cost estimate and actual expenditures is as summarized below.

Cost Estimate and Actual Expenditure

Item	Estimated Cost (Birr)	Actual Expenditures (Birr)
Pump	37,000	37,000
Pump store house	12,000	11,800
Machinery work	16,000	15,750
PVC pipe	5,500	5,000
Other work	4,000	3,000
Dug-well improvement work	4,000	3,000
Total	78,500	75,550

CHAPTER 9 WUA TRAINING

9.1 Objectives

WUA training consists of the following three (3) training aspects.

1) Training on operation and maintenance of diesel engine pump
2) Training on WUA management (preparation of by-law)
3) Training on financial management

The trainings were provided to six (6) WUA by OIDA to carry out sustainable pump and WUA management by applying the training manuals prepared by the JICA Study Team in cooperation with OIDA. Training materials were presented in Attachment-1

9.2 Performance

A series of the WUA trainings was conducted based on the training manuals prepared by the JICA Study Team in cooperation with OIDA. The summary of WUA training is listed below:

Summary of WUA Training

Time	Target WUA	Training	Periods	Venue	No. of WUA participants
1st Training	1. Odaa Chisa 2. Bade Gosa	O&M of pump	4 to 5 Oct 2003 (2 days)	Odaa Chisaa pump house	10
		Financial management	6 to 7 Oct 2003 (2 days)	OIDA Meki office	10
		WUA management	18 to 20 Oct 2003 (3days)	OIDA Meki office	10
2nd Training	1. Oda Bilbila 2. Taticha Elan 3. Taticha Golba 4. Kenteri Mikael	O&M of pump	24 to 25 Nov 2003 (2days)	Kenteri Mikael scheme	20
		Financial management	26 to 27 Nov 2003 (2 days)	OIDA Meki office	20
		WUA management	28 Nov 2003 (1 day)	OIDA Meki office	20

CHAPTER 10 GUIDELINE FOR ESTABLISHEMENT AND MANAGEMENT OF WATER USERS ASSOCIATIONS

10.1 Introduction

(1) Purpose

The guideline was prepared at the end of the Meki study in February 2001. Under Program II, the overall review was made and revised in order to meet the present requirement for the guideline.

(2) Applicability of the Guideline

The guideline is applied for community-based small-scale pump irrigation projects at wareda level. There are two standard size of irrigation scheme depending on water resource as follows.

Applicability of Guideline

Water Resource	Command Area	Beneficiaries	Plot Size	Pump Capacities
River or Lake	5 ha	20 HH	0.25 ha/HH	10 HP
Groundwater (Shallow Well)	3 ha	12 HH	0.25 ha/HH	5 HP

(3) Users of the Guideline

Users of the guideline are social workers and engineers of OIDA being engaged in community mobilization of irrigation development projects.

(4) Concept of the Project

The guideline indicates the process in line with the following concepts, learning the past experience:

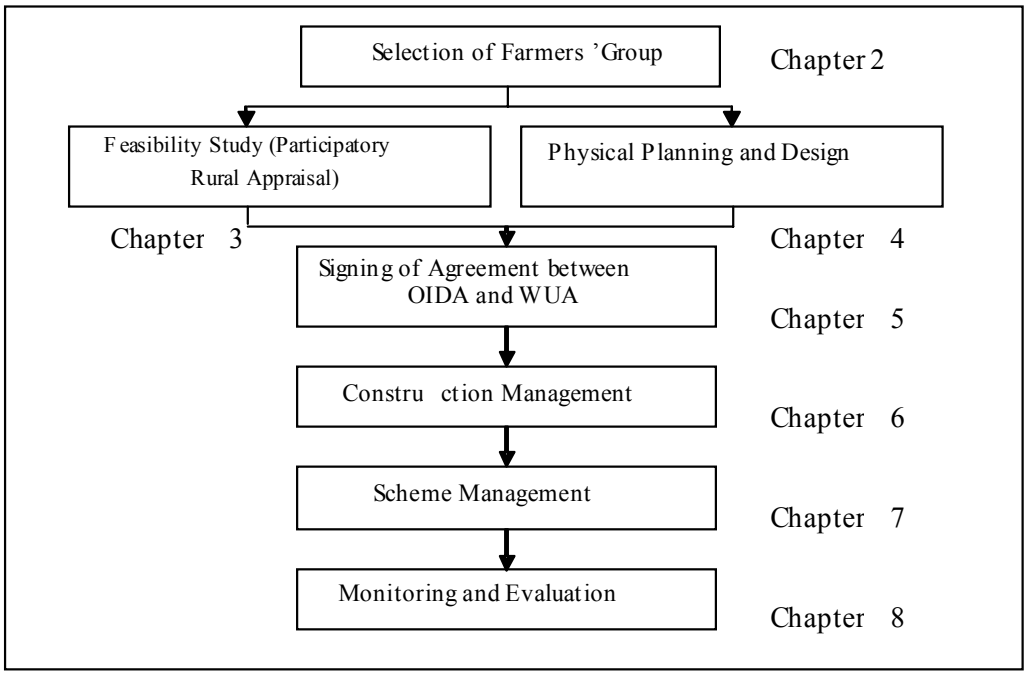
1) Concepts to achieve sustainable irrigation development, focusing on the following aspects.
   - Fair distribution of land and water resource among farmers
   - Fund formation by farmers
   - Saving for PRC
2) Awareness creation to let farmers understand the above concept and difficulty of irrigated farming practice
3) Discussion of responsibilities of OIDA and WUA, and consequent signing an agreement with farmers.
4) Enhanced farmers' participatory approach in planning and construction period

5) Strengthening WUA support for scheme management
6) Strengthening monitoring and evaluation system by OIDA and WUA

10.2 Contents of Guideline

The guideline is described according to the workflow of the WUA establishment in order. The contents of the guideline are presented below.

Contents of Guideline



The Guideline for Establishment and Management of WUA is presented in ANNEX V.

10.3 Duplicability of Guideline

It is obviously too early to discuss about duplicability of the guideline. During the study period, however, a case is presented in the 4th Project Monitoring Workshop that under the guidance of Dugda Bora Wareda OIDA desk, Meki-based Catholic NGO has already made an effort to translate the premises of guideline into Amharic, federal official working language, and modified it for their involvement in small-scale irrigation development project. The Amharic version of premises is presented in Attachment -2

Unlike the previous NGO approaches in Meki area, Catholic NGO adopted the core concept of JICA Study's community-based approach on irrigation project sustainability that is highlighted in an issue of WUA mandate to accumulate pump

replacement reserve. Adopting this concept, it is reported that NGO has modified the premises on the following points:

(i) Size of irrigation plot: 0.125 ha per household
(ii) Payment schedule of replacement reserve: 50 % in 2 years
(iii) Ownership of a pump: Half transfer of ownership from Wareda to WUA upon official confirmation of payment of 50 % replacement reserve deposited in a Bank

The presence of size of WUA by number of households and command area are not known. Duplicability of the guideline can be assessed based on continued monitoring and evaluation by OIDA Wareda desk. In other words, it is verified that the JICA Study contributes enhancement of implementation capacity of Dugda Bora Wareda OIDA desk involving NGO in irrigation development under their guidance. To continuously promote irrigation development in Meki area, Wareda's capacity of monitoring and evaluation on irrigation project is essential.

CHAPTER 11 PBME OF WUAs ESTABLISHED UNDER PROGRAM II

11.1 Objectives

This PBME was firstly applied to six (6) new WUAs after the Baseline Survey (BLS) in the December 2003, in which 21 bench mark farmers (BMF) were selected and surveyed. The 1st PBME envisaged verifying a wide range of the indicators to assess the sustainability of community-based irrigation development in Meki. In this report, the first analytical results concerning farm management at WUA and individual farmer level were reported from agronomic and financial point of view.

11.2 Methodology and Activities

The questionnaire survey was carried out for both WUA board members as well as WUA members. The survey was carried out by the JICA Study Team and the OIDA Meki office for 20 days from 19th May to 7th June 2004. The data compilation was done at the OIDA Meki office with aid of the computer introduced by JICA.

(1) Questionnaire Survey to WUA Board Members

Six (6) WUAs were surveyed in terms of the following aspect.

Monitoring Aspects	Indicators
Organization and Management	No. of members, Drop-out and reasons, Election of WUA board members, General meeting (frequency, agenda,), Board meeting (frequency, agenda,), Record keeping, Situation of by-laws, etc.
Land control	Scheme area, plots and layout, Plot ownership, etc.
Water control	Water shortage, Water management schedule and performance, Dispute in water distribution, etc.
Operation and Maintenance of Facilities	Pump operation and maintenance, O&M record keeping, Fuel procurement and consumption, Pump operator, etc.
Accounting	Bank account, Accounting files and record keeping, Deposits for pump replacement, Balance sheet, etc.
Constraints and Measures	Conflicts with crop traders/middlemen, PPOs, pump operators, outside farmers, etc.

(2) Questionnaire Survey to WUA Members

The questionnaire survey was carried out to 53 members out of all the WUA members of 106 under six (6) WUAs. The survey aspects are listed below.

Monitoring Aspects	Indicators
Household Characteristics of Member	Name, Gender, Age, Position in WUA
Farm Management Type	Land holding size by category, i.e. rainfed and irrigated, etc.
Crop Production	Crops, Cropping calendar, Planted area, Harvesting, Yield, Marketing, Prices, Main outlet (trader/middlemen), Plan for next crop seasons, etc.

Monitoring Aspects	Indicators
Farm Inputs	Seed rates, Seed sources & prices, Agro-chemicals & fertilizers (name, quantity, sources, prices), Farm mechanization (practices, charge), Hired labor (frequency, practices, wage), etc.
Irrigation	Irrigation interval, Irrigation hours per practice, Complaints to water supply conditions, Comments on water management schedules by WUA, etc.
WUA Activities	Comments on WUA activities and board members, etc.
Others	Income, Increment income, Expenditure, etc.

11.3 WUA Management

(1) Current Conditions of WUAs

Six (6) WUAs embarked on the irrigation farming in late 2003. The PBME verified that the total number of six (6) WUAs reduced from 106 to 103 by drop-out of three (3) members. The reasons of three (3) drop-outs were (i) lost incentives to WUA activities and (ii) land dispute. Command area was also changed due to drop-out of members and expanded by allocating farm plots as pump salary of pump operator.

The current conditions of six (6) WUAs are described below:

General Description of WUAs

Description	Oda Chisa	Bade Gosa	Oda Bilbila	Taticha Elan	Taticha Golba	Kenteri Mikael
Water Source	Ziway Lake	Ziway Lake	Ziway Lake	Ground-Water	Ground-water	Ground-water
Pump Capacity (HP)	12.5	12.5	12.5	5.0	5.0	5.0 (2 units
Canal Length (m)	Pipe:240 m	Pipe:40m Earth canal: 140m	Pipe:200m Earth canal: 300m	Pipe:200m	Pipe:200m	Pipe:200m
Command Area in Dec 03 (ha)	5.25	4.75	4.50	3.00	3.00	6.00
Command Area in May04 (ha)	5.25	5.00 (+0.25)	4.50	3.50 (+0.50)	2.75 (-0.25)	6.00
WUA members in Dec 03 (HH)	21	19	18	12	12	24
WUA members in May 04 (HH)	21	19	18	12	10 (-2)	23 (-1)

WUAs held the meeting 2 or 3 times after handing over. The main issues discussed include by-law, accounting, pump operation schedule, employment of operators, etc. Oda Chisa held meeting very frequently, i.e. 18 times, to discuss the water apportion with PPO in addition to the above-mentioned general issues. Over 90% of the respondents are satisfied with their WUA management.

The members of Bade Gosa WUA have complaints to the WUA board due to their weak leadership. The complaints are originated from lack of farm inputs, i.e. seeds, fertilizers and agro-chemicals, for high value vegetable production, which were not supplied by Program II. In contrast, the members of Oda Bilbila WUA were found to

be fully satisfied with the WUA activities because all of the members were supplied farm inputs for tomatoes under farming contract with traders. The performance of irrigation project in Meki is strongly affected by availability of farm inputs for the WUA members. This is commonly observed.

(2) Financial Status

The financial status of Oda Chisa as of May 2004 is summarized below.

Financial Status of Oda Chisa WUA (May 2004)

Description	Amount (Birr)	Proportion (%)
Revenue		
1.Members' wage during the construction under Program II	975	22
2.Organizational and personal donation	319	7
3.Members contribution	522	12
4.Penalty	38	1
5.Fuel sale to members for pump operation	1,426	33
6.Deposit for pump replacement	1,080	25
Total Revenue	4,360	100
Expenditure		
1.Expenses of Handing-over Ceremony	566	24
2.Stationaly	44	2
3.Cost for WUA Guideline	200	9
4.Fuel purchase	1,288	55
5.Transportation allowance for fuel purchase	52	2
6.Lubricant	49	2
7.Container for fuel	139	6
Total Expenditure	2,338	100
Net Reserve	2,023	

It may have been a little bit earlier to discuss the financial capability of WUA since only Oda Chisa WUA out of six (6) WUAs completed first harvest. In Oda Chisa, the total revenue of the WUA was Birr 4,360 of which Birr 1,700 was members' contribution and Birr 1,400 was fuel selling to members. The expenditure amounted to Birr 2,338 of which Birr 1,288 was for fuel purchase. It should be noted that the deposit for future PRC was Birr 1,080. Although the amount is limited to Birr 1,080 or 43% against the scheduled annual deposit of Birr 2,500, nine (9) members of 21 members are encouraged to investment for future.

The fund formation of the Oda Chisa WUA was initiated by collective wage (Birr 975) during the construction period by the JICA Study Team for compensation of their labor contribution above 5% of the total project cost. The most important part of financial management is purchase and sale of fuel for pump operation. Fuel is purchased in bulk by WUA and sold to the members upon their requirement. The selling price of fuel is higher than the purchasing prices to make reserve to cover cost of lubricant.

(3) Irrigation Water Management

The irrigation interval is about one week with slight changes among WUAs. The operation hours are 2.44 hours to complete irrigation of one plot on average. Over 80% of the members are satisfied with irrigation water supply to their individual plots, while some 70% of the members of Bade Gosa WUA expressed their complaints.

(4) Pump Maintenance

No mechanical problems of pump are so far reported except for defects of handy pump of Kenteri Mikael WUA. According to the technical advice by the OIDA Meki office, the WUA chairman traveled to Addis Ababa and procured necessary spare parts for immediate settlement of the problem.

(5) Assistance by OIDA

All the WUAs are quite confident with the governmental services provided by the OIDA Meki office. The questionnaire survey verified that the WUAs frequently visit the OIDA Meki office to consult about problems such as land dispute, lack/procurement of farm inputs, mechanical defects of pumps, etc.

11.4 Irrigation Farming under Program II

(1) Crop Selection

The main crops are represented by tomato, maize and chili, which occupied 81% of the total scheme area. However, the crop selection was varied by WUA. The results of survey are presented below.

General Description of WUAs (%)

	Oda Chisa	Bade Gosa	Oda Bilbila	Taticha Elan	Taticha Golba	Kenteri Mikael	Total
Tomato	5	22	100	0	8	48	34
Maize	0	0	0	86	92	13	25
Chili	64	11	0	0	0	35	23
Onion	2	33	0	14	0	1	8
Cabbage	18	22	0	0	0	0	8
Other	9	0	0	0	0	6	2
Fallow	2	11	0	0	0	0	2

Under the farming contract Oda Bilbila WUA was fully covered by tomato, while Oda Chisa, Taticha Elan and Taticha Golba WUAs selected maize, which is the cheapest among crop alternatives. Bade Gosa WUAs selected with mixture of such cash crops as onion, tomato, cabbage and chili.

(2) Cropping Calendar, Farm Inputs and Practices

The cropping calendar in Oda Chisa WUA is illustrated in Figure 3.3.1

Eleven members out of 20 surveyed members started 1st cropping in the period from middle of December 2003 to the beginning of January 2004. Other members started 1st cropping granularly form middle of January to end of February 2004. With this elongated sowing period, peak water requirement is mitigated. Some 80%of members selected chili for 1st Cropping season followed by cabbage (20%). It is conceivable that the members selected low input crops for 1st cropping season due to luck of farm budget.

It is remarkable that 4 members selected two to three crops for 1st cropping season. In addition, 6 members out of 11 interviewed members are contemplating maize for next cropping season mainly for home consumption. These multiple crop selection are desirable to reduce risk from price fluctuation.

Onion is high-input vegetable, which chili is low input crop. All the onion farmers used agro-chemicals, fertilizers and hired labor. Agro-chemicals are widely used not only onion but tomato. Hired labor inputs were conspicuous in cabbage and onion, which need intensive labor inputs for harvesting. Some 35% of the members hired either tractors or draft animal for land preparation.

(3) Crop Yield

The average crop yields in Oda Chisa are presented below.

Yield Records of 1st Cropping in Oda Chisa WUA

	Yield (ton/ha)			
	Cabbage	Chili	Onion	Tomato
Highest	14.6	5.1	16.0	5.2
Average	9.7	3.3	11.3	4.7
Lowest	2.1	2.3	8.0	4.0
Regional Average (Ave. Jun 02 – Jul 04)	7.7	8.1	8.6	8.5

(4) Farm gate prices

The farm gate prices in Oda Chisa are presented below.

Farm Gate Prices of 1st Cropping in Oda Chisa WUA

	Yield (Birr/kg)			
	Cabbage	Chili	Onion	Tomato
Highest	1.45	2.40	1.50	0.65
Average	0.76	1.44	1.43	0.56
Lowest	0.50	0.45	1.30	0.50
Regional Average (Ave. Jun 02 – Jul 04)	0.68	1.42	1.54	0.68

(5) Crop budget

The crop budget analysis was made for 1st crops in Oda Chisa WUA. The crop budgets are presented in Table 3.3.1 and summarized below.

Crop Budget Analyses of 1st Crop in Oda Chisa WUA

Item	Unit	Chili (No.2)	Chili (No.3)	Chili (No.5)	Chili (No.6)	Chili (No.7)	Chili (No.8)
Planted Area	ha/plot	0.187	0.25	0.25	0.25	0.187	0.187
Production	Qt	9.0	10.0	8.0	7.7	4.3	4.6
Converted	kg/ha	(4,740)	(4,000)	(3,200)	(3,080)	(2,260)	(2,420)
Selling Price	Birr/qt	45	50	100	240	175	200
Gross Revenue	Birr	405	500	800	1,848	751	918
Seed	Birr	20	21	20	70	34	9
Fertilizers	Birr	0	0	0	50	34	0
Agro-chemicals	Birr	0	125	0	115	94	20
Hired Labor	Birr	0	0	156	74	60	50
Tractor Service	Birr	0	0	0	130	0	68
Ox-cart	Birr	0	0	0	0	15	0
Irrigation (fuel)	Birr	125	250	313	188	187	117
Total Cost	Birr	145	396	489	686	424	264
Net Reserve	Birr/plot	260	104	311	1,162	327	654
Converted	Birr/ha	1,390	416	1,244	4,648	1,748	3,497
	US$/ha	157	47	141	525	197	395

Item	Unit	Chili (No.9)	Chili (No.10)	Chili (No.11)	Cabbage (No.1)	Cabbage (No.7)	Cabbage (No.9)
Planted Area	ha/plot	0.187	0.125	0.125	0.25	0.063	0.063
Production	qt	4.6	6.4	3.3	34.6	9.2	6.7
Converted	kg/ha	(2,420)	(4,920)	(2,540)	(13.840)	(15,330)	(11,170)
Selling Price	Birr/qt	223	166	100	60	145	60
Gross Revenue	Birr	1,024	1,062	330	2,075	1,334	402
Seed	Birr	48	20	59	50	12	16
Fertilizers	Birr	93	0	0	100	11	31
Agro-chemicals	Birr	43	62	170	29	31	14
Hired Labor	Birr	66	35	56	0	10	6
Tractor Service	Birr	68	0	0	70	0	0
Ox-cart	Birr	0	10	0	0	5	23
Irrigation (fuel)	Birr	47	98	103	130	66	16
Total Cost	Birr	365	225	388	379	135	106
Net Reserve	Birr/plot	659	837	-58	1,696	1,199	296
Converted	Birr/ha	3,524	6,699	-	6,784	19,032	4,698
	US$/ha	398	757	-	766	2,150	531

Item	Unit	Cabbage (No.10)	Tomato (No.8)	Tomato (No.11)	Onion (No.11)	Green Bean (No.4)	
Planted Area	ha/plot	0.125	0.063	0.063	0.063	0.25	
Production	qt	2.7	3.0	2.5	10.0	8.2	
Converted	kg/ha	(2,077)	(5,000)	(4,167)	(16,667)	(3,280)	
Selling Price	Birr/qt	60	50	54	150	52	
Gross Revenue	Birr	162	150	135	1,500	426	
Seed	Birr	20	3	29	29	75	
Fertilizers	Birr	0	0	0	0	0	
Agro-chemicals	Birr	79	7	87	87	0	
Hired Labor	Birr	35	10	12	16	128	
Tractor Service	Birr	0	0	0	0	0	
Ox-cart	Birr	10	23	0	0	0	
Irrigation (fuel)	Birr	98	43	56	62	125	
Total Cost	Birr	242	86	184	194	328	
Net Reserve	Birr/plot	-80	64	-49	1,306	98	
Converted	Birr/ha	-	1,016	-	20,896	392	
	US$/ha	-	115	-	2,360	44	

(6) Capacity to pay

The net reserve of each member from each plot of 0.25 ha is summarized below.

Net Reserve of 1st Crop in Oda Chisa WUA

(Birr/0.25ha)

No. of Members	Crop 1		Crop 2		Crop 3		Total net reserve (Birr)
	Crop	Net reserve (Birr)	Crop	Net reserve (Birr)	Crop	Net reserve (Birr)	
1	Cabbage	1,696					1,696
2	Chili	260					260
3	Chili	104					104
4	Green been	98					98
5	Chili	311					311
6	Chili	1,121					1,121
7	Chili	327	Cabbage	1,199			1,526
8	Chili	654	Tomato	64			718
9	Chili	659	Cabbage	296			955
10	Chili	833	Cabbage	785			1,618
11	Chili	-64	Tomato	-49	Onion	1,306	1,193

The procurement cost of a pump is Birr 40,000, of which annual reserve is estimated to be Birr 5,000 assuming that its useful life time at eight (8) years. Each member with a 0.25 ha plot is requested to pay Birr 250 a year (Birr 5,000 / 20 members). As seen in the above table, all the members except No. 3 and No.4 generated already more than Birr 250 a crop. From the results of the 1st PBME, the farmers' capacity to pay the PRC is basically proved. The monitoring will be continued by the OIDA Meki office.

CHAPTER 12 LESSON LEARNT

12.1 Major Factors governing Sustainability of Community-based Irrigation Development

On the basis of the experiences obtained through the Meki study, Program II of the Study has made further attempts for standardization of the procedure for establishment of WUA. The followings are the lesson leant through the Study.

1) Even Distribution of Land and Water Resources
2) Demarcation of Responsibilities between OIDA and WUA
3) Awareness Creation of Project Ownership
4) Optimum Irrigation Planning and Design
5) Integrated Agricultural Supporting System
6) Institutional Set-up

12.2 Even Distribution of Land and Water Resources

The Oromia Regional Proclamation no. 56/1994 restricts that the land holding of each WUA member should be less than 0.5 ha per household (HH) under irrigation projects implemented by public organs. Through the Study, the JICA Study Team received many requests from members to allocate the farm land sized at the maximum level, i.e. 0.5 ha per HH. However, the JICA Study Team advised the WUA members to start the projects with a limited land with 0.25 ha per HH referring to the three main advantages, namely (i) maximization of the number of memberships for WUA; (ii) equitable distribution of farm plots for irrigation; and (iii) optimum performance and efficiency of irrigation farming by using a small pump with around 10 hp, of which O&M is suited to local conditions of the Meki area and the technical knowledge of the WUA members.

In order to reduce the project cost for canal construction (length of pipe line), it is recommended to arrange farm plots near to the proposed pump house. This condition often results in necessity of land reallocation among the WUA members. To avoid future confusion including violation to agreement in land allocation among the WUA members, the Study learned that the land exchange agreement should be prepared in written form with witness of PA chairperson. As important measures, the Study recommends to prepare project

Apart from land resources, even distribution of water resources is another important issue. The significant gap was identified between upper steam and lower stream areas in terms of fuel consumption for irrigation water conveyance in the Shubi and

Sombo schemes. It seemed that the unity of the WUA members was highly subject to fair settlement of this crucial issue. The Study made intensive field observation of the conveyance loss in the existing canal systems and recommendation to introduce pipeline instead of earth canals for new schemes under Program II. This is an example for even distribution of water resources ensured by technical modification of facility plans.

12.3 Demarcation of Responsibilities between OIDA and WUA

Project sustainability is susceptible to demarcation of responsibilities between OIDA and WUA, who are the main stakeholders in community-based irrigation development. The roles and responsibilities of OIDA and WUA have to be clearly defined especially for (i) financial arrangement for project implementation and (ii) construction and O&M of the project facilities.

Since 1999 when OIDA was established, the irrigation development is under the OIDA's responsibility even through participatory approach to plan formulation and construction is a basic concept of the current irrigation policy. After handing over of project facilities, in principle, the responsibilities of their O&M including financial arrangement are fully under the WUA members. However, it is not practically functional due to lack of clear demarcation of responsibilities between both stakeholders. One of the reasons why international agencies, donors and NGOs have introduced relevant development schemes under the different conditions in terms of cost sharing of initial investment, procurement of farm inputs and rehabilitation. Program II of the Study therefore set up clear demarcation of responsibilities as a form of premises for project implementation.

12.4 Awareness Creation of Project Ownership

The project ownership is an essential factor for sustainable project management. Program II envisaged enhancing the sense of project ownership among the WUA members by allocating major responsibilities of water source development to them. Apart from the irrigation schemes along the Meki river, Program II selected the candidate WUAs on the lakeshore of Ziway and the groundwater irrigation areas around Alem Tena. The WUA members are obliged to make water source available on site. This means that the WUA members dig either lead canals from the Ziway lake to site or shallow wells on site. All the responsibilities for maintenance of water sources are currently under WUA. In drought years, therefore, the WUA members will take actions for deepening and extending lead canals to the Ziway lake or further digging shallow wells until lowered groundwater table.

This condition will contributes not only to strengthening project ownership of the WUA members but also reduce the financial loads of OIDA. After the financial assistance of JICA will phase out, the financial status of the project will not allow OIDA to extend further financial assistance to WUAs established under Program II. It is also crucial to optimize the financial responsibilities between OIDA and WUA so as to assure the project sustainable.

12.5 Optimum Irrigation Planning and Design

As mentioned in Section 12.2 on Even Distribution of Land and Water Resources, the irrigation facilities should be planned and designed to guarantee the fair distribution of water resources among the WUA members. The technical specifications of facilities, in particular for participatory development, have to be optimized from viewpoints of not only project economy but also social factors.

In case of the Oda Chisa WUA, as aforementioned, the canal system was changed from open earth canals to pipeline taking several advantages into consideration. During the construction, those advantages as well as disadvantages were recognized. Flexibility in design changes is one of essential factors for optimum irrigation planning and design. It is ensured more in the participatory irrigation development.

12.6 Integrated Agricultural Supporting System

Since the project was initiated and implemented by OIDA, the WUA members could obtain the government supports for irrigation engineering, while appropriate assistance in agronomic extension and farm credits which are also important for the WUA members. The integrated agricultural support services will be realized by close coordination among OIDA, Oromia Agricultural Development Bureau (OADB) and Oromia Corporative Promotion Bureau (OCPB). Apart from the governmental supports, Cooperative Union in Meki is another possible organ, which can supply the agricultural supports including credit services and marketing. Currently, some 12 WUAs comprising 500 members are under one umbrella of Cooperative Union in Meki. Further study is required.

12.7 Institutional Set-up

Under the decentralization policy, the community-based irrigation development will be in principle a mandate of OIDA at wareda level. However, the procedure from project application/selection to financial arrangement is not standardized. The institutional set-up for community-based irrigation development is urgently required.

Besides, the capacity building of the wareda staff is also essential in parallel to institutional set-up. In light of this view, Program II of the Study verifies project development procedures in a form of the guideline for establishment and management of WUA for standardization.

Tables

Table 2.3.1 Results of Water Quality Analysis

Item	Units	Tuchi Dembel	Abono Gabriel	Welde Mekdele	Derere Dalecha	Taticha Elan	Dodo Wederaa
Water Source		Ziway Lake	Ziway Lake	Ziway Lake	Groundwater	Groundwater	Groundwater
Appearance		Pale yellow	Pale yellow	Turbid	Clear	2241	Clear
Turbidity	FAU	28.0	33.0	472.5	10.0	12675.0	44.0
Color	plt.cob	150	199	2160	46	O	252
PH		7.26	7.48	7.66	7.45	8.52	7.98
Temperature at the time of Analysis	℃	19.8	20.9	19.7	20.0	21.3	19.8
Electrical conductivity	mS/cm	0.808	1.028	0.196	2.008	0.162	1.52
Total dissolved solids	mg/l	404	514	98	1004	81	76
Ammonia (NH_3)	mg/l	1.258	1.658	6.596	2.021	15.730	0.666
Bromine (Br_2)	mg/l	0.14	0.22	0.10	0.17	18.20	0.22
Total hardness as $CaCO_3$	mg/l	175	130	47	425	220	180
Calcium hardness as $CaCO_3$	mg/l	125	89	33	285	168	160
Magnesium hardness as CaCO3	mg/l	50	41	14	140	52	20
Total acidity as CaCO3	mg/l	180	208	136	210	20	90
Total chlorine	mg/l	0.06	0.00	0.10	0.00	0.01	0.09
Iodine (I2)	mg/l	0.200	0.350	0.350	0.500	0.040	0.410
Ammonium (NH4+)	mg/l	1.3420	1.7673	7.0301	2.1543	17.4150	0.7095
Potassium (K+)	mg/l	25	54	20	54	15	10
Calcium (Ca++)	mg/l	50.00	35.60	13.20	114.00	67.20	64.00
Magnesium (Mg++)	mg/l	12.00	9.84	3.36	33.60	12.48	4.80
Copper (Cu++)	mg/l	0.06	0.01	0.15	1.01	2.25	0.06
Iron (Fe++)	mg/l	0.37	0.04	0.46	0.01	4.50	0.08
Manganese (Mn++)	mg/l	1.05	0.10	0.20	1.50	0.25	0.05
Chloride (Cl-)	mg/l	4	15	10	32	8	68
Nitrate (NO3-)	mg/l	0.440	2.200	0.020	2.200	12.000	0.880
Fluoride (F-)	mg/l	1.01	1.60	2.90	4.88	0.25	1.55
Bicarbonate (HCO3-)	mg/l	517.28	1254.60	317.00	1234.64	146.40	951.60
Carbonate (CO3-)	mg/l	9.6	34.8	Nil	44.0	Nil	Nil
Sulfate (SO4-)	mg/l	Nil	Nil	Nil	525	1	1
Phosphate (PO4-3)	mg/l	0.26	0.94	1.45	0.86	30.75	0.83

Remarks: Water quality analysis was carried by Oromia Water Resources Bureau

Table 4.3.1 Agricultural Asset of Applicants - Oda Chisa WUA

	Name of Participant	Blood Relation	PPO	Chicken	Ox	Veal	Cow	Heifer	Sheep	Goat	Donkey	Min. Value	Ave.Min. Value/HH	Max. Value	Ave.Max. Value/HH	No. of Farm Plots	Total Size of Farm Land	Irrigation Land Ratio	Sex
1	Applicant No.1		Yes	4	0	0	1	1	0	0	1	720.00		748.00		1	1.50	16.67	F
14	Applicant No.14	Son of 1		0	0	0	0	0	0	0	0	0.00		0.00		2	1.25	20.00	M
16	Applicant No.16	Son of 1	Yes	3	0	0	0	0	2	0	0	215.00	818.33	336.00	919.00	1	0.50	50.00	M
17	Applicant No.17	Son of 1		9	0	0	1	1	3	0	0	745.00		958.00		1	0.50	50.00	M
19	Applicant No.19	Son of 1		2	0	0	0	0	0	0	0	10.00		24.00		0	0.00	100.00	M
15	Applicant No. 15			4	2	1	2	2	4	0	2	3,220.00		3,448.00		2	1.25	20.00	M
2	Applicant No. 2		Yes	3	2	1	4	1	0	0	3	3,915.00	2,170.00	3,936.00	2,298.00	1	1.25	20.00	M
20	Applicant No. 20	Son of 2		5	0	0	0	0	4	0	0	425.00		660.00		1	0.50	50.00	M
3	Applicant No.3			6	1	0	1	0	6	0	1	2,030.00	2,030.00	2,372.00	2,372.00	3	1.75	14.29	M
4	Applicant No.4			5	2	0	4	2	4	0	2	4,025.00	4,025.00	4,260.00	4269	2	1.50	16.67	M
8	Applicant No. 8			0	1	2	0	0	0	0	0	700.00		700.00		2	1.75	14.29	M
9	Applicant No. 9	Son of 8		0	1	0	0	1	0	0	0	700.00		700.00		1	0.50	50.00	M
10	Applicant No. 10	Son of 8		3	0	0	0	1	0	0	0	15.00	711.00	36.00	726.40	0	0.00	100.00	M
12	Applicant No. 12	Son of 8		2	0	0	1	1	0	0	0	410.00		424.00		1	0.75	33.33	M
21	Applicant No. 21	Brother 8	Yes	6	2	0	0	0	0	0	1	1,730.00		1,772.00		3	2.00	12.50	M
11	Applicant No. 11		Yes	5	1	1	0	0	1	0	0	825.00		910.00		1	1.25	20.00	M
5	Applicant No. 5	Son of 11	Yes	3	1	0	1	1	1	0	0	1,215.00	861.25	1,286.00	939.50	2	1.25	20.00	M
6	Applicant No. 6	Son of 11		1	0	0	1	0	0	0	0	405.00		412.00		1	0.50	50.00	M
13	Applicant No. 13	Son of 11		0	1	0	0	0	3	0	0	1,000.00		1,150.00		0	0.00	100.00	M
7	Applicant No. 7			0	0	0	0	1	0	0	0	0.00	0.00	0.00	0.00	2	1.25	20.00	M
18	Applicant No. 18			0	0	1	1	0	3	0	0	700.00	700.00	850.00	850.00	0	0.00	100.00	M
Total				61	12	6	17	12	31	0	9	21,305.00		23,282.00		27	19		F: 1 M:20
Average				5 to 12	700		400		100 to 150		300	Value 1	1,414.45	Value 2	1,546.74	1.29	0.92	41.80	

Source: JICA Tsudy Team, PRA results in Odaa Chiisaa, Dugda Bora Warada, June 2003

Table 5.3.1 Agricultural Asset of Applicants - Bade Gosa WUA

Unit: Head for Livestock; Local Market Price: Birr (local currency); Value: Birr (local currency); Size of Farm Land: hectare; Irrigation Land Ratio: percentage(%)

	Name of Participant	Position of Household	Blood Relation	PPO	Chicken	Ox	Veal	Cow	Heifer	Sheep	Goat	Donkey	Min. Value	Ave.Min. Value/HH	Max. Value	Ave.Max. Value/HH	Total Size of Farm Land	Irrigation Land Ratio	Sex
1	Applicant No.1	Head		Yes	0	1	1	1	0	0	0	1	1,200.00	1,200.00	2,000.00	2,000.00	5.00	5.00	M
2	Applicant No.2	Head		Yes	3	0	0	0	0	4	0	1	454.00	454.00	1,145.00	1,145.00	5.00	5.00	M
3	Applicant No.3	Head		Yes	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	2.87	8.71	M
4	Applicant No.4	Head		Yes	0	0	1	1	0	0	0	1	700.00	908.00	1,200.00	1,490.00	3.00	8.33	M
12	Applicant No.12	Head	Bro. of 4	Yes	2	0	1	2	1	0	0	0	1,116.00		1,780.00		4.25	5.88	M
5	Applicant No.5	Head		Yes	5	1	1	2	1	1	0	0	1,710.00	1,710.00	2,825.00	2,825.00	3.25	7.69	M
6	Applicant No.6	Head		Yes	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	2.50	10.00	M
7	Applicant No.7	Head		Yes	4	1	0	2	2	0	0	1	1,782.00	1,782.00	2,860.00	2,860.00	5.00	5.00	M
8	Applicant No.8	Head		Yes	0	0	0	0	0	0	0	1	150.00	150.00	300.00	300.00	1.00	25.00	M
9	Applicant No.9	Head		Yes	6	0	0	0	0	1	0	0	118.00	118.00	290.00	290.00	2.00	12.50	M
10	Applicant No.10	Head		Yes	0	2	2	2	0	0	3	1	2,430.00	2,430.00	4,150.00	4,150.00	5.00	5.00	F
11	Applicant No.11	Head		Yes	2	0	0	0	0	2	0	0	156.00	156.00	430.00	430.00	2.25	11.11	F
13	Applicant No.13	Head		Yes	4	1	1	1	1	0	0	0	1,282.00	1,282.00	2,110.00	2,110.00	3.25	7.69	M
14	Applicant No.14	Head		Yes	5	2	1	2	0	2	0	0	2,080.00	2,080.00	3,475.00	3,475.00	5.00	5.00	M
16	Applicant No.16	Head		Yes	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	2.75	9.09	M
17	Applicant No.17	Head		Yes	1	0	0	0	0	0	0	0	8.00	8.00	15.00	15.00	2.75	9.09	F
18	Applicant No.18	Head		Yes	5	2	2	3	2	1	5	1	3,410.00	3,410.00	5,925.00	5,925.00	2.50	10.00	M
19	Applicant No.19	Head		Yes	6	1	0	2	0	0	0	0	1,248.00	624.00	1,890.00	945.00	1.00	25.00	M
15	Applicant No.15	Head	Uncle of 19	Yes	0	0	0	0	0	0	0	0	0.00		0.00		2.00	12.50	M
Total					43	11	10	18	7	11	8	7	17,844.00	939.16	30,395.00	1,599.74	60.37		M
Local Market Price in Birr				Min.	8	500	200	350	200	70	60	150	Range: Birr 0 to Birr 3,410 per HH: Average: Birr 939		Range: Birr 0 to Birr 5,925 per HH; Average: Birr		Average 3.18	7.87	F:3 M:16
				Max.	15	800	400	500	350	200	150	300							

Source: JICA Study Team/ Results from a series of PRAs in Bade Gosa, Tuchi Dembel Peasant Association, Dugda Bora Wareda, September 2003

Table 11.4.1 Crop Budget Analyses of 1st Crop in Oda Chisa (1/3)

Farmer No.1

Crop: Cabbage Dec.2003 - Apr. 2004

1. Income

Cabbage (0.25)	ha	35	qts	* 60	Birr/qt	= 2,100	Biir
Sub-Total : Gross Income (a)						2,075	Birr

2. Expenditure

	Item	Unit Price		Quantity		Total
(1) Seed		200/kg	*	0.25 kg	=	50 Biir
(2) Fertilizer	Urea	5.0/kg	*	20 kg	=	100 Biir
						Biir
(3) Agro-chemical	Malatine	58.0/lit	*	0.5 lit	=	29 Biir
						Biir
						Biir
(4) Hired Labour						0 Biir
(5) Tractor		70/day	*	1day	=	70 Biirr
(6) Irrigation		130/season	*	1season	=	130 Biirr
Sub-Total : Production Cost (b)					=	379 Birr

3. Net Reserve (a)-(b) = 1,696 Birr

(6,784 Birr / ha)

Farmer No.2

Crop: Chili Feb.2004 - June.2004

1. Income

Chili (0.19)	ha	9	qts	* 45	Birr/qt	= 405	Biir
Sub-Total : Gross Income (a)						405	Birr

2. Expenditure

	Item	Unit Price		Quantity		Total
(1) Seed		20/kg	*	1 kg	=	20 Biir/kg
(2) Fertilizer						0 Biir
						Biir
(3) Agro-chemical						0 Biir
						Biir
						Biir
(4) Hired Labour						0 Biir
(5) Tractor						0 Biir
(6) Irrigation		125/season	*	1season	=	125 Biir
Sub-Total : Production Cost (b)					=	145 Birr

3. Net Reserve (a)-(b) = 260 Birr

(1,390 Birr / ha)

Farmer No.3

Crop: Chili Jan. 2004 - May. 2004

1. Income

Chili (0.25)	ha	10	qts	* 50	Birr/qt	= 500	Biir
Sub-Total : Gross Income (a)						500	Birr

2. Expenditure

	Item	Unit Price		Quantity		Total
(1) Seed		14/kg	*	1.5 kg	=	21 Biir
(2) Fertilizer						Biir
						Biir
(3) Agro-chemical	Malatine	53/liter	*	1.0 lit	=	53 Biir
	Menkozeb	72/kg	*	1.0 kg	=	72 Biir
						Biir
(4) Labour						0 Biir
(5) Tractor						0 Biir
(6) Irrigation		250/season	*	1season	=	250 Birr
Sub-Total : Production Cost (b)					=	396 Birr

3. Net Reserve (a)-(b) = 104 Birr

(416 Birr / ha)

Farmer No.4

Crop: Green Bean Jan.2004 - Apr.2004

1. Income

Grren Bean (0.25)	ha	8.2	qts	* 52	Birr/qt	= 426	Biir
Sub-Total : Gross Income (a)						426	Birr

2. Expenditure

	Item	Unit Price		Quantity		Total
(1) Seed		50/kg	*	1.5 kg	=	75 Biir
(2) Fertilizer						0 Biir
						Biir
(3) Agro-chemical						0 Biir
						Biir
						Biir
(4) Labour		8.0/MD	*	16MD	=	128 Biir
(5) Tractor						0 Biir
(6) Irrigation		125/season	*	1season	=	125 Biir
Sub-Total : Production Cost (b)					=	328 Birr

3. Net Reserve (a)-(b) = 98 Birr

(392 Birr / ha)

Farmer No.5

Crop: Chili Dec.2003 - Apr.2004

1. Income

Chili (0.25)	ha	8	qts	* 100	Birr/qt	= 800	Biir
Sub-Total : Gross Income (a)						800	Birr

2. Expenditure

	Item	Unit Price		Quantity		Total
(1) Seed		20/kg	*	1.0 kg	=	20 Biir
(2) Fertilizer						Biir
						Biir
(3) Agro-chemical						Biir
						Biir
						Biir
(4) Labour		6.0MD	*	26MD	=	156 Biir
(5) Tractor						0
(6) Irrigation		313/season	*	1season	=	313
Sub-Total : Production Cost (b)					=	489 Birr

3. Net Reserve (a)-(b) = 311 Birr

(1,244 Birr / ha)

Farmer No.6

Crop: Chili Dec.2003 - Apr.2004

1. Income

Chili (0.25)	ha	7.7	qts	* 240	Birr/qt	= 1,848	Biir
Sub-Total : Gross Income (a)						1,848	Birr

2. Expenditure

	Item	Unit Price		Quantity		Total
(1) Seed		140/kg	*	0.5 kg	=	70 Biir
(2) Fertilizer	Urea	2.6/kg	*	7 kg	=	18 Biir
	DAP	2.1/kg	*	15 kg	=	32 Biir
(3) Agro-chemical	Menkozeb	73/kg	*	0.21 kg	=	15 Biir
	Selecron	180/kg	*	0.33 kg	=	59 Biir
						Biir
(4) Labour		6/M/D	*	29 M/D	=	174 Biir
(5) Tractor		65/day	*	2 days	=	130 Biir
(6) Irrigation		188/season	*	1season	=	188 Biir
Sub-Total : Production Cost (b)					=	686 Birr

3. Net Reserve (a)-(b) = 1,162 Birr

(4,648 Birr / ha)

Table 11.4.1 Crop Budget Analyses of 1st Crop in Oda Chisa (2/3)

Farmer No.7

Crop: Chili Dec.2003 - Apr. 2004

1. Income

Chili	(0.187)	ha	4.3	qts	* 175 Birr/qt	=	751	Biir

Sub-Total : Gross Income (a) = 751 Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		28.3/kg	*	1.2 kg	=	34	Biir
(2) Fertilizer	DAP	3.1/kg	*	11 kg	=	34	Biir
							Biir
(3) Agro-chemical	Malatine	53.3/liter	*	0.75 liter	=	40	Biir
	Menkozeb	72/kg	*	0.75 kg	=	54	Biir
							Biir
(4) Labour		10/M/D	*	6MD	=	60	Biir
(5) Ox-cart		10/day	*	1.5 day	=	15	Biir
(6) Irrigation		187/season	*	1season	=	187	Biir

Sub-Total : Production Cost (b) = 424 Birr

3. Net Reserve (c)=(a)-(b) = 327 Birr (1,747 Birr / ha)

Cabbage: Jan.2004 - May.2004

1. Income

Cabbage	(0.06)	ha	9.2	qts	* 145 Birr/qt	=	1,334	Biir

Sub-Total : Gross Income (d) = 1,334 Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		30/kg	*	0.4 kg	=	12	Biir
(2) Fertilizer	Urea	2.8/kg	*	4 kg	=	11	Biir
							Biir
(3) Agro-chemical	Malatine	52/liter	*	0.25 liter	=	13	Biir
	Menkozeb	72/kg	*	0.25 kg	=	18	Biir
							Biir
(4) Labour		10/MD	*	6 MD	=	10	Biir
(5) Ox-cart		10/day	*	0.5 day	=	5	Biir
(6) Irrigation		66/season	*	1 season	=	66	Biir

Sub-Total : Production Cost (e) = 135 Birr

3. Net Revenue (f)=(d)-(e) = 1,199 Birr (19,032 Birr / ha)

4. Total Gross Income (g)=(a)+(d) = 2,085
Total Production Cost (h)=(b)+(e) = 559
Total Net Reserve (i)=(g)-(h) = 1,526

Farmer No.8

Crop: Chili Jan.2004 - May.2004

1. Income

Chili	(0.187)	ha	4.6	qts	* 200 Birr/qt	=	918	Biir

Sub-Total : Gross Income (a) = 918 Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		11.3/kg	*	0.8 kg	=	9	Biir
(2) Fertilizer						0	Biir
							Biir
(3) Agro-chemical	Malatine	54/liter	*	0.37 liter	=	20	Biir
							Biir
							Biir
(4) Labour		10/MD	*	5 MD	=	50	Biir
(5) Tractor		90/day	*	0.75 MD	=	68	Biir
(6) Irrigation		117/season	*	1 season	=	117	Biir

Sub-Total : Production Cost (b) = 264 Birr

3. Net Reserve (c)=(a)-(b) = 654 Birr (3,497 Birr / ha)

Crop: Tomato Jan.2004 - May.2004

1. Income

Tomato	(0.06)	ha	3.0	qts	* 50 Birr/qt	=	150	Biir

Sub-Total : Gross Income (d) = 150 Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		10/kg	*	0.3 kg	=	3	Biir
(2) Fertilizer						0	Biir
							Biir
(3) Agro-chemical	Malatine	54/liter	*	0.13 liter	=	7	Biir
							Biir
							Biir
(4) Labour		10/MD	*	1MD	=	10	Biir
(5) Tractor		90/day	*	0.25 MD	=	23	Biir
(6) Irrigation		43/season	*	1season	=	43	Biir

Sub-Total : Production Cost (e) = 86 Birr

3. Net Revenue (f)=(d)-(e) = 64 Birr (1,016 Birr / ha)

4. Total Gross Income (g)=(a)+(d) = 1,068
Total Production Cost (h)=(b)+(e) = 350
Total Net Reserve (i)=(g)-(h) = 718

Farmer No.9

Crop: Chili Dec.2003 - Apr. 2004

1. Income

Chili	(0.187)	ha	4.6	qts	* 223 Birr/qt	=	1,024	Biir

Sub-Total : Gross Income (a) = 1,024 Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		64/kg	*	0.75 kg	=	48	Biir
(2) Fertilizer	Urea	3.33/kg	*	8.1 kg	=	27	Biir
	DAP	4.4/kg	*	15 kg	=	66	Biir
(3) Agro-chemical	Malatine	59.3/liter	*	0.3 liter	=	16	Biir
	Menkozeb	73/kg	*	0.37 kg	=	27	Biir
							Biir
(4) Labour		6/M/D	*	11MD	=	67	Biir
(5) Tractor		90/day	*	0.75 day	=	68	Biir
(6) Irrigation		47/season	*	1season	=	47	Biir

Sub-Total : Production Cost (b) = 365 Birr

3. Net Reserve (c)=(a)-(b) = 659 Birr (3,524 Birr / ha)

Cabbage: N.A

1. Income

Cabbage	(0.06)	ha	6.7	qts	* 60 Birr/qt	=	402	Biir

Sub-Total : Gross Income (d) = 402 Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		64/kg	*	0.25 kg	=	16	Biir
(2) Fertilizer	Urea	3/kg	*	3 kg	=	9	Biir
	DAP	4.4/kg	*	5 kg	=	22	Biir
(3) Agro-chemical	Malatine	50/litre	*	0.1litre	=	5	Biir
	Menkozeb	69/kg	*	0.13kg	=	9	Biir
							Biir
(4) Labour		6/M/D	*	1MD	=	6	Biir
(5) Tractor		90/day	*	0.25 Day	=	23	Biir
(6) Irrigation		16/season	*	1season	=	16	Biir

Sub-Total : Production Cost (e) = 106 Birr

3. Net Revenue (f)=(d)-(e) = 296 Birr (4,698 Birr / ha)

4. Total Gross Income (g)=(a)+(d) = 1,426
Total Production Cost (h)=(b)+(e) = 471
Total Net Reserve (i)=(g)-(h) = 955

Table 11.4.1 Crop Budget Analyses of 1st Crop in Oda Chisa (3/3)

Farmer No.10

Crop: Chili Dec.2003 - Apr. 2004

1. Income

Chili	(0.125)	ha	6.4	qts	* 166	Birr/qt	= 1,062	Biir
Sub-Total : Gross Income (a)							1,062	Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		36/kg	*	0.56 kg	=	20	Biir
(2) Fertilizer							Biir
							Biir
(3) Agro-chemical		43/litre	*	1 litre	=	43	Biir
		72/kg	*	0.5 kg	=	19	Biir
							Biir
(4) Labour		7/M/D	*	5 MD	=	35	Biir
(5) Ox-Cart		10/day	*	1 day	=	10	Biir
(6) Irrigation		98/season	*	1 season	=	98	Biir
Sub-Total : Production Cost (b)					=	225	Birr

3. Net Reserve (c)=(a)-(b) = 837 Birr
(6,699 Birr / ha)

Cabbage: Jan.2004 - May.2004

1. Income

Cabbage	(0.13)	ha	2.7	qts	* 60	Birr/qt	= 162	Biir
Sub-Total : Gross Income (d)							162	Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		36/kg	*	0.56 kg	=	20	Biir
(2) Fertilizer							Biir
							Biir
(3) Agro-chemical	Malatine	43/litre	*	1 litre	=	43	Biir
	Kocide	72/kg	*	0.5 kg	=	36	Biir
							Biir
(4) Labour		7/M/D	*	5 MD	=	35	Biir
(5) Ox-Cart		10/day	*	1 day	=	10	Biir
(6) Irrigation		98/season	*	1 season	=	98	Biir
Sub-Total : Production Cost (e)					=	242	Birr

3. Net Revenue (f)=(d)-(e) = -80 Birr
(-640 Birr / ha)

4. Total Gross Income (g)=(a)+(d) = 1,224
Total Production Cost (h)=(b)+(e) = 467
Total Net Reserve (i)=(g)-(h) = 757

Farmer No.11

Crop: Onion Dec.2003 - May 2004

1. Income

Onion	(0.063)	ha	10	qts	* 150	Birr/qt	= 1,500	Biir
Sub-Total : Gross Income (a)							1,500	Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		88/kg	*	0.33 kg	=	29	Biir
(2) Fertilizer						0	Biir
							Biir
(3) Agro-chemical	Menkozeb	72/kg	*	0.25 kg	=	18	Biir
	Kocide	76/kg	*	0.25 kg	=	19	Biir
	Selesron	200/kg	*	0.25 kg	=	50	Biir
(4) Labour		8/M/D	*	2MD	=	16	Biir
(5) Tractor						0	Biir
(6) Irrigation		62/season	*	1season	=	62	Biir/season
Sub-Total : Production Cost (b)						194	Birr

3. Net Reserve (c)=(a)-(b) = 1,306 Birr
(20,896 Birr / ha)

Crop: Chili N.A

1. Income

Chili	(0.13)	ha	3.3	qts	* 100	Birr/qt	= 330	Biir
Sub-Total : Gross Income (d)							330	Birr

2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		91/kg	*	0.65 kg	=	59	Biir
(2) Fertilizer						0	Biir
							Biir
(3) Agro-chemical	Menkozeb	72/kg	*	0.5 kg	=	36	Biir
	Kocide	76/kg	*	0.5 kg	=	34	Biir
	Selecron	200/kg	*	0.5 kg	=	100	Biir
(4) Labour		8/M/D	*	7MD	=	56	Biir
(5) Tractor						0	Biir
(6) Irrigation		103/season	*	1season	=	103	Biir
Sub-Total : Production Cost (e)						388	Birr

3. Net Revenue (f)=(d)-(e) = -58 Birr
(-464 Birr / ha)

Crop: Tomato Dec.2003 - Apr. 2004

1. Income

Tomato	(0.063)	ha	2.5	qts	* 54	Birr/qt	= 135	Biir
Sub-Total : Gross Income (g)							135	Birr

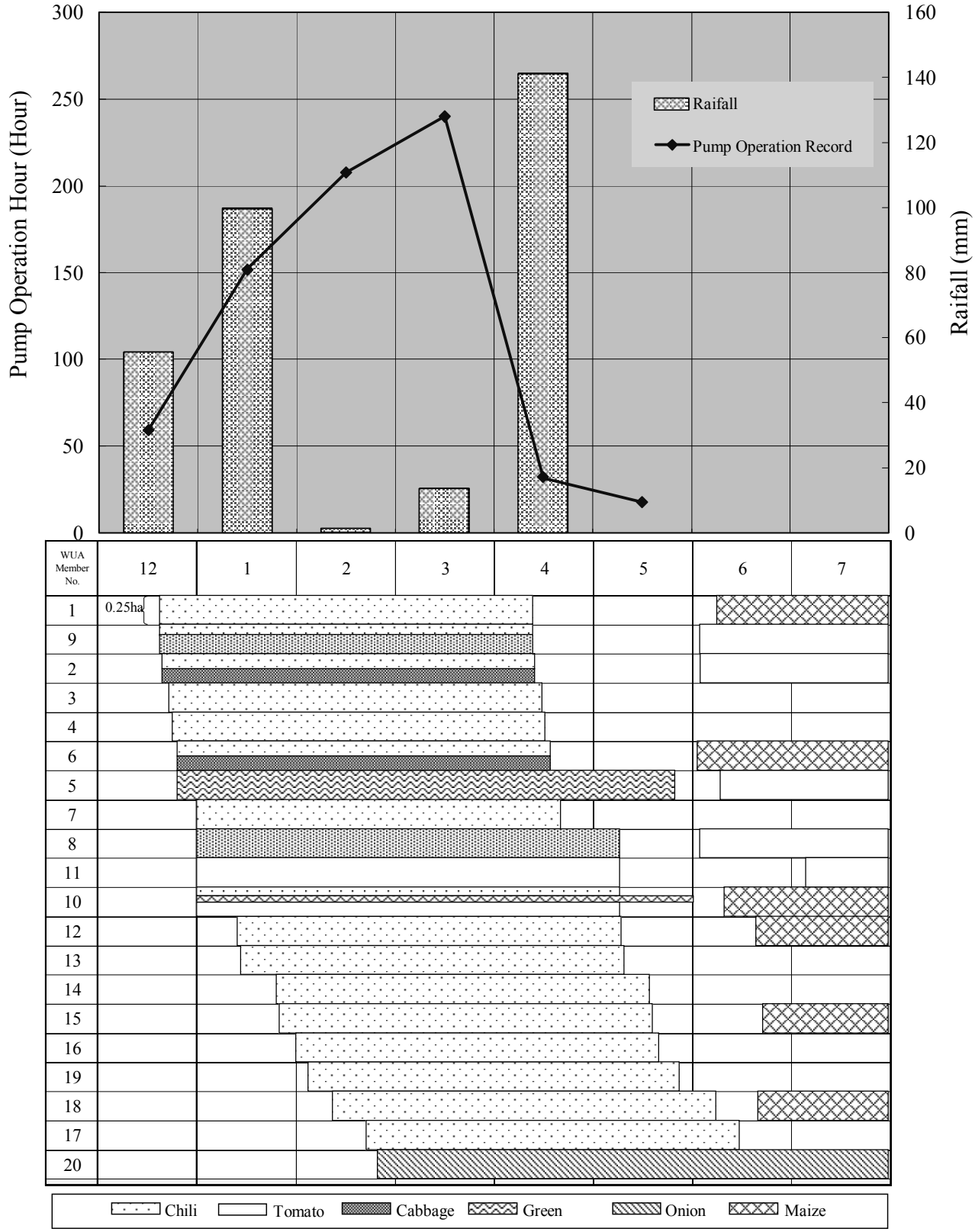
2. Expenditure

Item		Unit Price		Quantity		Total	
(1) Seed		88/kg	*	0.33 kg	=	29	Biir
(2) Fertilizer						0	Biir
							Biir
(3) Agro-chemical	Menkozeb	72/kg	*	0.25 kg	=	18	Biir
	Kocide	76/kg	*	0.25 kg	=	19	Biir
	Selesron	200/kg	*	0.25 kg	=	50	Biir
(4) Labour		8/M/D	*	1.5 MD	=	12	Biir
(5) Tractor						0	Biir
(6) Irrigation		56/season	*	1season	=	56	Biir/season
Sub-Total :Production Cost (h)						184	Birr

3. Net Revenue (i)= (g)-(h) = -49 Birr
(-781 Birr / ha)

4. Total Gross Income (j)=(a)+(d)+(g) = 1,965
Total Production Cost (k)=(b)+(e)+(i) = 766
Total Net Revenue (j)=(j)-(k) = 1,199

Figures



Data Source : 3 rd PBME taken by the study team
Note : Cropping Schedule of 1 WUA member was not collected

Figure 11.4.1 Cropping Calendar and Monthly Pump Operation Hour in Oda Chisa WUA

Attachment - 1

WUA Training Manuals

Japan International Cooperation Agency (JICA)
Oromia Irrigation Development Authority (OIDA)

TRAINING MATERIAL IN COMMUNITY-BASED IRRIGATION DEVELOPMENT

PUMP OPERATOR'S TRAINING MANUAL

Based on Diesel Engine

(English Version)

Prepared by Obbo Abebe Dissussaa

November 2003

The Study on Capacity Building Programs
for Community-based Irrigation Development
in Central Oromia Region of Ethiopia

1. GENRAL SAFETY NOTICES

1.1 Always wipe off spilled fuel and dispose of oil soaked clothes properly.

1.2 Operators with long hair should make sure their hair does not catch during operation.

1.3 The area in which the operator is working must be kept tidy and free of oil or other liquid spillages and solid waste (metal, chips, rugs etc.).

1.4 Before starting the engine look and walk around the engine, advice people or children to stand clear from the motor.

1.5 If your skin comes in to contact with high pressure fuel, and if swelled immediately take medical advice and attention.

1.6 When carrying out maintenance on the generator always wear gloves, and avoid wearing loose clothing, bracelets of any other items, that may get trapped in the engine parts. Set tools that are suitable for the intended maintenance.

1.7 Fire risks:

- Never bring naked flames near to the engine.
- Never smoke during refueling

1.8 Keep clear of hot parts:

- Components and liquids subject to high temperatures (engine block, manifold, cylinder head etc.) can cause serious burns.

1.9 Keep clear from rotating parts while the unit is operating. Note carefully that fans and other rotating objects can not be clearly seen while the engine is running.

1.10 Exhaust fumes and oil vapor can be fatal:

- Never use the engine in ambient without sufficient air circulation or with no discharge of exhaust fumes to the outside, make sure the engine is installed so as to avoid accumulation of fume gases.
- Don’t stay long in close rooms. Open doors, windows insure the circulation of fresh air widely.
- Don’t take adjustments you do not understand, don’t modify the engine.
- Never carry out any maintenance operations on moving parts.
- Never clean, lubricate or adjust the engine whole running (unless you are qualified to do so in which case, great care must be taken to prevent accidents).
- Use the correct tools for the job.
- Follow the maintenance table and its instructions.

2. PREPARING THE ENGINE

If the engine is to undergo a long period of in activity the following recommendation must be followed.

- Clean the out side of the engine thoroughly
- Run the engine with propulsion diesel fuel for long periods of inactivity until proper working temperature is achieved (hot air)
- Drain of the oil.
- Change the oil filter and pour in fresh oil until it reaches the correct level
- Remove the injectors and lightly oil the inside of the cylinders, give the engine a few turns by hand (using a wrench) and then replace the injector.
- If the engine starts on battery, disconnect the battery terminals and grease the two poles with vaseline.
- Lastly, close the exhaust pipe and the air filter aperture with sealing tape.

3. PRELIMINARY CHECKS BEFORE STARTING THE ENGINE

Before putting a new engine in to operation for the first time it is advisable to check it carefully, bearing in mind that it is supplied without fuel, as follows.

3.1 Check the level of the oil in the sump, making sure that the level always remains between the minimum and maximum marks on the deep stick.

3.2 Check the tank with fuel. Re-fill if necessary. Check the fuel line leakage repairs if necessary.

3.3 Prepare History Jacket (Log Book) for your new engine. Record working hours of the motor fuel, oil etc. on log book daily.

4. STARTING UP THE ENGINE

After the preliminary checking operation start up the engine as follows.

4.1 Shift the accelerator lever to halfway long its strokes.

4.2 Operate the supplementary fuel button or choke.

4.3 Pull the rope in the proper direction of the rotation of pulley or crank shaft

4.4 When the engine has started up. Shift the accelerator lever to minimum until the correct working temperature has been reached (hot oil) or worm up the engine for about 5 minutes.

4.5 Accelerate according to working requirement.

5. STOPPING THE ENGINE

5.1 Shift the accelerator lever to minimum; let the engine idle for 5 minutes at idle speed. Then shut off the engine.

6. ROUTINE (FREQUENCY) OF MAINTENANCE OPERATION

6.1 Every 8 working hours:

- Check the level of the engine oil.
- Check the clogged air filter indicator.
- Check air cleaner oil level.
- Check oil bath air filter.

6.2 Every 50 working hours:

- Drain air cleaner and remove element.
- Drain and clean bowel.
- Drain crankcase fill with engine oil up to the level mark.

6.3 Every 100 working hours:

- Clean and dry cooling fans.
- Change oil filter.
- Change fuel filter.
- Change air cleaner oil.

6.4 Every 200 working hours:-

- Repeat all works that had been done during the last 100 working hours.
- For special situation consult the authorized personnel, do not attempt to work what you do not know.

6.5 Every 2500hours

- Partial overhaul.

6.6 Every 5000 hours

- Total overhaul of the engine.

7. PERIODICAL MAINTENANCE SCHEDULE

OPERATION	COMPONENT		INTERVAL (HOURS)								
				10	50	100	200	500	1000	2500	5000
CLEANING	Air Cleaner			●							
	Fuel Feed Pump Filter						●				
	Head & Cylinder Fins		(●)				●				
	Oil Cooler Fins						●				
	Fuel Tank								●		
	Injectors							●			
	Interval of Filter									●	
CHECK	Level	Air Cleaner Oil		●							
		Crankcase Oil		●							
		Battery Electricity			●						
	Fan Belt Tension					●					
	Valve and Rocker Arm Clearance							●			
	Injector- Calibration							●			
REPLACE-MENT	Oil	Air cleaner	(●●)	●							
		Crankcase					●				
	Oil Filter						●				
	Fuel Filter						●				
	Dry Air Cleaner Element		(●●●)					●			
	Fan Belt									●	
OVERHAUL INSPECTION	Partial		(●●●)								●
	Complete		(●●●●)								

(●) Under sever working condition clean daily
(●●) Under externally dusty condition clean every 45hours
(●●●) When clogging indictor shows the need for replacement
(●●●●) Include checking cylinders, piston rings, springs, grinding valve seats, scaling heads and cylinders as well as checking injection pump and injectors.

8. TROUBLE SHOOTING

Trouble	Problems Causes and Actions
Failure to start	A1-A2-A3-A4-A5-A6-A7 C1-C2-C3-D3-E1-E3
Starts then stops	A1- A3- A5- D5- E4- E7
Poor acceleration	A1-A2-A3-A4-A7- D1- D2- D4
Uneven running speed	A4- A7- B2-E4
Black smoke	A6-AB-D1- D2 D4- D6- E1- E2
White smoke	B2- D5- E1- E6- E7
Engine over-heating	A8- B1- B4-B5- B9- D2 D3-D4- D6-E5
Low oil pressure	B1- B3- B4- B5- B5- B6-B7-E6
Noisy engine	A6- D3- E5- E6-E8
Oil pressure too high	B3- B6
Low power	A6- A8- B9- D1- E2- E5

8.1 Trouble Shooting

FUEL SYSTEM	REF.No.	ACTION
Faulty or clogged fuel pump	A1	Clean or Change
Obstructed fuel line	A2	Clean and Adjust
Fuel filter clogged	A3	Change
Faulty injection pump	A4	Calibrate
Air in fuel system	A5	Bleed
Injectors not set correctly	A6	Adjust pressure
Hardened control rod rock	A7	Loosen and Adjust
Excess fuel device seized	A8	Lubricate and Adjust
Injection pump no set correctly	A9	Adjust timing
LUBRICATION	REF.No.	ACTION
Oil pump defective	B1	Change
Oil level too high	B2	Level
Oil pressure relief valve sticking	B3	Change
Oil viscosity too high	B4	Select the proper grade
Oil level too low	B5	Top-up
Faulty pressure valve	B6	Change
Faulty pressure gauge	B7	Change
Oil suction lines clogged or union loose	B8	Clear and Tighten
Oil cooler clogged	B9	Clear
ELECTRIC SYSTEM	REF.No.	ACTION
Battery Discharged	C1	Charge or Change
Loose cable connection	C2	Tighten
Faulty starting switch	C3	Change
Faulty starter motor	C4	Repair or Change
OTHER COMPONENTS	REF.No.	ACTION
Clogged Air cleaner	D1	Maintain
Engine overloaded	D2	“
Timing too Advanced	D3	“
Timing too Retarded	D4	“
Low idle speed	D5	“
Clogged cooling circuiting	D6	“
OTHER COMPONENTS	REF.No.	ACTION
Worn or stuck rings	E1	Repair
Poor valve sealing	E2	“
Stuck valve	E3	“
Governor spring broken or wrong spring	E4	“
Fan failure	E5	“
Worn con rods/ or main bearings	E6	“
Worn cylinders	E7	“
Wrong valve clearance	E8	“

9. LOG BOOK

Engine Type: _____

Engine No._____

Serial No. _____

Date	Users Name		Operators Name	Lubricants used			Parts changed	Starting Hrs.	Stopping Hrs.	Differences	Work done
	Plot No.	Users Name		Fuel	Oil	Grease					

NB: - The maintenance and servicing time table above will act as a log book in which one should record details of all work done on a motor.

10. NECESSARY TOOLS

Item No.	Description	Unit	Qty.	Remarks
1	Jerican of 20 lts.	Pcs	1	
2	Pail of 15 lts.	"	1	
3	Funnel mid size	"	1	Medium size
4	Syphon	mts	10	
5	Grease gun	pcs	1	
6	Oil filter spanner	"	1	
7	Packing of 8"	pcs	1	
8	Packing of 10"	"	1	
9	Plier	"	1	
10	Mechanic hammer	"	1	
11	Screw driver flat	"	1	Medium size
12	Screw driver Phillips	"	1	Medium size
13	Open end spanner 10x11	"	1	
14	Open end spanner 12x13	"	1	
15	Open end spanner 14x15	"	1	
16	Open end spanner 16x17	"	1	
17	Open end spanner 18x19	"	1	
18	Open end spanner 22x24	"	1	
19	Ring spanner 10x11	"	1	
20	Ring spanner 12x13	"	1	
21	Ring spanner 14x15	"	1	
22	Ring spanner 16x17	"	1	
23	Ring spanner 18x19	"	1	
24	Ring spanner 22x24	"	1	
25	Over cact	"	1	
26	Rug	rg	10	

Japan International Cooperation Agency (JICA)
Oromia Irrigation Development Authority (OIDA)

TRAINING MATERIAL IN COMMUNITY-BASED IRRIGATION DEVELOPMENT

PREPARATION OF WUA'S BY-LAW

(English Version)

Prepared by Obbo Berhanu Hirpo

November 2003

The Study on Capacity Building Programs
for Community-based Irrigation Development
in Central Oromia Region of Ethiopia

Art 1 Name of the scheme /Project _____

Art 2 Location:
Zone _____District / Aanaa_____

PA _____ Locality Name _____

Art 3 Number of Beneficiaries M_____ F _____ Total

Art 4 Size of the command area of the scheme _____ ha

Art 5 Irrigation system

Diversion ☐ Pump ☐ Micro Dam ☐ Shallo Well ☐

Art 6 Operating Boundary of IWUA

To the North: adjacent to Obbo /Addee_____

_____

_____

Land holding.

To the south: adjacent to Obbo / Adda_____

_____

_____

To the East: adjacent to Obbo / Adda _____

_____

_____

To the West: adjacent to Obbo / Adda _____ _____

_____

_____

Art 7 Objectives

- To use irrigation water commonly
- To solve the problem that can't be solved individually
- To carry out maintenance of irrigation scheme
- To build-up self-management and strength self reliance
- To increase production and productivity by using modern irrigation and there by improve the standard of the members.
- To use modern agricultural technology and inputs.
- To use pump as common wealth & take care of it.

Art 8 Duties

This IWUA has the following duties

a. Prepare water usage programs for members
b. Conduct new irrigation technologies
d. Purchase fuel and lubricants for the pump
e. Carry out pump maintenance
f. Establish replacement fund from for the pump and it on the bank account.
g. Pay salary for pump operator and guards
h. Give decision on marketing of the products together

Art 9 Legibility to be a member of IWUA

a. Who has got land from the command area
b. He / she has to be above 14 years of age
c. Who has participated in study and construction of the scheme.

Art 10 Right of the members

a. Has got the right to use irrigation water
b. Has got the right to elect or to be elected in different committees. But a member whose age is less than 18 years can't be elected.
c. Give ideas, comments and decision on the meetings.

Art 11 Obligation of the members

a. Respect the bye-law the rules, regulation and decisions of the general meeting and executives committee.
b. Every member should take care of the schemes and other properties of association.
c. Give service requested by the committee
d. Purchase fuel and lubricant for pump and pay salaries for operator and guards
e. Contribute money for pump replacement.
f. To obey the agreement on land distribution.

Art 12 General Assembly

a. The G.A is an assembly in which all members are presented during a meeting.
b. The G.A is the highest decision making.
c. There will be a G.A meeting twice a year, but in case of necessity an emergency meeting can be called.
d. In case of necessity 1/3rd of the total member can call an emergency meeting 30 before its effective date.
e. 15 days before G.A meeting, the agenda of the meeting shall be prepared and distributed for member.
f. If the quorum is not full the meeting will called in 15 days postponed and again the meeting will called in 15 days, If the quorum is not full again, the meeting will carried out by those who are present.
g. In case of a need for special decision making meeting, the quorum should not be less than 2/3 of the members.
h. One member has got only vote.

I. A member vote cannot be represented by any other member or outsider.
j Any decision of G.A meeting will be carried out based on the number of the votes counted on the meeting. If the votes have equal number the chairman vote will have the decisive vote.
K Dismiss member from association or allow to enter the association.
l Pass the right of land ownership to legal inheritors.

Art 13 Authority and Responsibility of G.A

a Elects or dismisses the executive committee.
b Elects or dismisses other committee.
c Evaluate the activities of association and make higher decisions.
d Solves the problems created among the members.
e Decides on the amount of contribution

Art 14 Executive committee (EC)

a. Number of EC will be _____
b. Their term of service is 2 years, but they can be elected again or dismissed and any time by G.A.
c. Member of EC shall give notice of 15 days before G.A meeting about his leaving out the committee.
d. EC carry out meeting when the number of the EC is 50%
e. Decision of EC carried out on the majority base of the vote. If both side votes are equal, the chairman vote will be the winner.

Art 15 Authority and Responsibility of EC

a. Prepares annual irrigation plan
b. Prepare irrigation water distribution program and control it's implementation.
c. Prepare schemes maintenance schedule and control it's implementation.
d. Produces and presents the rules and regulation of the association of irrigation water, disobey of laws, of not participate in maintenance activities.
e. Prepare report for G.A
f. Executes the decision and directives made by the GA
g. Checks whether the minutes of every meeting is properly filed.
h. Will create good relationship between members and IWUA and surrounding community, solves the problems happened.

Art 16 Authority and responsibility of chairman of IWUA chairman is elected by GA and will have the following authorities.

- Chairs the EC and GA meetings
- Plans and manage activates of IWUA.
  Follows up and creates good relationship between members and also between IWUA and surrounding community.
- Controls coordinated and organizes the works of sub-committees
- Will find out, searches and subjects new ideas toward the use of modern irrigation technologies and marketing management.

- Controls the common wealth of the IWUA, i.e. the use of money, materials and etc is controlled and monitored by chairperson, if these resources as used illegally by members or by him self or by any other from out side the member of IWUA will be responsible for the damages happened.
- Controls whether the minutes of EC and GA is recorded properly.
- Prepares report for GA
- Approve the expenses of IWUA.

Art 17 Authority and Responsibility of secretary of IWUA
The secretary of IWUA is elected GA and has the following authorities

- Keeps minutes of meetings of EC and GA
- Approves the expenses of IWUA.
- Gives the responses to letters and requests by writing letters.
- Administrates the office of IWUA
- Keeps documents, records and information about IWUA.
- Keeps IWUA's only cash receipts voucher.

Art 18. Authority and Responsibility of cashier of IWUA
The cashier of IWUA is elected by GA and has the following authorities.

- Collects income and deposits on IWUA Bank account.
- Pays cash after approved by chairman /secretary
- Withdraw cash from the bank for the payment of IWUA activities.
- Keeps all documents of payments, revenue and relevant letters and payments orders.
- Prepares report for the finance head monthly.

Art.19 Authority and responsibility of Auditor of IWUA
The auditor of IWUA is elected by GA and has the following Authorities.

- Inspects the activities of IWUA at all level.
- Inspects the activities of EC.
- Audits financial and material resource i.e. income, expenses and material resource.
- Prepares report for GA.

Art.20 Authority and Responsibility of Finance Head of IWUA
The finance head is elected by GA and has the following authorities.

- Registers and keeps records of the income and expenses of IWUA.
- Keeps payment vouchers and income receipt voucher and gives new once to the cashier when the cashier returns the previously taken and used vouchers' pads contains account copy, only and recording it.
- Prepares Bank reconciliation monthly.
- Prepares financial reports for EC monthly and annually.

Art 21. Amendment of the Bye-law
This Bye-low can be amended, if not less than 2/3 of the total member shall hand over the total member are presented in the meeting.

Art 22. General

Any out going committee member shall hand over the property of the association to new committee members.

Art23 Internal Regulations

Depending on this Bye-low, the EC shall produce rules, guidelines and regulations.

Art 24. Effective Date
This By-law shall enter in to force after GA discussed and approved it on _____ 199_____ EC.

Internal Regulation of
IWUA

1. Name Location and Number of the beneficiaries
   1.1 Name of the scheme _____
   1.2 Zone _____District _____
   PA _____
   1.3 Number of Beneficiaries _____
   M_____
   F_____
   1.4 Size of the command area _____ha

2. Objectives
   2.1 Efficient use of irrigation water to produce crops 2-3 times in the year.
   2.2 To manage water resource, protect and maintain the scheme commonly.
   2.3 To increase irrigated crop production as to ensure food self-sufficiency and poverty reduction.

3. Pays membership contribution_____Birr

4. Contributes pump replacement fund _____Birr

5. Unaccepted acts and level of penalties
   5.1 Coming late and being absent from meeting is not allowed
      5.1.1 A member, who is late, from the meeting for 0.30minite shall pay ____ Birr penalty.
      5.1.2 A member, who is not attended the meeting shall pay___Birr penalty
      5.1.3 Any GA starts at ___ and ends at ____hrs
      5.1.4 Beneficiary group work starts at ___ and ends at ____hrs
      5.1.5 A member, who is late from beneficiary group work for 0.30 shall pay ___ Birr penalty.
      5.1.6 A member who is not participated in beneficiary group work shall pay ___ Birr penalty.
      5.1.7 If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA"S court and PA EC the land will be transferred to any other PA member

6. Illegal use of irrigation water consumption and level of penalties
   - 6.1 A member, who loots, irrigation water out of his time schedule shall pay 50 birr penalty.
   - 6.2 A member shall not take irrigation water by cutting canal and other structures, if so,
     - 6.2.1 For the first time he/she shall pay 30 Birr,
     - 6.2.2 For second time he/she shall pay 60 Birr
     - 6.2.3 If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA"S court and PA EC the land will be transferred to any other PA member
   - 6.3 The schemes command area, structure shall be strictly protected from cattle. If the member allowed his/her cattle grassing in command area, crossing over the canal with out using with out culverts and fetching from canal; so:
     - 6.3.1 For the first time pays 50 Birr
     - 6.3.2 For the second time pays 100 Birr
     - 6.3.3 If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA"S court and PA EC the land will be transferred to any other PA member
   - 6.4 If members cattle graze or destroy the crops in the field, he/she shall pay ___2 Birr per cattle.
   - 6.5 A member coming to the group work with out hand tool shall pay _____Birr penalty.
   - 6.6 If a members elected in different committees will not carry out their duties:
     - 6.6.1 For the first time he/she shall pay 10 Birr
     - 6.6.2 For the second time he/she shall pay 20 Birr.
     - 6.6.3 For the third time case will be brought to General meeting and she/he exempted from the position.
   - 6.7 If the member does not cultivate his/her irrigable land:
     - 6.7.1 For the first season he/she will be advised.
     - 6.7.2 If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA"S court and PA EC the land will be transferred to any other PA member
   - 6.8 A member who does not contribution on time for pump replacement salaries of pump operator and guards in accordance with agreement made with IWUA and OIDA shall pay the following penalties
     - 6.8.1 If she/ he does not pay up to one month after harvest sales of crops will pay ____Birr

6.8.2 If she/ he does not pay up to tow month after harvest sales of crops will pay ____Birr

6.8.3 If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA"S court and PA EC the land will be transferred to any other PA member

We, the member of _____ Irrigation scheme beneficiaries ratified and accepted this internal regulation putting our signature.

C.C

_____ Aana Irrigation Development Desk

_____ Aana Coopreative Promotion Desk

Obbo _____, _____Irrigation scheme DA

Japan International Cooperation Agency (JICA)
Oromia Irrigation Development Authority (OIDA)

TRAINING MATERIAL IN COMMUNITY-BASED IRRIGATION DEVELOPMENT

BASIC ACCOUNTING TRAINING MANUAL

(English Version)

Prepared by Obbo Tilahun Negera

November 2003

The Study on Capacity Building Programs
for Community-based Irrigation Development
in Central Oromia Region of Ethiopia

Training Material on IWUA's Financial Management

Strength of any organization, Enterprise or association is measured by their strong financial and material management system, which helps to judge that the organization is profitable or unprofitable from their current and up dated records.

To conduct training on financial and material management for EC of IWUA the paper is produced.

This training material consists different income, expenditure and material issue ledgers, journals, payment orders and different formats to keep records and prepare financial report of IWUA.

Revenue

Income of the IWUA shall be collected by printed legal receipts which has serial number. Cash receipts vouchers shall be prepared in 3 (three) copies and signed by cashier also this cash shall be recorded in Journal immediately.

In addition to this:-

- The cash collected shall be deposited on bank on the dare of collection
- Each income title shall have it's own ledger, to make clear understanding to determine, which income stream is a major and reduce or control corruption.
- Members, income is depending on the production and productivity of irrigated crops, thus to sustain efficiency of productivity means is sustaining the income level of IWUA, the process is only proved by strong financial management of IWUA.
- Trends of Income level of IWUA is only indicated by good financial records of IWUA.
- Income from similar sources shall be receded in the same ledger.

Expense

Expense are made to execute any works that are regular and non regular activities of the IWUA.

Any payment voucher /orders shall have serial numbers and prepared in (copies), i.e. the first copy with the supporting documents will be given to finance head and the second copy will be kept by cashier, example of payment of IWUA is presented in this training material.
Any payment shall be approved by the concerned authorized person i.e. chairman /secretary before it is carried out.

- The authorities to approve payments and leveled of authority i.e. amount of money approved shall be indicated in bye-low of IWUA.
- Each expense shall have it's own title and registered in their respective ledger, salary to salary expense ledger and perdiem to the perdiem expense ledger.

  Always expensed shall be measured against their effect that they can bring about, each expense shall bring a profit for IWUA, though any expense shall be controlled and monitored, if otherwise, they will be the cause of bankruptcy and poverty for the members of IWUA.

Expenses can be grouped in to two categories.

A. Over head cost (indirect)
B. Direct costs

Over head cost are the costs, which have constant characters in the process production, they are always exists even production is under going i.e. production is increasing or decreasing. eg. Salary, rents, water, telephone etc.

Direct costs are production costs that are incurred to produce unit of product. It varies as per the quantity of products. eg. Wage, fuel, inputs etc.

To conduct financial management properly, Journals and ledgers shall be established and properly posted to each relevant ledgers from Journals. The financial records of IWUA and Bank statement (Bank records) shall be kept alone and reconciliation shall be made.

The account of IWUA shall be kept with out errors, to avoid errors, financial activities shall be controlled and monitored every time, also cash on bank shall be controlled.

EC of GA shall determine the amount of petty cash needed for daily expenditure as per the occurrences of expenses.

In addition to this level of replenishment of petty cash also shall be decided by EC or GA.

Cash received from different income streams shall be deposited on IWUA bank account on the date of collection without dalliance, otherwise it will exposed to teft of illegal use by different concerned persons.

Bank account operation has the following operation systems.

1. Saving Account 2. Current Account

It is possible to open saving account for association, or by name of individual person, by name of 2-3 individuals. The bank will issue saving book, to get this book authorized persons 2 photograph and ID card renewed is required by Bank. Such tipe of bank account opened for association and operated only with those members authorized by bye-low and entered in the agreement with bank, For each withdrawal of cash from the bank the responsible persons to operate bank account shall beer the saving book with them and present it the bank. The association will get interest on the balance. The amount of cash withdrawal from this account is limited by the bank.

The other bank cash operation system is current account, this system is operates by withdrawing signed authorized checks by chairman /secretary and cashier of the association. To open such supporting letter from district administration, or cooperative office and OIDA district office After opening the account the bank shall issue cheek Book which has registered serial numbers and sales to the association the account is operated by check payments or letter of payments signed by authorized persons by bye-low the bank will prepare bank statement at the end of monthly as GC and give to the association the finance head of IWUA shall receive the bank statement and cheek weather the all cash deposit and withdrawals are recorded and prepare reconciliation of account

To prepare financial reports all income and expense transaction shall be summarized and posted to their respective ledgers and proved that totals shall be equals to sum of ledgers the report which shows strength and weakness of IWUA shall be prepared clearly and carefully without error. The financial secret of the asocial shall be respected and not passed to other person without the knowledge and approval of EC or GA.
The financial report shall also includes the problems encountered solutions given strains threats and opportunities

Example of Income and Expense recording or registering.

Revenue

1 Date 5/6/95 contribution from member cash receipt No 003501- 003520 Birr 15,000
Date 18/6/95 Bank loan received Birr 25000 receipt No 003521
2 Date 12/8/95 Sales of onion Birr 15,000 receipt No 003522-003530
3 Date 12/8/95 Income from different penalties Birr 250 rec. No 003531-003534
4 Date 16/9/95 Sales of Tomato Birr 8000 rec. No 003535
5 " 20/9/95 " of Maize (green) Birr 4000 " No 003536
6 " 21/9/95 " of pepper and chili Birr 2300 " No 003537
7 " 22/9/95 " of Beet root Birr 1500 " No 003538
8 " 25/9/95 " of papaya Birr 5000 " No 003538
9 " 25/9/95 " Mango Birr 6500 " No 003539
10 " 26/9/95 " Carrot Birr 500 " No 003540
11 " 26/9/95 " Cabbage Birr 750 " No 003540
12 " 27/9/95 " Orange and leman Birr 1200 " No 003541
13 " 30/9/95 " Potato Birr 5000 " No 003542

Expenses

1 Date 16/6/95 Purchase of onion seed payment order No 001001 Birr 5000
2 Date 16/6/95 Purchase of Tomato " payment order No 001002 Birr 1000
3 " 17/6/95 Wage for daily labor payment order No 001003 Birr 750
4 " 17/6/95 Purchase of fertilizer payment order No 001004 Birr 7800
5 " 18/6/95 Perdiem Payment order No 001005 Birr 150
6 " 18/6/95 Car rent Payment order No 001006 Birr 150
7 " 19/6/95 Fuel and lubricant purchase " " No 001007 Birr 350
8 " 19/6/95 Purchase of tomato seed " " No 001008 Birr 150
9 " 20/6/95 Purchase of chemicals " " No 001008 Birr 8050
10 " 21/6/95 Purchase of stationary " " No 001009 Birr 125
11 " 19/6/95 Pump maintenance " " No 001011 Birr 1525
12 Date 21/6/95 Tractor rent Payment order No 001010 Birr 12500
13 " 22/6/95 Fuel purchase " " No 001012 Birr 400
14 " 30/6/95 Wage payment for daily labor " " No 001013 Birr 2500
15 " 30/6/95 Chemical purchase Payment order No 001014 Birr 250
16 " 30/6/95 Perdiem and transport " " No 001015 Birr 50
17 " " Purchase of maize seed " " No 001016 Birr 800
18 " " Purchase of Beef root seed " " No 001017 Birr 200
19 " " Purchase of Cabbage seed " " No 001017 Birr 150
20 " " Wage payment for daily labor " " No 001018 Birr 2500
21 " " Purchase of fuel and lubricant " " No 001020 Birr 350
22 " " purchase of potato seed " " No 001019 Birr 500
23 " " Bank Loan payment " " No 003545 Birr 25000

Name of WUA_____

Accounts Register Book

Page__

No	Date	Description	Receipt No	Debit		Credit		Balance	
1	15-5-95	Membership collection	003501	15,000	-			15,000	-
2	16-6-95	Onion seed purchase	001001			5,000	-	10,000	-
3	"	Tomato seed purchase	001002			1,000	-	9,000	-
4	17-6-95	Wage for daily labor	001003			750	-	8,250	-
5	"	Fertilizer purchase	001004			7,500	-	450	-
6	18-6-95	Perdiem	001005			150	-	300	-
7	18-6-95	Loan from Bank	0035021	25,000	-			25,300	-
8	"	Car rent	001006	40,000	-	1,500	-	23,800	-
9	19-6-95	Fuel and Lub. purchase	001007			350	-	23,450	-
10	"	Tomato seed purchase	001008			150	-	23,300	-
11	20-6-95	Chemical purchase	001009			800	-	22,500	-
12	21-6-95	Stationary purchase	001010			125	-	22,375	-
13	21-6-95	Tractor rent	001011			12,500	-	9,875	-
14	22-6-95	Fuel purchase	001012			400	-	9,475	-
15	"	Spar part purchase	001013			150	-	9,325	-
16	30-6-95	Wage for daily labor	001014			2,500	-	6,825	-
17	"	Chemical purchase	001015			250	-	6,575	-
18	"	Perdiem	111016			50	-	6,525	-
19	"	Maize seed purchase	001017			800	-	5,725	-
20	"	Root seed purchase	001018			200	-	5,525	-
21	"	Cabbage seed purchase	001019			150	-	5,375	-
22	30-7-95	Wage for daily labor	010020			2500	-	2,875	-
23	12-9-95	Sales of onion	03522					17,875	-
24	"	Revenue from penalties	03530	15,000	-				
25	16-9-95	Sales of Tomato	003531	250	-			18,125	-
26	20-9-95	Sales of Maize	003834						
27	21-9-95	Sales of Pepper	003535	8,000	-			26,125	-
28	22-9-95	Sales of Root	003536	4,000	-			30,125	-
29	25-9-95	Sales of Papaya	003537	2,300	-			32,425	-
30	"	Sales of Mango	003538	1,500	-			33,925	-
31	26-9-95	Sales of Carrot	003539	5,000	-			38,925	-
32	"	Sales of Cabbage	003540	6,500	-			45,425	-
33	27-9-95	Sales of Orange and	003541	550	-			45,925	-
34	30-9-95	lemon	003542	750	-			46,675	-
35	"	Sales of Potato	003543	1,200	-			47,875	-
36	"	Purchase of potato seed	003544	5,000	-			52,875	-
37	30-9-95	Fuel purchase	010021			500	-	52,375	-
		Loan payment	010022			350	-	52,025	-
			010023			25000	-	27,025	-
				90,000	-	62,975			
				90,000	-	62,975			

Name of the WUA____________________

Account Name Contribution

Page___

No.	Date	Ref. No.	Item	Posting Ref. No. .	Debit		Credit		Balance	
1	15-5-95	03501 03520	Member ship collection	G.1	15000	-			15000	-

Name of the WUA _____

Name of Account Onion

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	16-6-95	001001	Onion seed cost	G.1	5,000	-			5,000	-
2.	12-8-95	03522-30	Onion sales	G-2-23			15,000		10,000	

Name of the WUA_____

Name of Account Tomato

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	16-6-95	001002	Seed purchase	G-1	1000				1000	-
2.	19-6-95	001008	Seed purchase	G-1-10	150				1150	-
3.	16-6-95	003535	Sales of Tomato	G-2-24			8000		6850	-

Name of the WUA_____

Name of Account Wage payment

Page__

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	17-6-95	001003	Wage payment	G.1-4	750				750	-
2.	30-6-95	001014	Wage payment	G-1-16	2500				3250	-
3	30-7-95	002020	Wage payment	G-2-22	2500				5750	-

Name of the WUA_____

Name of Account Fertilizer

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	17-6-95	001004	Purchase of fertilizer	G.1-5	7800				7800	-
										-
										-

Name of the WUA_____

Name of Account Perdium and Transport allowace

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	18-6-95	001005	Perdiem Payment	G.1-6	150				150	-
2.	30-6-95	001016	Perdiem payment	G-1-8	50				200	-

Name of the WUA_____

Name of Account Car and Tractor rent

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	18-6-95	035021	Car rent	G.1-8	1500				1500	-
2.	21-6-95	001011	Tractor rent	G-1-13	12500				14000	-

Name of the WUA_____

Name of Account Fuel and lubricant

Page __

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	19-6-95	001007	Fuel for car	G.1-9	350				350	-
2.	22-6-95	001012	Fuel for tractor	G-1-14	400				750	-
3	30-9-95	002022	Fuel and lub. tractor	G-2-36	350				1100	-

Name of the WUA_____

Name of Account Chemicals

Page 1

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	20-6-95	001009	Pesticide	G.1-11	800				800	-
2.	30-6-95	001015	Herbicides	G-1-17	250				1050	-
										-

Name of the WUA_____

Name of Account Stationary and Office supply

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	11-6-95	001010	Paper and pens	G.1-12	125				125	-

Name of the WUA_____

Name of Account Spare parts

Page __

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	22-6-95	001003	Pump spare part	G.1-15	150				150	-

Name of the WUA_____

Name of Account Cabbage

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	30-6-95	001019	Seed purchase	G.1-21	150				150	-
2.	30-7-95	003542	Sales of cabbage	G-2-32			750		600	-

Name of the WUA_____

Name of Account Other Income

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	12-8-95	003531-34	Revenue from penalty	G.2-24			250		250	-
2.	21-9-95	003537	Pepper and chili sales	G-2-27			2300		2550	-
3	25-9-95	003539	Papaya sales	G-2-29			5000		7550	-
4	25-9-95	003540	Mango sales	G-2-30			6500		14050	-
5	26-9-95	003541	Carrot sales	G-2-31			500		14550	-
6	27-9-95	003543	Orange and lemon sales	G-2-33			1200		15750	-

Name of the WUA_____

Name of Account Potato

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	30-9-95	003544	Sales of Potato	G.2-44			5000		5000	-
2.	30-9-95	002021	Seed Purchase	G-1-50	500				4500	-
										-

Name of the WUA_____

Name of Account Maize

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	30-6-95	001017	Maize seed purchase	G.1-19	800				800	-
2.	20-9-95	003536	Sales of Maize (Green)	G-2-26			4000		3200	-

Name of the WUA_____

Name of Account Beetroot

Page ___

No.	Date	Ref. No	Item	Posting Ref.	Debit		Credit		Balance	
1.	30-6-95	001018	Seed purchase	G.1-20	200				200	-
2.	30-6-95	003538	Sales of Beet root	G-2-28			1500		1300	-
										-

Name of WUA

_____

Financial Report

_____

For the season Ended

_____

Revenue

1. Income:-

		15,000.-	
		25,000.-	40,000.-
		15,000.-	
		8,000.-	
		4,000.-	
		1,500.-	
		750.-	
		5,000.-	
		15,000.-	50,000
Total			90,000

Expense

Seed purchase	- Onion	5,000.-	
	- Tomato	1,150.-	
	- Maize	800.-	
	- Beetroot	200.-	
	- Cabbage	150.-	
	- Potato	500.-	7,800.-
Production cost:	- Salary	5,750.-	
	- Fertilizer	7,800.-	
	- Loan payment	25,000.-	
	- Car and tractor rent	14,000.-	
	- Fuel and lubricant	1,100.-	
	- Chemicals	1,050.-	
	- Perdiem trans allow	200.-	
	- Other materials	125.-	
	- Spare part	150.-	55,175 -
Total expenditure			62,975.00
Profit			27,025.00

Name of WUA_____

Bank account register book

No.	Date	Description	Ref. No	Debit		Credit		Balance	
1.	15-5-95	Income from contribution	003501 003520	15000	-			15000	-
2.									

NO_____

Date_____

Name of Committee Member /Person received _____

Cash Receipt Voucher

Name Person Paid _____
Reason of
Income_____

Amount In figure_____

Amount In words _____

Prepared by

Name_____

Signature_____

Receiver

Name_____

Signature_____

NO______________
Date _____________

Committee ______________________________________

<u>Goods Receiving Note</u>

No of receipts_________________________________

No.	Name of Item	Unit	Quantity	Unit Price		Total Price	
Total							

Submitted by Name ___________________ Received by Name ________________

Signature _____________________________ Signature________________________

Committee Name _____

Perdiem Payment Form

Date _____

Full Name _____ Daily Perdiem. _____

Purpose of Travel

_____

Function in short _____

	Departure		Destination						
Place	Date	Time	Place	Date	Time	Perdier	Transport	Total	
Total									

Amount in Words_____

Requested by Prepared by Conformed by Authorized by

_____ _____ _____ _____

No ______________
Date______________

Committee________________________

Goods Issue Voucher

Request by___________________________
Reason of Issued ____

No.	Name of Item	Unit	Quantity	Unit Price		Total price	
Total							

Authorized by

Name ___________________________

Signature ________________________

Received by

Name_________________________

Signature_____________________

Issued by

Name_____________________________

Signature__________________________

No _____
Date _____

Committee Name_____

Payment Voucher

Name of payee_____

Amount in Figure _____

Amount in word_____

Reason of
payment_____

_____

Prepared by

Name_____

Signature_____

Paid to

Name_____

Signature _____

Authorized by

Name_____

Signature_____

Advance payment Requisition form

Name _____

Reasons of payment _____

_____

_____

Amount in figure _____

In words_____

_____

I received _____ Birr, and prove by my signature.

Received by	Approved by	Cashier
Name _____	Name _____	Name _____
Signature _____	Signature_____	
Date _____	Date _____	

Loading and unloading payment form

Name _____

Reason _____

_____

_____

Amount in figure _____

Amount in words _____

_____

_____

I which my name is stated above received _____ birr for the work of loading on car plate No. _____

Received by	Paid by
Name _____	Name _____
Signature _____	Signature _____
Date _____	Date _____

Name of IWUA _____

Fuel and Lubricant issue Ledger

Date	Name of Recipient	Fuel (litter)	Lubricant (Kg)	Signature

Name of IWUA _____

Fuel and Lub. Purchase Records

Date	No of Receipts	Type	Unit	Quantity	Amount Birr	

Loan Taken By Members

Date	Name	Purpose of loan	Duration of loan	Amount Borrowed birr	Paid birr	Balance

Attachment - 2

Amharic Version of Premises

9. የሀራ ደንበል የመስኖ ማህበር የስራ ድርሻ:-
   - የጉልበት ሥራ ሙሉ በሙሉ የአባላቱ ይሆናል
   - የሞተሩ መጠለያ መስራት
   - የሞተሩን 50% በ2 ዓመት ማህበሩ በባንክ ሂሳባቸው ያጠራቅማሉ
   - ቀሪውን 50% (የሞተሩ አገልግሎት ተቀናሽ) የሞተሩ የህይወት እድሜው ታስቦ በየምርት ወቅት ከአባላት እየተዋጣ በማህበሩ ባንክ ሂሳብ ገቢ ይሆናል

10. የአጠቃቀም ሁኔታ:-
   - በብቃትና ለዘለቄታው ማህበሩ የውኃ ሞተሩን ይጠቀማሉ

11. የውሃ ሀብት ማጎልበት:-
   - ሙሉ በሙሉ የሀራ ደንበል መስኖ ሥራ ማህበር ይከናወናል።

ANNEX V

GUIDELINE FOR ESTABLISHMENT AND MANAGEMENT OF WUA

ANNEX V

GUIDELINE FOR ESTABLISHMENT AND MANAGEMENT OF WUA

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List of Attachment

CHAPTER 1 INTRODUCTION

1.1 Purpose

The guideline was prepared at the end of the Meki study in February 2001. Under Program II, the overall review was made and revised in order to meet the present requirement for the guideline. The revised guideline is presented in Attachment-1.

1.2 Applicability of the Guideline

The guideline is applied for community-based small-scale pump irrigation projects at wareda level. There are two standard size of irrigation scheme depending on water resource as follows.

Applicability of Guideline

Water Resource	Command Area	Beneficiaries	Plot Size	Pump Capacities
River or Lake	5 ha	20 HH	0.25 ha/HH	10 HP
Groundwater (Shallow Well)	3 ha	12 HH	0.25 ha/HH	5 HP

1.3 Users of the the Guideline

Users for the guideline are social workers and engineers of OIDA being engaged in community mobilization of irrigation development projects.

1.4 Concept of the Project

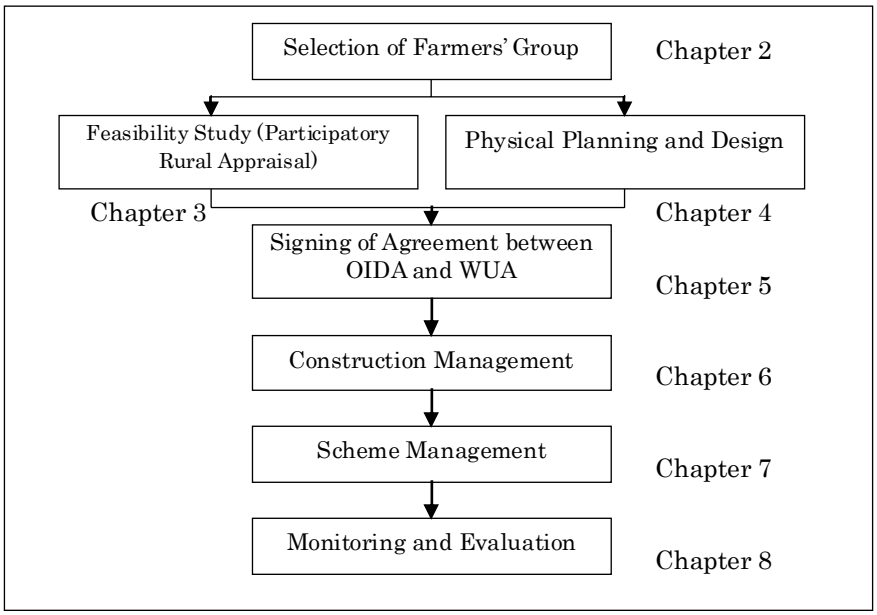
The guideline indicates the process in line with the following concepts, learning the past experience:

1) Concepts to achieve sustainable irrigation development, focusing on the following aspects.
    - Fair distribution of land and water resource among farmers
    - Fund formation by farmers
    - Saving for replacement of a pump
2) Awareness creation to let farmers understand the above concept and difficulty of irrigated farming practice
3) Discussion of responsibilities of OIDA and WUA, and consequent signing an agreement with farmers.
4) Enhanced farmers' participatory approach in planning and construction period
5) Strengthening WUA support for scheme management
6) Strengthening monitoring and evaluation system by OIDA and WUA

CHAPTER 2 CONTENTS OF THE GUIDELINE

2.1 Contents of the Guideline

The guideline is described according to the workflow of the WUA establishment in order. The contents of the guideline are presented below.



Contents of Guideline

Attachment-1

Guideline for Establishment and Management of WUA

Guideline for Establishment and Management of Water Users Associations (WUA)

Prepared on the basis of Verification Study under
Meki Irrigation and Rural Development Project and
Capacity Building Programs for
Community-based Irrigation Development in
Central Oromia Region of Ethiopia




March 2004

Japan International Cooperation Agency (JICA) and

Oromia Irrigation Development Authority (OIDA)

Guideline for
Establish and Management of
Water Users Associations (WUA)

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CHAPTER 1 INTRODUCTION

1.1 General

1.1.1 Purpose

- The GUIDELINE describes process of establishment and management of a water users' association (WUA).

1.1.2 Applicability of the Guideline

- The GUIDELINE is applied for community-based small-scale pump irrigation projects at wareda level. There are two standard size of irrigation scheme depending on water resource as follows.

Water Resource	Command Area	Beneficiaries	Plot Size	Pump Capacities
River or Lake	5 ha	20 HH	0.25 ha/HH	10 HP
Groundwater (Shallow Well)	3 ha	12 HH	0.25 ha/HH	5 HP

1.1.3 Users of the Guideline

- Users for the GUIDELINE are social workers and engineers of Oromia Irrigation Development Department (OIDA) being engaged in community mobilisation of irrigation development projects.

1.2 Concept of the Project

- The GUIDELINE indicates the process in line with the following concepts, learning the past experience:

  ① Concepts to achieve sustainable irrigation development, focusing on the following aspects.
  - Fair distribution of land and water resource among farmers
  - Fund formation by farmers
  - Saving for replacement of a pump

  ② Awareness creation to let farmers understand the above concept and difficulty of irrigated farming practice

  ③ Discussion of responsibilities of OIDA and WUA, and consequent signing an agreement with farmers.

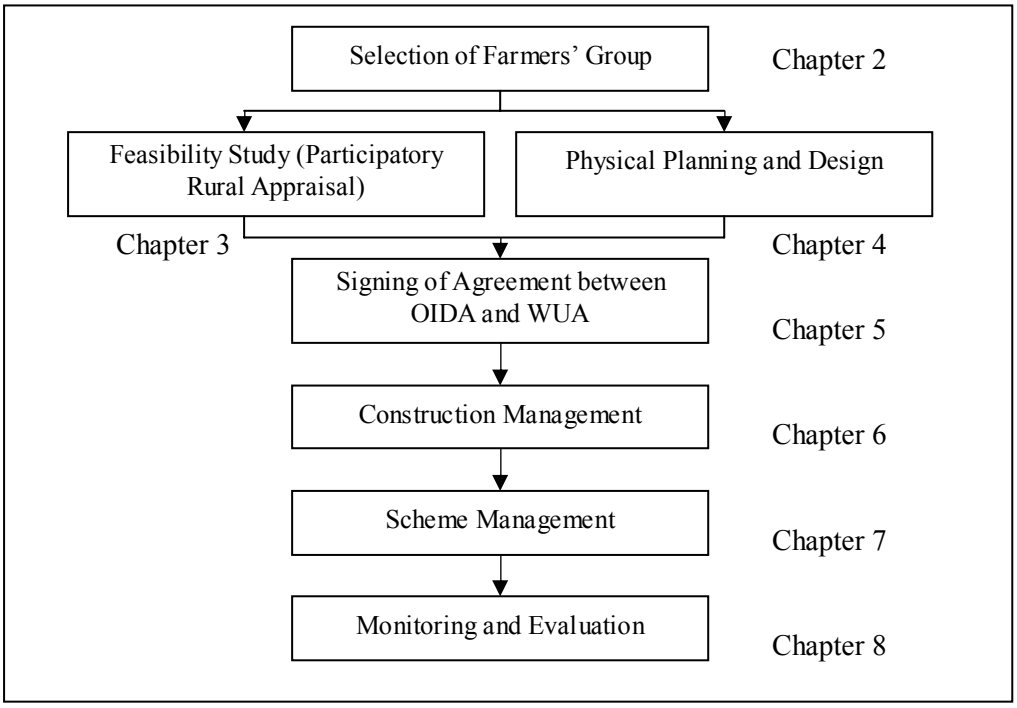
  ④ Enhanced farmers' participatory approach in planning and construction period

  ⑤ Strengthening WUA support for scheme management

  ⑥ Strengthening monitoring and evaluation system by OIDA and WUA

1.3 Work Flow of the Project

・ The GUIDELINE describes according to the work procedure of the project as show below.



1.4 OIDA Team for the Project

・ The OIDA team with other organizations concerned for the project shall be organised by the following members.

	Office	Designation	Selection of group	F/S	Planning & design	Signing of agreement	Construction management	Scheme management	Monitoring & Evaluation
1.	OIDA Wareda office	Wareda head	◎	◎	◎	◎	◎	◎	◎
2.		Experts (Social workers)	○	○			○	○	○
3.		Experts (Engineer)	○	○	○		○	○	○
4.		Development Agent (DA)		○			○	○	○
5.	OIDA Head / Branch office	Design Engineer			●				
6.		Social Worker		●				●	●
7.		Construction Engineer					●		
8.		Surveyor			○				
9.		Mechanic					○		
10.	Wareda Administration Office	Rural Development Officer	○			○		○	○
11.	Peasant Association (PA)	PA Chairman	○	○		○	○	○	○

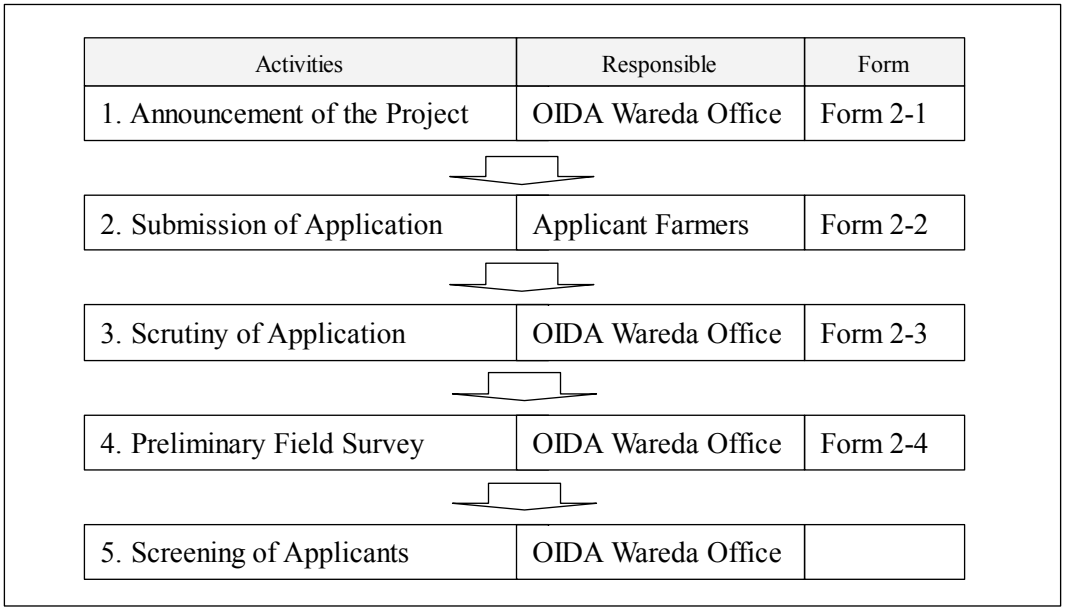
◎: Responsible person
○: Person in charge
●: Supporting person for Wareda office staff

- In addition to the above personnel, a manager of the branch office, a design engineer in planning and design department of the head office, and a social worker in community mobilisation department of the head office, will provide necessary supports and instruction.

CHAPTER 2 SELECTION OF FARMERS' GROUP

2.1 General

- Selection of farmers' groups for the Project will be conducted in the following procedure.



2.2 Announcement of Project

- Announcement of the Project should be noticed on notice board in Wareda Office, indicating conditions for the application as shown in Form 2-1.

2.2.1 Standard Size of the Project

- The standard command area and number of applicants per group shall be as the following table.

Water Resource	Command Area	Beneficiaries	Plot Size	Pump Capacities
River or Lake	5 ha	20 HH	0.25 ha/HH	10 HP
Groundwater (Shallow Well)	3 ha	12 HH	0.25 ha/HH	5 HP

- The farming plot size per household shall be 0.25 ha.

2.2.2 Premises for the Project

- Applicants shall understand and agree with the following basic concept on pump use management (Premises).

Basic Concept of Agreement on Pump Use Management (Premises)

1) Ultimate Goal of Agreement	:	Food Security – Stability of and Increase in Agricultural Production by user household through irrigation farming
2) Main Stakeholders in Agreement	:	OIDA, Water Users Association and Peasant Association
3) Specific Scope of Agreement	:	Pump Use Management in Irrigation Farming (Implying no support to farm inputs is provided)
4) Type of Agreement	:	Contract Lease Agreement
5) Basic Rights of Pump	:	Ownership held by OIDA Usufruct right enjoyed by Water User Association
6) Item in Lease Agreement	:	Pump for Irrigation Use Only
7) Cancellation of Agreement	:	Existing due to Violation or Unjustifiable Application of Agreement
8) Basic Principles of Lease	:	One Time Investment of Pump by OIDA Cost Recovery by Water Users Association
9) Contributions by WUA	:	Physical contributions as labor by WUA (5 % of investment cost)
10) Operational Conditions of Lease	:	Effective, Efficient and Sustainable Use and Management of Pump by WUA
11) Water Resources	:	Water Resources Development under Communities' Responsibility (e.g. Construction and Maintenance of Lead Canals to the Site and Shallow-Wells)

2.3 Application by Farmers' Groups

- Applicants for the project shall visit the Wareda Office to receive the application form.
- The applicants shall submit the form to the OIDA wareda office after getting approval from PA Chairman.
- The application form with its covering letter is shown in Form 2-2.
- The OIDA Wareda office receive the application after scrutiny described in the Section 2.4.

2.4 Scrutiny by OIDA

- An application should be scrutinised whether some data and information are missing.
- Name of the representative for each applicant should be confirmed.
- The information of applicants shall be summarized on the table in Form 2-3

2.5 Preliminary Field Survey

- The staff in the OIDA wareda office shall conduct preliminary field survey for selection of the farmers' group, with check sheet shown in Form 2-4.
- Points for the field survey are as follows:
  - Location of command area, water resource, and, pump station
  - Topography of command area
  - Approximate length of irrigation canal
  - Soil
  - Existing irrigation facilities
  - Farmers' experience for irrigation
  - Water quality for irrigation
  - Sketch of proposed scheme

2.6 Screening of Farmers' Groups

- Based on the results of field survey, staff of OIDA wareda office shall conduct screening of the farmers' groups according to the following criteria:

1. Natural conditions:
1) The size of the command area is not more than 5 ha or 3 ha (groundwater irrigation), with some members. 2) The location of the pump house and command area are not located in frequent flood-affected area. 3) Soil in the command area is not sandy. 4) Design head for the pump is not more than 10 m. 5) Water discharge is sufficient for command area. 6) Water quality is suitable for irrigation 7) Length of the main canal is not more than 500 m. 8) The proposed canal does not need special related structures such as siphon and aqueduct.
2. Sociological conditions:
The farmers' group should be; 1) Strengthened in their unity, 2) Fairly formed and democratically managed, 3) With strong leadership, and 4) (4) Organized by youths, who are acceptable for modern farming technologies, in a majority

2.7 Report of Result

- Result of the screening shall be noticed to the applicants.
- List of applicants, original of the check sheet, and the application form shall be kept in OIDA wareda office.

- List of applicants and selection of farmers' group shall be sent to the Branch office.

2.8 Action for Next Step

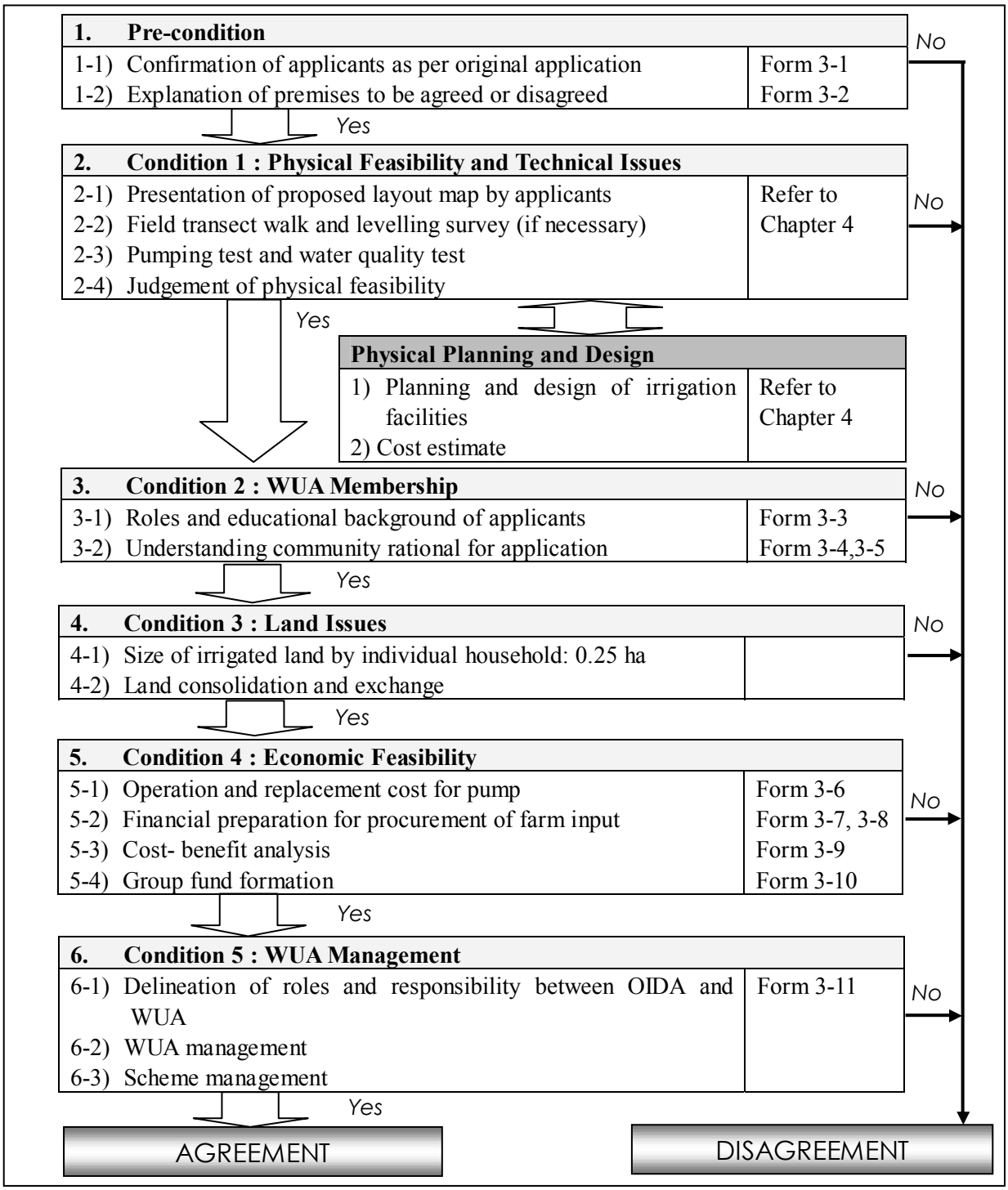
- The OIDA wareda office head shall co-ordinate schedule for assigning his staff in the pre-feasibility study and request to the OIDA branch office to dispatching an sociologist and design engineer, if necessary.

CHAPTER 3 FEASIBILITY STUDY

3.1 General

- Feasibility study of the project is carried out with applying **Participatory Rural Appraisal (PRA)**. The objectives of PRA are to perform a participatory plan formulation of community-based irrigation development with candidate WUA applicants under the premises.

- The PRA is to be carried out in line with the following flow.



Basic Flow of PRA

- Farmers' preferences are listened to as much as possible in order to incorporate them to final plan.
- At each step of discussion, both OIDA and applicants reserve rights to terminate or cancel the discussion when one or both sides can not agree the conditions arising from the PRA.

3.2 Time Frame of PRA

- The PRA session shall be organized for about 5 working days per an applicant group. Typical time frame is shown as follows.

Typical Time Frame of PRA

Session	Day 1	Day 2	Day 3	Day 4	Day 5
1. Pre-condition	○				
2. Condition 1 Physical feasibility	○	○			
Physical planning & Design	○	○	○		
3. Condition 2 WUA membership		○			
4. Condition 3 Land issues		○	○	○	
5. Condition 4 Economic feasibility			○		
6. Condition 5 WUA management				○	
7. Signing agreement					○

3.3 PRA sessions

- Detailed activities at each PRA session are summarized in the tables from the next page.

3.4 Action for Physical Planning and Design

- Physical planning and design of irrigation facilities including a pump shall be carried out at the same time of PRA.
- The wareda office staff shall arrange a schedule for dispatching an design engineer and a surveyor in cooperation with OIDA branch office or head office.

1. Pre-Condition

I. Objectives

(1) To confirm applicants and their status
(2) To have consensus about "Premises" among members.

II. Main Staff

OIDA	Wareda head, Social worker
Other	PA chairman

III. Activities	Form
(1) Confirmation of applicants ・ Name of participants shall be confirmed based on the application form.	Form 3-1
・ It is noted the membership of WUA is entitled for the children of the members over 18 years old as well as the head of household if the members of WUA approve that the children have membership. Thus, it is necessary to check the membership by not only the authorised application but also interview of the WUA member.	
(2) Explanation of premises ・ OIDA social worker shall explain the contents of premises and the basic concepts of the project and confirm their understanding.	Form 3-2

IV. Equipment and Material

・ Application form submitted by applicants
・ Flip chart
・ Stationery

V. Remark	Reference No.
・ Background of premises	・ Box 3.1
・ Points of awareness creation	・ Box 3.2

2. Condition 1: Physical Feasibility and Technical Issues

I. Objectives

(1) To assess physical feasibility of the proposed layout
(2) To collect physical information for planning and design

II. Main Staff

OIDA	Wareda head, Engineer
Other	

III. Activities	Form
(1) Presentation of the proposed layout map by applicants ・ Applicants shall present and explain their proposed layout. ・ Points for confirmation are as follows: – Type and location of water resource (river/lake/shallow well) – Location of pump house – Canal layout and the number of canal structures – Existing irrigation facilities – Arrangement of farming plot / Direction of water distribution (2) Field transect walk and levelling survey ・ The OIDA staff shall conduct field transect walk with applicants. ・ They shall confirm locations of proposed pump house and main canal, condition of existing facilities, boundary of command area, and present land use. ・ Approximate suction head and delivery head as well as required length of pipes shall be confirmed using a tape. ・ Soil condition and topography shall be also surveyed so as to study validity of irrigation plan. ・ The OIDA engineer shall make a survey plan for physical planning and design. (3) Pumping test and water quality test ・ In the case of groundwater irrigation, the OIDA engineer shall carry out simple water discharge and water quality test. The methods of both tests are described in Chapter 4. (4) Judgement of physical feasibility ・ The OIDA engineer shall give applicants a judgement of physical feasibility based on the results of planning and design.	Refer to Chapter 4

IV. Equipment and Material

・ Proposed layout map (Application form)
・ Flip chart / Stationery
・ 50 m tape
・ Survey equipment (Auto level / Staff / Peg)

V. Remarks	Reference No.
・	

3. Condition 2: WUA Membership

I. Objectives

(1) To know the character of applicants group and members
(2) To confirm the strength of applicants group

II. Main Staff

OIDA	Wareda head, Social worker
Other	

III. Activities	Form
(1) Confirmation of roles and educational background of applicants ・ The OIDA social worker shall confirm the roles and educational background of applicants	Form 3-3
(2) Understanding community rational for application ・ The OIDA social worker shall collect information of history of community and applicants' experience in irrigation.	Form 3-4 Form 3-5

IV. Equipment and Material

・ Flip chart
・ Stationery

V. Remarks	Reference No.
・	

4. Condition 3: Land Issues

I. Objectives

(1) To make awareness creation for land consolidation and exchange
(2) To finalize land exchange among members with official approval from PA

II. Main Staff

OIDA	Wareda head, Social worker
Other	Executive member from peasant association

III. Activities	Form
(1) Awareness creation for land holding issue ・ Irrigation farm land size should be 0.25 ha per applicant. ・ Asked by the applicants, commenting that 0.25 ha of irrigated land is too small to have benefit, the following explanation will be made to them: - 0.25 ha is the optimum scale by family labour force, - Large-scale cultivation may result in the loss, accompanied with high risk, - It is appropriate to start the irrigation farming practice with the optimum scale, - It is no objection for the WUA members to expand the irrigation area, arranging another pump, when the irrigated cultivation will be well under way. (2) Land consolidation and exchange ・ One of the executive member from PA shall be requested to attend this PRA session. ・ Applicants shall prepare a note for each internal agreement on land exchange and transfer. ・ Internal agreement on land exchange and transfer shall be approved by PA executive member.	

IV. Equipment and Material

・ Flip chart
・ Stationery

V. Remarks	Reference No.
・	

5. Condition 4: Economic Feasibility

I. Objectives

(1) To make awareness creation for financial issue
(2) To calculate operation and replacement cost for pump

II. Main Staff

OIDA	Wareda head, Social worker, Engineer
Other	

III. Activities	Form
(1) Operation and replacement cost for pump and irrigation facilities	
・ Applicants shall understand the following type of costs required for operation and management of pump and irrigation facilities: - Operation cost (fuel / lubricant / salary for operator & guard) - Maintenance cost (canal / structures / pipe / pump house) - Replacement cost (pump / pipe)	
・ Applicants shall calculate total cost per household per crop season with assistance of OIDA social worker and engineer.	Form 3-6
(2) Financial preparation for procurement of farm input	
・ The OIDA staff shall explain the condition on no-provision of farm inputs repeatedly.	
・ The OIDA staff shall ask applicants their internal strategy to prepare farm inputs.	
・ In reference to above strategy, the OIDA staff can request applicants to present their preference on types of crops and livestock assets.	Form 3-7 Form 3-8
(3) Cost-benefit analysis	
・ The OIDA staff shall inform the applicants crop budget for major crops, such as tomato, cabbage, chilli, onion, and papaya.	
・ Through this awareness session, the OIDA staff shall inform the applicants the fact that benefits with irrigated farming is accompanied with risk depending on market price of the crops.	
・ The OIDA staff shall explain gross revenue as shown below. - Farm gate price of the products with range from annual minimum and maximum price (trend of annual fluctuation). - Factors the price varies, such as mass production and production in another areas - Yield of the products with range from minimum and maximum yields. - Gross income per household	

・ The OIDA staff shall explain production cost as shown below. - Composition of production cost - Input (seed, fertiliser, and pesticide) - Labour cost - Operation and management cost for pump and facilities ・ Net revenue - Net revenue - Break even price ・ Samples of crop budget for the major crop are presented in Form 3-9.	Form 3-9
(4) Group Fund Formation ・ The OIDA staff shall explain necessity of the group fund formation according to the following procedures. - Based on cost-benefit analysis presented, the OIDA staff will ask the applicants whether they can afford farming cost, including seeds, fertiliser, chemicals, and others, - The OIDA staff will ask the applicants how much they can arrange farming costs selling rain-fed crops, cattle. - During the discussion, farmers will be aware that it is very difficult to arrange the fund for irrigated farming under present rain-fed farming. ・ The OIDA staff will introduce the proposed system, paying labor wages for their participation in the construction works above 20 MD labor contributions per household.	Form 3-10
IV. Equipment and Material	
・ Flip chart ・ Stationery ・ Calculator	
V. Remarks	Reference No.
・ Replacement cost for pump and pipe	Box 3.3

6. Condition 5: WUA Management

I. Objectives

(1) To make awareness creation for WUA organization, financial, and scheme management

(2) To establish WUA organization

II. Main Staff

OIDA	Wareda head, Social worker
Other	

III. Activities	Form
(1) Delineation of roles and responsibilities between OIDA and WUA ・ The responsibilities of OIDA and the WUA member in the project shall be confirmed in due course. The presentation shall be conducted by use of paper on panel.	Form 3-11
(2) WUA management ・ The applicants shall select the following committee members: - Chairman / Secretary / Cashier / Auditor / Pump operator ・ The OIDA staff shall explain the necessity of opening bank account and keeping account book.	
(3) Scheme management ・ The OIDA staff shall provide several information of scheme management, including the responsibilities of the members as well as committee members. ・ The OIDA staff shall explain repeatedly that OIDA reserves the right to withdraw the pump from WUA in any case described as below. - No cultivation is made during two consecutive years after installation of the pump. - Unfairness is observed for use of pump. - Unfairness is observed for land distribution. - Unfairness is observed for irrigation water distribution. - Saving money for replacement of pump is not carried properly. - Unclearness or dishonesty is observed in the account book. ・ Throughout this session, the OIDA staff shall let the applicants understand difficulty of irrigation scheme management. ・ The OIDA staff shall explain the necessity of keeping pump operation and maintenance book.	
(4) Support of the WUA Establishment 1) Selection of Committee Members ・ The OIDA team shall assist the applicants to select committee members, consisting of a chairman, a secretary, a cashier, and an auditor.	

・The OIDA team shall assist the applicants to prepare minutes of the meeting of selection of the committee members.

2) Responsibilities of Committee Members

・The OIDA team shall explain the applicants roles and responsibilities of the committee members according to the followings.

Chairperson
Chair person is elected at General Assembly Meeting and has the following authorities:

a) Keeps minutes of meetings
b) Chairs the EC and GA
c) Approve the expense of the association

Secretary

a) Keeps minutes of meetings
b) Attaches letters directed from the chairperson to their respective files if necessary replies to concerned offices.
c) Administers the office of the association.

Treasures

a) Collect income of the association
b) Save the money in the bank
c) Pay the money after it has been approved by chairperson or secretary
d) Withdraw the money from the bank
e) Keeps all documents of cash flows, expenses and income.

Auditors

a) Controls whether the EC is functioning according by or not.
b) Controls all activities of the association
c) Controls the utilization of money and properties of the association.
d) Prepare report for GA.

3) Selection of block leader and pump operator

・ Leader of each irrigation block of 1 ha, consisting of four applicants, shall be selected. He (she) will be representative of the irrigation block and be members of the committee to decide irrigation schedule.

・ Pump operator(s) shall be selected among the applicants.

4) Opening bank account

・ The OIDA Team shall support the applicants to obtain bank account in the name of them as described below

- The minute of meeting, that appoints three (3) representatives for the bank operation, shall be prepared and sent to the wareda administration office.

IV. Equipment and Material

・ Flip chart

・ Stationery

V. Remark	Reference No.

Box 3.1 Background of Premises

1. Concept of Project Premises for Community's Self-preparation (1): Ownership of Pump

A core project concept of the agreement is concerned with the ownership of the pump. The OIDA should hold the ownership of the pump, while user community enjoys full range of usufruct right of the pump. This issue becomes the first subject to consent with user community.

During PRA session, the following two main issues shall be discussed;

1) Mutual understanding on an ultimate goal of project, i.e. attainment of food security; and,
2) Recognition of three basic stakeholders concerned with the common goal;
   i) OIDA on behalf of government for nation building;
   ii) Peasant Association on behalf of administrative village for rural integration; and,
   iii) WUA on behalf of individual households for their management.

OIDA as government agent for irrigation has duties to maximize effects of pump irrigation by efficient use of pump for the attainment of ultimate goal. In case if a pump shall be found to be idling by ineffective use of pump by water users, OIDA hold rights to take such idling pump from the WUA due to its poor performance and hand over it to the other water user association which would be anticipated to make better performance on the effective, efficient and sustained use of pump.

WUA applicants should be aware of the issue concerned on ownership and usufruct rights, subsequently understanding that the agreement to be made between OIDA and WUA is in nature treated as contract lease arrangement. A pump, the use of which should be restricted for irrigation farming purpose, is also clearly understood as the single item subject to the contract lease agreement.

2. Concept of Project Premises for Community's Self-preparation (2): Cost-Sharing

The concept of cost-sharing in this project implementation is closely referred to the modality of development project implementation prevailing in this country. The representative of the implementation modality to be referred to is the one of the Ethiopian Social Development and Rehabilitation Fund (ESRDF), since the ESRDF's modality has been widely adopted as nationwide scale by Wareda administration as well as peasant association.

One of the core concepts, which are highlighted in the modality, is concerned with cost-sharing. Before the year of 2002, user community should share 10 % of investment cost in both forms of cash and kind. In addition to this, user community should also cover expenses for pre-feasibility study cost. This conditionality with regards to cost-sharing is, however, said to be slightly modified into the one that ESRDF will provide each water users association with minimum amount of farm inputs like seeds as grant only after the irrigation scheme is officially handed over to the community. This change of modality is understood that water users association, that committed to share 10 % of investment cost, normally faces difficulties to engage in irrigation farming due to no availability of farm inputs. The provision of farm inputs is roughly estimated with a rate of around 5 % of total investment cost. In reference to modality of ESRDF on cost-sharing, it is set in the project premises that 20 man-days (MD) of physical labor forces per household shall be contributed by user community in consideration with the following calculation behind.

With regards to small pump irrigation, a scale of operation is more or less standardized as the most optimized scale of operation with around 20 households for irrigating 5 ha by using a pump with around 10 horse powers. For this, a total amount of Birr 80,000.00 is estimated as standard investment cost. If the current ESRDF's modality on cost-sharing can apply into the case, 5 % of share accounts for Birr 4,000.00. The amount of Birr 4,000 can be further converted into 400 MD of labor inputs referring to current market price of labor at the rate of Birr 10 per day. Therefore, it is formulated as one of project implementation modality that 20 MD of labor forces per household are to be provided by users' communities.

Box 3.2 Points for Awareness Creation

Needs for awareness creation

An emphasis shall be put on an awareness creation to farmers is, so that they have knowledge of responsibility and management of WUA as well as general information of irrigation farming. It is expected that OIDA also get farmers' intention for proposed schemes so as to realize sustainable irrigation development.

To achieve proper resource management and sustainable irrigated agriculture, technical and financial constraints for the project implementation should be informed to farmers. This project adopts an awareness creation procedure, through presenting the condition for supplying pump equipment.

The social workers of OIDA should let farmers understand risk accompanied with an irrigated agriculture. Thus, they are expected to enhance knowledge for crop budget and marketing for major irrigated crops.

Group fund formation

Group fund formation by WUA shall be promoted for securing the funds for the initial cultivation. In stead of 10% labour contribution in construction cost, wages for the construction works will be paid to the farmers. The wages will be saved into a bank account of WUA and they will be utilised as the initial cost for cultivation. OIDA will help WUA to open the bank account.

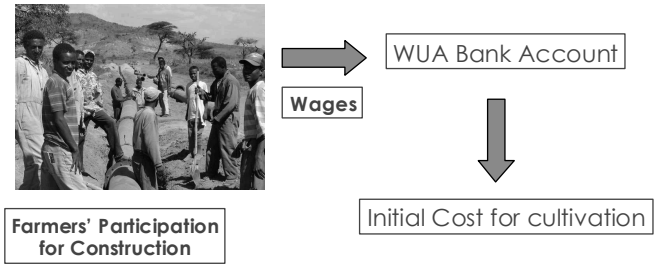


Figure 5.3 Group Fund Formation of WUA

Saving for replacement of pump

OIDA is requested to instruct WUA members to save money annually for replacement of a pump considering a life of the pump.

Land consolidation

Land consolidation of irrigated land near water resource shall be facilitated in order to enhance irrigation performance. This measure could reduce canal length and water seepage, and consequent fuel cost, improving irrigation efficiency and performance of the pump. It is essential to exchange of farmland among the WUA members to achieve the effect of land consolidation, discussing thoroughly among the members.

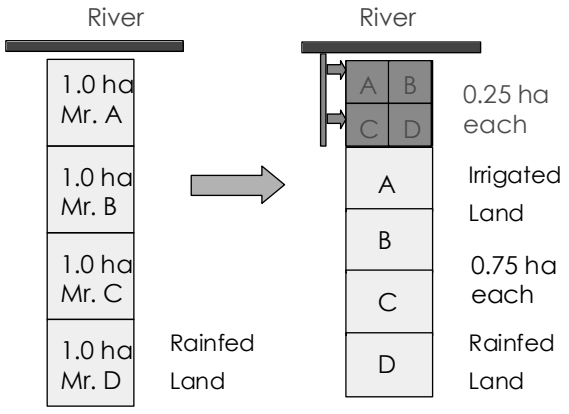


Figure 5.4 Consolidation and Exchange of Lands

Support to WUA to be self-help organisation

From planning stage, OIDA will be requested to support WUA continuously so that the WUA become a self-help organisation. This will include mechanism of decision-making, operation and maintenance of the scheme facilities, water management, and financial management.

Strengthening of monitoring & evaluation by OIDA

Function of OIDA for monitoring and evaluation of the schemes shall be strengthened, determining their method, such as frequency, monitoring index, and so on.

Box 3.3 Replacement Cost of Pump and Pipes

1. Needs to save money for replacement of the pump and pipes can be presented as follows:

- To ask whether applicants know operational life of the pump and pipes
- Unless money is saved, there is no fund for replacement of the pump and pipes and the scheme will be corrupt.
- Therefore, seasonal saving money for replacement is essential.

2. Calculation of seasonal saving amount for replacement

Example 1: Diesel Engine Pump (10 HP)

- Price of a pump : Birr 40,000
- Operational life : 8 years
- Number of cropping : 2 times per year (Rainy season / Dry season)
- Number of WUA members : 20 households
- Saving amount per member per cropping season

Birr40, 000 / 8 years / 20 members / 2 seasons = Birr 125

Example 2: Mobile Type Diesel Engine Pump (5 HP)

- Price of a pump : Birr 20,000
- Operational life : 8 years
- Number of cropping : 2 times per year (Rainy season / Dry season)
- Number of WUA members : 12 households
- Saving amount per member per cropping season

Birr20, 000 / 8 years / 12 members / 2 seasons = Birr 105

Example 3: PVC Pipe (Diameter: 4 inch)

- Price of a pipe : Birr 100 / piece (=6m)
- Price of a joint : Birr 20 / piece
- Length of pipe (canal) : 200 m
- Working life : 5 years
- Number of cropping : 2 times per year (Rainy season / Dry season)
- Number of WUA members : 20 households
- Saving amount per member per cropping season

200 m / 6 m x (Birr 100 + Birr 20) / 5 years / 20 members / 2 seasons = Birr 20

CHAPTER 4 PHYSICAL PLANNING AND DESIGN

4.1 General

4.1.1 Basic Concepts

・ The basic concepts for preparation of physical plan and design are itemized below.

1) Existing resources, e.g. canals and ponds, shall be fully utilized for new irrigation system.

2) Basic layout plan shall be drawn by applicants. Layout plan shall indicate water sources, location of pump, canals, related structures, farm plots and water delivery system.

3) Water for irrigation shall be made available on site by applicants. Lead canals from the lake and shallow-wells shall be constructed by applicants.

4) Local materials shall be utilized for construction of irrigation facilities and pump houses as much as possible so as to ensure cost-saving and easy maintenance. Use of modern materials such as delivery pipes shall be minimized.

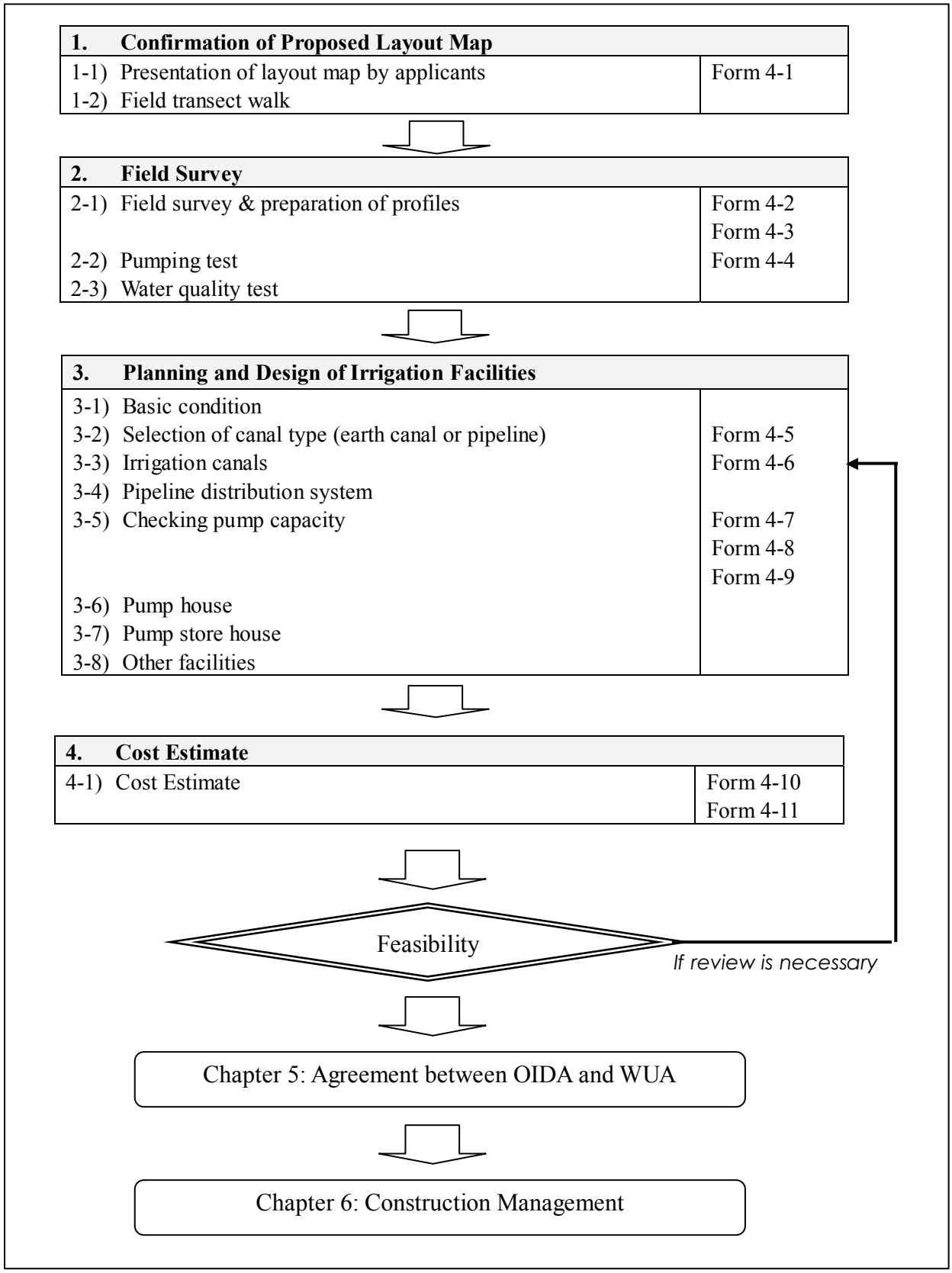
5) Models of pumps shall be selected by OIDA taking easy maintenance, after-sale service by suppliers and availability of spare parts into consideration.

6) Pump and canal capacities shall be adjusted talking into account reasonable allowance for farmers' capability in irrigation water management.

4.1.2 Flow of Physical Planning and Design

・ Flow of physical planning and design of the project is shown in the next page.

・ At each step, the plan and design shall be discussed with applicants in order to reflect their preferences to the plan.



Basic Flow of Planning and Design

4.2 Staff and Organisation

- Staff being engaged in planning and design period are as follows.

	Work Item	Wareda office				Head office/ Branch office		
		Head	Expert (Engineer)	Expert (Social Worker)	DA	Design Engineer	Surveyor	Social Worker
1.	Confirmation of Proposed Layout Map	●	●	●	●			
2.	Field Survey	●	●		●		●	
3.	Planning of Basic Layout and Irrigation Facilities	●	●			●		
4.	Design of Irrigation and Other Facilities	●	●			●		
5.	Cost estimate	●	●			●		

4.3 Confirmation of Proposed Layout Map

4.3.1 Presentation of Layout Map by Applicants

- Proposed layout map prepared by applicants shall be explained by them.
- Points for confirmation are as follows:
  - Type and location of water resource (river/lake/shallow well)
  - Location of pump house
  - Canal layout and canal structures
  - Existing irrigation facilities
  - Arrangement of farming plot / Boundary of farming plot
  - Direction of water distribution
  - Houses of applicants
  - Road
  - Other farming structures
- Sample of layout map is shown in Form 4-1.
- If the above information is not presented in the map, the OIDA staff shall confirm with applicants.
- The OIDA engineer shall confirm what existing facilities will be utilized in the new scheme.

4.3.2 Field Transect Walk

- The OIDA staff shall conduct field transect wall with applicants based on proposed layout map.
- The following items shall be confirmed during field transect walk.

- Type and location of water resource (river/lake/shallow well)
- Boundary of command area and farming plots
- Location of irrigation facilities, e.g. proposed pump house, irrigation canals, lead canal, pond, shallow well
- Condition of existing facilities (cracks, erosion, sediment, weed)
- Present land use
- Topographic condition (slope of topographic)
- Soil condition

・ The OIDA engineer shall make a survey plan for physical planning and design.

4.4 Field Survey

4.4.1 Field Survey and Preparation of Profiles

・ The surveyor shall carry out field survey taking the following information based on Form 4-2.

1) For design of pump capacity
- Suction head
- Delivery head
- Length of pipe

2) For design of canal profile
- Length of canal
- Ground surface elevation including existing canals in line with proposed canal route at 25 m intervals. (Profile levelling survey)
- Ground surface elevation in downstream and highest farm plots

・ Survey sheet shown in Form 4-3 can be used for profile levelling survey.

・ The surveyor or OIDA draft man shall prepare the profiles based on the survey results.

4.4.2 Pumping Test

・ In the case of groundwater irrigation using shallow well, the OIDA staff shall carry out a pumping test in order to check the yield of water.

・ The program of pumping test is shown in Form 4-4.

・ If the OIDA staff can judge that the yield is not enough for 3 ha, the OIDA staff shall show applicants the test results and discuss the counter measure.

4.4.3 Water Quality Test

・ In the case of groundwater irrigation using shallow well, the OIDA staff shall carry out a water quality test.

・ Water quality test can be carried out in the following two ways.

1) Simple test
- The OIDA staff shall check the electric conductivity of sampling taken in the water resources using E-C meter.

2) Laboratory test
- The OIDA staff shall request Oromia Water Resources Bureau to analyze the water quality.

4.5 Planning and Design of Irrigation and Other facilities

4.5.1 Basic Condition

- The basic condition shall be determined as follows.

1) Design discharge
   - River or lake water irrigation (5 ha) : 22 l/s
   - Groundwater irrigation (3 ha) : 13 l/s

2) Pump type : Diesel engine pump

3) Standard required pump horse power
   - River or lake water irrigation : around 10 HP (from 10 HP to 14 HP)
   - Groundwater irrigation : around 5 HP

4) Minimum canal gradient : 1 / 500

5) Standard pipe diameter : 4 inch for 10 HP pump
   : 3 inch for 5 HP pump

- The calculation formula is described in Box 4.1

4.5.2 Selection of Canal Type (Earth Canal or Pipeline)

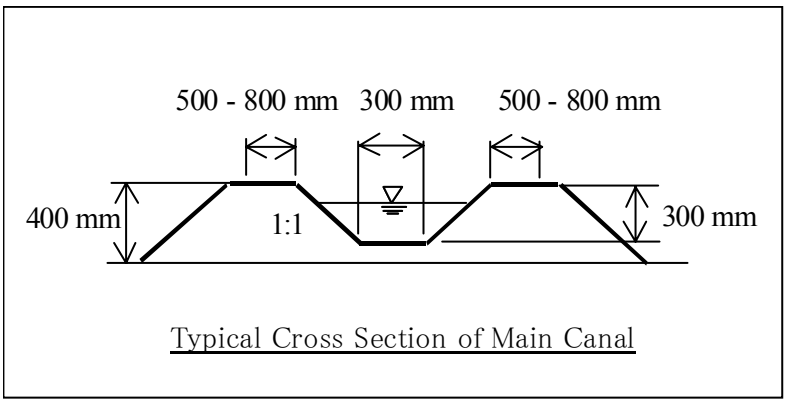
- If the conditions of project sites are as follows, the OIDA engineer shall take the adoption of pipeline distribution system into consideration.

  - Proposed canal needs high height of embankment and big volume of filling.
  - Transportation of filling material from out of the project site is necessary, because suitable material for filling is not available near site.
  - Length of main canal is more than 200 m.

- The OIDA engineer shall compare pipeline with earth canal from economical as well as social point of view.
- The comparison table between earth canal and pipeline is shown in Form 4-5.
- The OIDA head and engineer shall discuss with applicants and select type of canal.

4.5.3 Irrigation Canals (Earth Canal)

- Irrigation canals consist of a main canal, secondary canals, and field canals.
- Excessive cut and embankment shall be avoided as far as possible for stability as well as to minimise cost of the canal.
- Profile of the main canal shall be designed by the design engineer. A sample of design profile is shown in Form 4-6.
- Typical cross section of the main canal is shown below.



Typical Cross Section of Main Canal

- Related structures consist of headwork, off-take, drop, culvert, and so on.
- The structures, in principle, shall be constructed by masonry.
- The OIDA team shall discuss with the applicants necessity and location of the off-takes.

4.5.4 Pipeline Distribution System

- In the case of adoption of pipeline, pipeline distribution system shall be designed.
- Two types of pipe, steel and PVC, can be selected.
- PVC pipe is cheaper than steel pipe. Therefore PVC type shall be selected in principle.
- Steel pipe shall be selected in a high pressure portion and vehicle crossing point.
- Friction loss for water distribution and capacity of pump shall be calculated.
- Off-take points shall be discussed with applicants.

4.5.5 Checking Pump Capacity

- Required pump capacity is calculated from design discharge and total pumping head.
- Total pumping head consists actual design head and friction loss.

- Pump capacity can be checked in the Form 4-7.
- Sample of calculation sheet of total pumping head is shown in Form 4-8.
- Sample of calculation sheet of required pump house is shown in Form 4-9.

4.5.6 Pump House

- If farmers use pump at one place, pump house shall be constructured.
- The location of pump house is decided considering the following conditions:
  - River slope is stable against erosion.
  - Foundation is stable.
  - Sufficient water level can be secured during the dry season.
  - No damage from flood
  - Maximum suction head shall be less than 6 m.
- Floor area is 9 m^2 (3m x 3m)
- Material of the pump house is recommended as follows.

Item	Material
Foundation	Masonry
Wall	Concrete block
Roof	Corrugated iron sheet
Window and door	Steel
Outlet	Masonry
Floor	Mortal

4.5.7 Pump Store House

- If farmers use pump at several places in the case of groundwater irrigation, pump store house shall be constructured.
- The location of pump house is decided considering the following conditions:
  - Foundation is stable.
  - Security of pump is ensured.
  - Location is central place of shallow wells for irrigation.
- In the case of storing PVC pipe, floor area shall be 27 m^2 (9m x 3m)
- Material of the pump store house is as same as pump house.

4.5.8 Other Facilities

- The following facilities also shall be considered in consultation with applicants.
  - Improvement of access road
  - Planting tree for protection against the wind near lake

4.6 Cost Estimate

- Based on design of irrigation facilities, OIDA wareda staff in cooperation with the design engineer in the branch office carried out cost estimate for the project.
- A sample of work quantity calculation sheet is shown in Form 4-10. A sample of bill of quantity calculation sheet is shown in Form 4-11.
- If project cost become beyond the budget, the OIDA staff shall reconsider and discuss basic layout plan with applicants.

4.7 Confirmation of Development Plan

- With design drawing and the map, development plan, including location of the pump house and irrigation canal route, shall be discussed and confirmed with the applicants in the field.

4.8 Action for the Next Step

- The OIDA team shall start to arrange a signing of agreement between OIDA and WUA for implementation of the project.

Box 4.1 Calculation Formula for Design of Pump and Irrigation Canal

(1) Design pump discharge

The pump capacity is decided from the peak water discharge. It is taken as 4.32 l/s/ha based on the following calculation.

- Peak crop water requirement (Etc) : 4.2 mm/day (Tomato)
- Irrigation efficiency : 27 % (Ea x Eb x Ec x 100)
  - Conveyance efficiency (Ec) :0.7
  - Field canal (Eb) :0.7
  - Field application (Ea) :0.55
- Peak water requirement : 1.80 l/s/ha (4.2 mm/day / 8.64/ 0.27)
- Average pump operation time : 10 hours
- Required pump discharge : 4.32 l/s/ha (1.80 l/s/ha x 24 /10)
- Average design pump discharge (Q) : 21.6 l/s (4.32 l/s/ha x Irrigation area 5.0 ha)

(2) Calculation of required pump power

Required pump horse power is calculated by the following formula:

$$\text{A-BHP} = \frac{1000 \times Q \times H}{75 \times \eta_p \times \eta_g}(1+\alpha), \quad H = h_{as} + h_{fs} + h_{ad} + h_{fd}$$

where,

A-BHP	:	actual break horse power (HP)
Q	:	design discharge (m^3/s)
H	:	total delivery head (m)
h_{as}	:	actual suction lift head (m)
h_{fs}	:	total head loss in suction pipe including friction loss, bend loss etc.
h_{ad}	:	actual delivery lift head (m)
h_{ds}	:	total head loss in delivery pipe including friction loss, bend loss etc.
η_p	:	pump efficiency (0.60 ~ 0.70: for small pump)
η_g	:	motor efficiency (0.90)
α	:	De-rate factor (0.28: determined by altitude, temperature and operation hours)

(3) Hydraulic calculation for canal

The discharge of the canal is calculated using the following formula:

$$Q = A \cdot V, \qquad V = \frac{1}{n} \cdot R^{2/3} \cdot S^{1/2}$$

where,

Q	:	design discharge (m^3/s)
A	:	cross section area (m^2)
V	:	mean velocity (m/s)
R	:	hydraulic radius (m)
n	:	coefficient of roughness

The roughness coefficients used for design of the canals are follows:

Canal type	Roughness coefficient
Lining canal	0.015
Earth canal	0.025

CHAPTER 5 AGREEMENT BETWEEN OIDA AND WUA

5.1 Documentation of Project Agreement

- The following sets of documents are prepared for the signing of the project agreement between OIDA and WUA.
  - Project Agreement (Form 5-1, 5-2);
  - Finalized list of WUA members (Form 5-3);
  - Measurement-result on individual farm plots to be irrigated;
  - WUA Minutes of Meeting on the selection of executive members;
  - WUA Minutes of Meeting on signatory member to operate a bank account
- The draft agreement shall be prepared by the social workers of the branch or head office.

5.2 Explanation of the Agreement to WUA members

- The OIDA Team shall hold a meeting in order to explain contents of the agreement for the project implementation including the followings.
  - Responsibilities of OIDA and the WUA
  - Development plan, including location of the pump house, canal layout, and canal structures
  - Scope of construction works with WUA members' participation
  - Condition of the participation in the construction works, such as daily labour wage, necessity of group fund formation, and so on,
- The agreement shall be modified or amended according to the discussion with the applicants.

5.3 Signing of the Agreement

- A signing of the agreement shall be made between representative of OIDA and the chairman of WUA.
- The rural development officer and PA chairman shall company and make a signing agreement.
- In this occasion, each member has reserve right to join or leave WUA.
- WUA are allowed to replace some members with any other persons, who will wish to join the group, understanding the condition of the agreement.

5.4 Action for the next step

- The OIDA team shall remind the members of process of the bank account opening since it may need much time to complete it.

CHAPTER 6 CONSTRUCTION MANAGEMENT

6.1 General

- Construction management of the project will be conducted in the following procedure

1. Preparation of Work Program and Schedule	
1-1) Preparation of work program and schedule	Form 6-1
2. Arrangement of Equipment, Material, and Labor	
2-1) Pump 2-2) Pump house 2-3) Irrigation canals and structures 2-4) Place of procurement	
3. Construction Works	
3-1) Preparatory works 3-2) Construction of pump house 3-3) Delivery and installation of pump 3-4) Construction of irrigation canals and structures 3-5) Construction management	Form 6-2 Form 6-3 Form 6-4
4. Communication with WUA Members	
4-1) Participation in construction works 4-2) Other issues	
5. Inspection and Handing Over	
5-1) Test operation of pump 5-2) Training of pump operator 5-3) Inspection of irrigation canals 5-4) Preparation of handing over documents 5-5) Handing over	Form 6-5 Form 6-6

Basic Flow of Construction Management

6.2 Staff and Organisation

- Staff being engaged in construction period are as follows.

	Work Item	Wareda office				Head office/ Branch office		
		Head	Expert (Engineer)	Expert (Social Worker)	DA	Construction Engineer	Surveyor	Social Worker
1.	Preparation of work program and schedule	●	●		●			
2.	Arrangement of equipment, material and labor.	●	●		●	●		
3.	Construction management	●	●		●			
4.	Communication with WUA	●	●	●	●			
5.	Inspection and handing over	●	●	●	●			●

- Wareda office head, as a site representative, is responsible for all field activities, supervising the staff.
- Wareda office staff is mainly responsible for all construction management and handing over of irrigation facilities.
- Wareda office head shall request the head or branch office to arrange the required equipment, equipment, or materials.

6.3 Preparation of Work Program and Schedule

- The wareda head and expert shall prepare the work program according to the format in Form 6-1.
- It is noted that performance of the work is supposed to be as follows.
  - Performance of filling of irrigation canal is 0.5 m^3 / day / person.
  - The construction of the pump house will be completed with two weeks.

6.4 Arrangement of Equipment, Material and Labour

6.4.1 Pump

- The wareda staff in cooperation with the construction engineer in the head office shall proceed procurement of the pump equipment, such as price quotation, selection of supplier, order of the equipment, delivery, and so on.
- Procurement of spare parts shall be carried out in consultation with the supplier.

- It is noticed that length of suction pipe and delivery pipes shall be decided based of field investigation taking into consideration lowest water level of the river and location of outlet structure of the pump house.

6.4.2 Pump House

- The wareda expert is responsible for procurement of the materials for the pump house, such as cement, sand and stone, reinforcement bar, concrete block, wood, corrugated iron sheet, window, doors, and so on.

6.4.3 Irrigation Canals

- The wareda head and expert are responsible for the following arrangement for the construction of the main canal:
  - Production of compaction tools for filling works
  - Procurement of hoes, buckets, and any other tools for the construction works upon requests of the WUA members and hired labours.
- In the case that equipment for soil transportation is required, the construction engineer shall request the manager of the branch office manager to arrange the equipment, such as dump trucks, and wheel loader.

6.4.4 Place of Procurement

- The required construction materials and procurement sites are summarized below.

Required Construction Materials & Procurement Places

Items	Procurement place		
	Site	Vicinity	Addis Ababa / Adama
1. Materials			
1) Cement	-	●	△
2) Stone	-	●	△
3) Sand	○	●	△
4) Soil	●		△
5) Materials for pump house	-	●	△
6) PVC pipe	-	-	●
7) Diesel	-	●	△
2. Equipment			
1) Diesel engine pump	-	-	●
2) Construction tools	-	●	△
3) Tractor	○	●	△
4) Truck	-	●	●
3. Labor			
1) Common labor / farmers participatory	●	△	△
2) Mason	-	●	△
3) Carpenter	-	●	△

Note) ●: Proposed procurement place, -: Not available, ○: Available in some sites
△: Available, but high transportation cost

6.5 Construction Works

6.5.1 Preparatory Works

- Before commencement of the construction works, the location of pump house and irrigation canal, off-take shall be confirmed with the WUA member in the field.
- If an access road shall be constructed, its route shall be discussed with the members so as to avoid such conflict with them, as damage of crops.
- In the case the new constructed canal crosses existing canal, the measures to secure the water to the lands fed by the canal.
- Selection of the borrowed area shall be decided carefully in consultation with the Wareda Administration, PA chairman, and farmers residing near the place.
- The surveyor shall proceed field setting based on the design drawings. According to ground elevation, the construction engineer shall calculate the excavation depth and embankment height for the pump house and the canals.

6.5.2 Construction of Pump House

- The OIDA staff shall employ carpenters, mason, and skilled labors for the construction of the pump house.
- The construction includes foundation, wall, roof, door and window, water outlet.

6.5.3 Delivery and Installation of Pump

- The wareda staff in cooperation with construction engineer in the head office shall arrange vehicle and transportation of the pump equipment to the site.

6.5.4 Construction of Irrigation Canals

- OIDA is responsible for the construction of the main canal, while the field canals shall be constructed by the WUA members.
- Clearing of canal route
  - Before embankment, all top soil, organic deposit, grass, bushes, etc. shall be stripped.
- Excavation
  - Excavation of soil shall be made by farmers.
  - The excavated soil shall be re-used for embankment as much as possible.
- Embankment
  - In principal, material for embankment of canal is brought near the site.
  - The OIDA staff shall arrange borrowed material in the case the local filling materials are not appropriate

- Quality of canal embankment shall be carried out carefully with proper watering.
- The OIDA staff shall instruct the WUA members to compact soils properly, providing the with a compaction tools.

6.6 Construction Management

6.6.1 Revision of Design

- The wareda head and expert can revise the design according to discussion with the WUA members. Special care shall be taken for location of off-take.
- Records of design revision shall be kept in document.

6.6.2 Quality Control

- Special care shall be taken for quality control of embankment, especially watering.

6.6.3 Progress Monitoring

- The construction engineer shall monitor the work progress according to the work schedule.
- The constriction works shall be carried out by participation of the WUA members. However, in the case the work is behind the schedule, the constriction engineer shall decide to employ hired labours to catch up the progress.
- Further, the construction engineer shall request, if necessary, to arrange additional construction equipment.

6.6.4 Management of Material and Labour

- The wareda DA shall keep attendance records of farmers and hired labour according to the Form 6-2 and Form 6-3, and submit them to the wareda head.

6.6.5 Financial Management

- The wareda head is responsible for financial control for the works, such as procurement of fuel and materials, payment of per diem and bed allowance to OIDA staff, and wage for WUA members and labors.
- The wareda staff shall receive temporary payment from the branch office.
- Official receipts with cash books shall be surrendered to the branch office.

6.6.6 Preparation of Report

- The wareda head shall prepare weekly report indicating daily activities to the branch office according to Form 6-4.

6.7 Communication with WUA Members

6.7.1 Participation in Construction Works

- The participation rate of the WUA members in the construction works shall be monitored by the Wareda Staff.
- If the rate is low, the Wareda Staff shall urge them to participate in the works more.

6.7.2 Other Issues

- The wareda head, in co-operation with social workers, shall examine seriously how the situation can be improved, if the following issues arise among the WUA members or out of them.
  - Route of access roads
  - Conflict of the WUA members and existing water user in the command area
  - Conflict with private pump owners
  - Explanation and persuasion to the members, who oppose to pass the irrigation canals in their farm lands
  - Revision of the off-take location
  - Conflict with people near borrowed area.

6.8 Inspection and Handing over

6.8.1 Test Operation of Pump

- The wareda staff shall be responsible for final inspection of the facilities and test pump operation.
- The OIDA team bear the expenses costs, consisting of fuel and allowance of night guards, until the handing over.

6.8.2 Training of Pump Operator

- The OIDA team shall hold two-days training for operation and maintenance of the pump.
- The training shall include the daily operation, regular maintenance, and repair.
- The training shall be carried out by a mechanic dispatched from the branch office.
- The training shall be carried out based on “Pump Operation Manual” prepared by OIDA.

6.8.3 Inspection of Irrigation Canals

- During test pump operation, the irrigation canal shall be checked in terms of quality of embankment, slope of the canal.

6.8.4 Preparation of Handing over Document

- The agreement for handing over shall be prepared by the construction engineer of the branch office.
- Sample of the draft agreement is shown in Form 6-5 (English Version) and Form 6-6 (Oromifaa Version).

6.8.5 Handing-over

- A signing of the contract shall be made between representative of OIDA and leader of the applicants.

6.9 Action for the next step

- The wareda head and social workers shall start to arrange training provided to the WUA committee members.

CHAPTER 7 SCHEME MANAGEMENT

7.1 General

- WUA is responsible for scheme management supported by the such government institutions:
  - OIDA,
  - Co-operative Promotion Bureau, and
  - Peasant Association (PA), and
  - Wareda Administration Office.

7.2 Staff and Organisations to Support WUA

7.2.1 OIDA

- In connection with the scheme management, OIDA shall support the WUA in the following aspects:
  - WUA organisation management,
  - Land management,
  - Water management,
  - Operation and maintenance of pump and irrigation canals,
  - Financial management,
  - Conflict management and communication, and
  - WUA staff training.
- All the activities scheme management shall be carried out by DA and the Wareda staff in co-operation with social workers and experts of extension and water management department in the branch office.

7.2.2 Co-operative Promotion Bureau

- Co-operative Promotion Bureau would support WUA to get legal entities, and provide WUA with support programme for marketing promotion and rural credit.

7.2.3 Peasant Association (PA) and Wareda Administration Office

- The chairman of PA would be a stakeholder of irrigated land management, acting a witness of agreement for land exchange or transfer.
- The chairman of PA and the rural development officer of the Wareda Administration Office would play a role for a mediator if land dispute will take places among the WUA members.

7.3 WUA Organization Management

7.3.1 Preparation of By-law

- The Wareda staff shall support the WUA members to establish by-law.
- The model by-law is presented in Form 7-1.
- The Wareda staff shall explain the WUA members contents of the by-law.
- The revision and amendment of the by-law is required according to situation of the WUA.

7.3.2 Membership

- Membership of WUA is to be as per regulation of the by-law.
- In the case of new entry of members, without exception, the agreement for the land exchange shall be prepared witnessed by the PA chairman, so that irrigated farmland of new members shall be located within the original command area.
- In the case of land transfer among blood-shed group caused by inheritance or any other reasons, the agreement for the land transfer shall be prepared without exception witnessed by the PA chairman, so that irrigated farmland of new members shall be located within the command area.
- In the case of dismission or withdrawal of the members caused by member's death or any other reasons, the WUA committee shall report to the OIDA office how to use the irrigated farmland cultivated by those who lost their rights for cultivation.

7.3.3 Election of Committee Members

- In accordance with the regulation of the by-law, committee members are to be elected, consisting of a chairman, a secretary, a casher, and an auditor.

7.3.4 Election of Pump Operator / Guard

- A pump operator and a guard shall be selected among the members.

7.3.5 General Meeting and Committee meeting

- In accordance with the regulation of the by-law, the Chairman of WUA shall preside over a general meeting in order to discuss the problem arisen among the WUA members and issues to be requested to the government organisation.
- The Secretary of the WUA shall prepare minutes of the meeting.
- The minutes of the meeting shall be opened to all the members.

7.3.6 Penalty

- A penalty to be imposed against members, who violate the by-law, are specifed by the special agreement of the by-law (Form 7-1).

7.4 Land Management

- The irrigated farmland for each member shall be strictly 0.25 ha.
- WUA has responsibility to monitor if the land exchange / transfer has been executed in accordance with the agreement of land exchange.
- In the event that anyone violate the agreementof the land exchange, WUA shall make a report to the OIDA Wareda Office immediately.
- The OIDA Wereda Office shall take action to solve the conflict in consultation with the PA Chairmen.
- The WUA Committee members shall investigate each farm plot, indentifying its cultivator with irrigated area, and shall prepare the WUA Monotoring Report (Form 8-4) to submit it to the OIDA Office twice a year.

7.5 Water Management

7.5.1 Irrigation Planning and Scheduling

- Irrigation schedule in the scheme, such as starting and closing date of irrigation, operation hours of the pump, rotation schedule of water distribution, shall be discussed and decided in the general meeting.
- The OIDA office may advise WUA to adopt a rotational irrigation, dividing the commanding area into several irrigation blocks, which are headed by block leaders.
- The members of WUA shall follow the rules and regulation of water distribution. The water distribution schedule is advised to be noticed on the wall of the pump house.
- In transplanting periods, when irrigation demand for crops could be at its peak, the WUA committee shall apply a flexible water distribution schedule.

7.5.2 Water Distribution

- The irrigation water shall be distributed to each farm plot according to the schedule.
- The leaders of each block are responsible for the water distribution.

7.5.3 Identification of Irrigation Defects

- Whenever the WUA members observe any farm plots with irrigation difficulties, the WUA committee shall report to OIDA Wareda Office.
- The OIDA staff shall make necessary investigation to solve the irrigation defects.

7.5.4 Conflict Management on Water Distribution

- The pump operator shall inform the WUA committee members water distribution conflics among the members.
- Giving the persons concenred hearing, the committee members shall take necessary actions to solve the conflicts.

7.6 Operation and Maintenance

7.6.1 Operation of Pump

- The pump operator shall operate the pump according to the irrigation schedule.
- The operator shall keep an operation records of the pump. It should be basis of maintenance plan of the pump. Sample of the pump operation record sheet is shown in Form 7 - 2.
- It is advised that daily pump operation is to be 8 hours at maximum except the peak irrigation period, that is 4 hours in the morning and 4 hours in the afternoon. It means that the maximum irrigation area per day will be 0.75 ha to 1.0 ha.
- A way how to collect fuel and lubricant cost shall be discussed and decided in the general meeting.
- The operator shall keep records indicating quantity of fuel consumption and irrigated area. It will be the basis of the cost recovery.

7.6.2 Maintenance of Pump

- WUA shall be responsible for maintenance of the pump to ensure that it always function in proper condition.
- The pump shall carry out regular maintenance, such as cleaning air cleaner, check of air cleaner oil, and replacement of air cleaner, oil filter, fuel filter in accordance with “the Pump Operation Manual”.
- Sample of pump maintenance records is shown in Form 7-2.

- In the event that the pump is out of order, the WUA members shall report to the Wareda Office, referring the trouble-shooting in the manual (Form 7-3). The Office shall send the officers in charge to the field for inspection.
- Spare parts of the pump shall be managed by the Wareda Office. If necessary, the parts shall be changed b the officer.
- In the case that the pump is damaged seriously, the operator shall inform the accident to the Chairman / Secretary of WUA. The committee members of WUA shall report to the OIDA Wareda Office. The Wareda office shall arrange the repair in Addis Ababa. In co-operation with the branch office, transportation of the pump to the supplier shall be arranged.

7.6.3 Maintenance of Irrigation Canals

- The WUA member shall conduct maintenance works for the irrigation canals, including grass cutting, silt removal, reshaping canal, and so on.
- The cross section of the canals are kept trapezoid to reduce leakage of water from the canals.
- The committee members shall decide the schedule of the canal maintenance taking into consideration the report by the pump operator, who shall carry out a patrol regularly to check the condition of the canals.
- The chairman inform the members the date of canal maintenance.
- Ii is advised that the regular maintenance of the canal is carried out monthly at the minimum requirements.
- The committee members shall make a caution against those who do not attend the maintenance works.
- In accordance with the regulation of by-law, the penalty can be imposed to violator.

7.7 Financial Management

7.7.1 Management of Bank Account

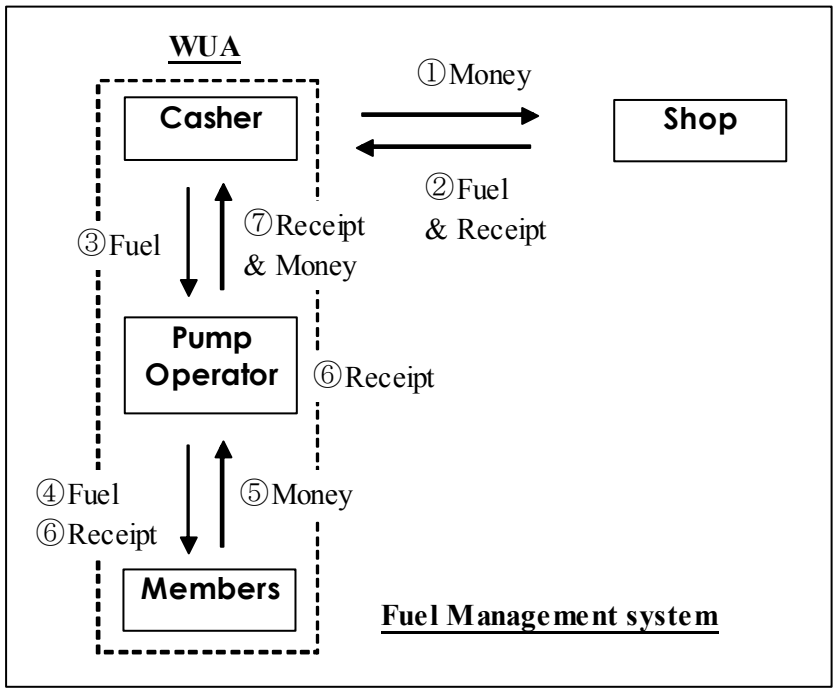
- It should be reminded that the financial transaction, such as deposit and withdrawal, can be carried out under joint signatures of the appointed three persons.

7.7.2 Procurement of Goods

- The chairman / secretary will request the casher to purchase good for WUA management, such as stationary and any other consumables.
- The casher shall go to shops to purchase the goods.
- The casher shall bring the purchased goods with cash receipts.
- The cash receipt shall be kept by the casher. The payment records shall also be entered into the cash book.
- The chairman / secretary will receive the goods from the casher.

7.7.3 Procurement and Management of Fuel and Lubricants

- The cashier / pump operator are responsible for procurement of fuel and lubrication as well as collection of fuel cost according to regulation specified in the by-law.



- ①The casher / the pump operator shall carry out to procure fuel and lubricants upon request by the chairman / secretary.
- ②The casher / pump operator shall bring the purchased goods with cash receipts.
- ③The casher shall deliver the purchased goods for operation of the pump.
- ④The pump operator shall operate the pump upon request by the members.

- ⑤Immediately after the operation, the pump operator shall calculate the fuel charge for each member based on the actual pump operation time. The member shall pay the pump operator for fuel in cash. Sample of the fuel consumption records is shown in Form 7-4.
- ⑥The pump operator shall prepare two copies of the fuel consumption memo (Form 7-5), in which date, user name, quantity of fuel consumed, and amount are filled up. While one copy is to be handed over to the user, another shall be kept by the pump operator.
- ⑦The pump operator shall report to the casher on the fuel consumption with the collected cash. The casher shall check the consumption record and forward it to the chairman / secretary for approval for next fuel purchase.
- Upon approval by the members, the cost for lubricants may be added to the charge.

7.7.4 Salary for Pump Operator / Guard

- Salaries for the pump operator ans guard shall be collected from the members.
- Distriburibution of a farm plot may compensate for their salaries, upon approval by the general meeting.

7.7.5 Collection of Saving Money for Pump Replacement

- The casher is responsible for collection of contribution to saving money for pump replacement according to regulation specified in the by-law.
- The money shall be collected twice a year after harvest. The amount shall be on the basis of size of irrigated farm lands. The amount and time to collect are decided by the general meeting under guidance of the OIDA Wareda Office, taking into consideration life of the pump, number of the WUA members, and so on.
- After reporting amount of collected money to the chairman / secretary, the casher shall deposit the money into the bank account. The casher shall keep the deposit slip in his hand.
- WUA shall prepare the WUA Monitoring Report describing situation of the money collection for each member as well as balance of the bank (Form 8-4)
- The WUA committee shall cousion against mambers who do not contribute money by the agreed time.
- The WUA committee may grant time extension to pay money to members who are in reasonable situation to fail to contribute.

7.7.6 Maintenance of Cash Book

- The cashier is responsible for filing receipts of expenses, consisting fuel, lubricants, allowance of the operator, and others required for the scheme management.
- The cashier shall be responsible for keeping payment transaction into the cash book.
- Sample format of the cash book is shown in Form 7-6.

7.7.7 Preparation of Financial Report

- The casher shall submit the accounting ducuments, such as balance of bank account, cash book, and cash balance, to the chairman / secretary in coorrdance with the decision by the committee meeting.
- The casher is responsible for preparation of annual financial report, summing up annual income, expenditure.
- The report shall be checked by the committee and the auditor.
- After auditing, the financial report shall be approved by the general meeting.

7.8 Internal Audit

- In accordance with clauses in the by-law, auditor of the WUA shall conduct internal auditing whether the decided matters in the meeting are performed properly and financial management is carried out precisely.
- The auditor shall prepare an annual auditing report describing result of the internal auditing activities.
- The results of the audit shall be reported to all the members in the general meeting.

7.9 WUA Staff Training

- The OIDA staff shall provide the WUA staff with necessary training not only just after handing over but also regular training programme prepared by OIDA.
- The training, consisting of pump operation, financial management, shall be carried out by use of training manuals prepared by OIDA

7.10 Legal Entities

- The OIDA staff in collaboration with officials of the Cooperative Promotion Bureau to promote to obtain WUA's legal entity as a co-operative.

7.11 Communication and Conflict Management

7.11.1 Internal Communication

- In order to ensure tranperancy of the management, the WUA committee shall provide the members with the following information:
  - Member list of committee members as well as all WUA members;
  - Plot map with name of cultivator;
  - Water distribution schedule and name of members per each block
  - Minutes of meetings;
  - Financial report; and
  - WUA Monitoring Reports submitted to OIDA,

7.11.2 Reporting to OIDA

- The chairman of the WUA shall report the following to the OIDA Wareda office in writing:
  - Entry of new members with land exchange/transfer agreement witnessed by PA Chairman
  - Any land exchange / transfer caused by death of the member or any other reasons with land exchange/transfer agreement witnessed by PA Chairman
  - Withdrawal of members
  - Result of re-election of the committee members
  - Revision / amendment of by-law of WUA

- In the field inspection conducted by the staff of OIDA Wareda Office, WUA shall present the following documents to the staff of OIDA Wareda Office in accordance with their request:
  - Bank statement
  - Cash book
  - Pump operation records
  - Records of pump maintenance
  - Fuel consumption record
  - Any management records requested by the OIDA staff.

- The WUA shall submit the **WUA Performance Monitiring Report** (Form 8-4) to the OIDA Wareda office twice a year in accordance with instruction of the

OIDA office. It includes members list of WUA with farm plot No., irrigated area, names of cultivated crops, and status of contribution for pump replacement, and so on.

- In the Monitoring Report, WUA shall report the following problems, if any:
  - Vacancy of the committee member(s) for long time
  - Existence of uncultivated area
  - Conflicts to land exchange / transfer
  - Conflicts on irrigation scheduling and water distribution
  - Trouble on pump operation
- Referrence is made to Section 8.4.3

7.11.3 Conflict Management

- Basically, the OIDA staff shall be aware that the conflict arisen among the WUA members, such as land and water related dispute, shall be solved by themselves.
- However, in the case that the solution of the disputes are beyond capacity of the WUA members, the OIDA staff shall intervene between the parties concerned.
- The OIDA staff shall prepare the documents, describing detail of the event, suggestions to solve the problems made by OIDA, and action taken by the WUA members (Refer: Section 8.4.2).

CHAPTER 8 MONITORING AND EVALUATION

8.1 General

- After construction, the activities of WUA shall be monitored continuously and carefully by OIDA.
- The monitoring shall focus on whether equity of land and water resources allocation will be ensured among the WUA members, and whether proper operation and maintenance of the facilities and financial management are carried out, holding the regular meetings to solve their problems arisen in the scheme.
- It is also of importance to monitor if the funds formation for replacement of the pump is being conducted according to the plan.

8.2 Monitoring Items

- Monitoring items for WUA scheme management are outlined below.

Monitoring Items for WUA Scheme Management

Description	Items for Monitoring
Irrigation Performance	- Number of WUA members. - Total Irrigation area. - Status of saving for pump replacement.
Organisation Management	- Change of members. - Holding meetings. - Conflict among WUA members.
Land and Water Management	- Land holding condition of each member - Irrigation scheduling and actual water distribution. - Irrigation defects in the command area.
Operation and Maintenance	- Pump operation. - Condition of irrigation canal. - Documentation of operation and maintenance records
Financial Management	- Book keeping. - Fuel management system.
Communication and Conflict Management	- Communication with government agencies. - Relation to private pump owners.

8.3 Monitoring System

8.3.1 Categories of Monitoring

- Monitoring activities conducted by OIDA as well as WUA are classified in the following categories:
  - Field visit monitoring,
  - Interview from WUA members, and
  - WUA performance report.

- The field visit monitoring shall be conducted regularly by DA of OIDA so as to grasp present condition and potential risk of the WUA management activities.
- Whenever the members of WUA report to the OIDA any problems arisen during the scheme management, the officers of Wareda Office shall carry out interview from them.
- The records of the field visit monitoring as well as the interview from WUA members shall be documented according to the specified formats, in which the officers are requested to fill the events through the field visit and interviews, suggestions and recommendations to solve the problems, and result of follow-up study if the problems are solved or not.
- The WUA performance monitoring report shall be prepared twice a year to report the results of the monitoring and evaluation to the OIDA Head Office.

8.3.2 Schedule of Monitoring

- Schedule to conduct the monitoring activities is set as shown below:

	Category of Monitoring	Month											
		Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Field Visit Monitoring	△		△		△		△		△		△	
2	Interview from WUA members	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪	▪▪▪
3	WUA performance report	▲						▲					

Annual Schedule of WUA Monitoring

8.3.3 Monitoring Formats

- Formats to be used for the monitoring activities are shown as follows:
  - Check list for field visit monitoring (Form 8 - 1),
  - WUA activities monitoring sheet (Form 8 - 2),
  - Summary of WUA activities monitoring sheet (Form 8 - 3),
  - WUA performance monitoring report prepared by WUA (Form 8 - 4), and
  - WUA performance monitoring report to be prepared by OIDA (Form 8 - 5).

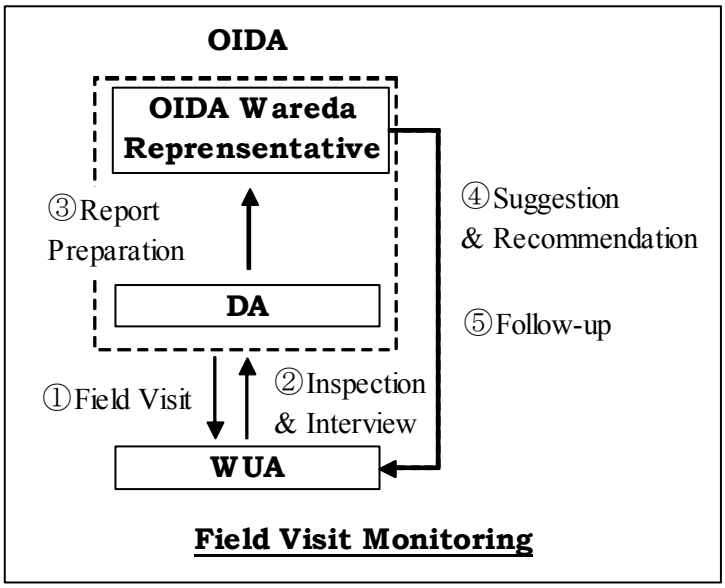
- The following formats shall be used for each monitoring activity:

Formats to be used for monitoring

Formats to be used	Categories of Monitoring		
	Field visit monitoring	Interview from WUA members	WUA performance report
Check list for field visit monitoring (Form 8-1)	○	-	-
WUA activities monitoring sheet (Form 8-2)	○	○	-
Summary of WUA activities monitoring (Form 8-3)	○	○	-
WUA performance monitoring report prepared by WUA (Form 8-4)	-	-	○
WUA performance monitoring report prepared by OIDA (Form 8-5)	-	-	○

8.4 Execution of Monitoring

8.4.1 Field Visit Monitoring



Step-1

- The DA of the OIDA Wareda Office shall visit the scheme every two months.

Step-2

- The DA shall conduct the field inspection and interview from the WUA member.
- The DA shall utilize the **check list for field visit monitoring** (Form 8-1) so as to grasp present condition and potential risk of the WUA management activities.

- In the field inspection conducted by the staff of OIDA Wareda Office, WUA shall present the following documents in accordance with their request:
    - Bank statement,
    - Cash book,
    - Pump operation records,
    - Records of pump maintenance,
    - Fuel consumption record, and
    - Any management records requested by the OIDA staff.

Step-3

- If any obvious and / or potential problems are observed during the field visit, the DA shall prepare the **WUA activities monitoring sheet** (Form 8-2), describing the events happened in the WUA management and submit the sheet to the representative of the OIDA Wareda Office.

Step-4

- The OIDA Wareda Office shall study the problems and make some suggestions and recommendation to the WUA committee members how to solve the problems encountered.
- The representative of the OIDA Wareda Office shall fill the suggestions and recommendations to the members in the **WUA activities monitoring sheet** (Form 8-2).

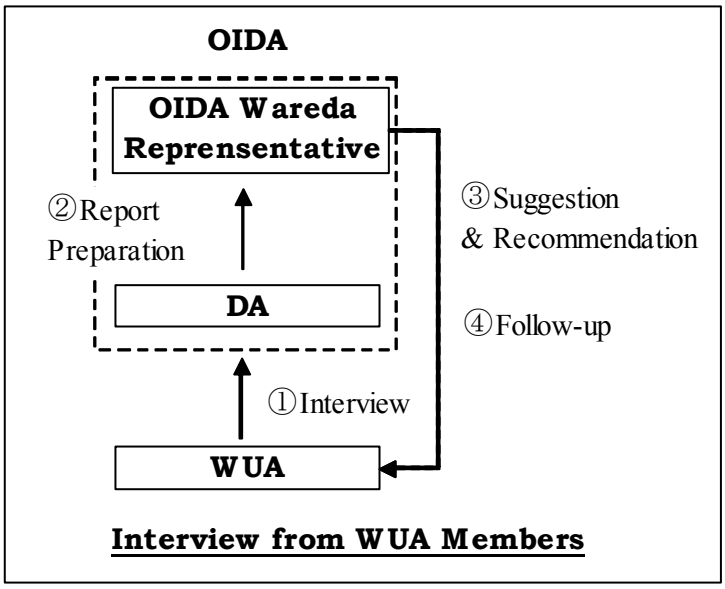
Step-5

- The OIDA Wareda Office shall monitor the activities of WUA continuously whether the some actions are being taken by WUA to correct the activities.
- The representative of the OIDA Wareda Office shall fill records of follow-up for the activities in the **WUA activities monitoring sheet** (Form 8-2).

Document Control

- The **Summary of WUA activities monitoring** (Form 8-3) can be used as a document control sheet to browse the activities of the OIDA Office taken for each WUA.
- The Original Copies of the monitoring sheets shall be file in the OIDA Wareda Office.

8.4.2 Interview from WUA Members



Step-1

- Whenever the members of WUA report to the OIDA any problems arisen during the scheme management Wareda Office, the officers shall carry out interview from them.

Step-2

- Based on the interviews, the DA shall prepare the **WUA activities monitoring sheet** (Form 8-2), describing the events happened in the WUA management and submit the sheet to the representative of the OIDA Wareda Office.

Step-3

- The OIDA Wareda Office shall study the problems and make some suggestions and recommendation to the WUA committee members how to solve the problems encountered.
- The representative of the OIDA Wareda Office shall fill the suggestions and recommendations to the members in the **WUA activities monitoring sheet** (Form 8-2).

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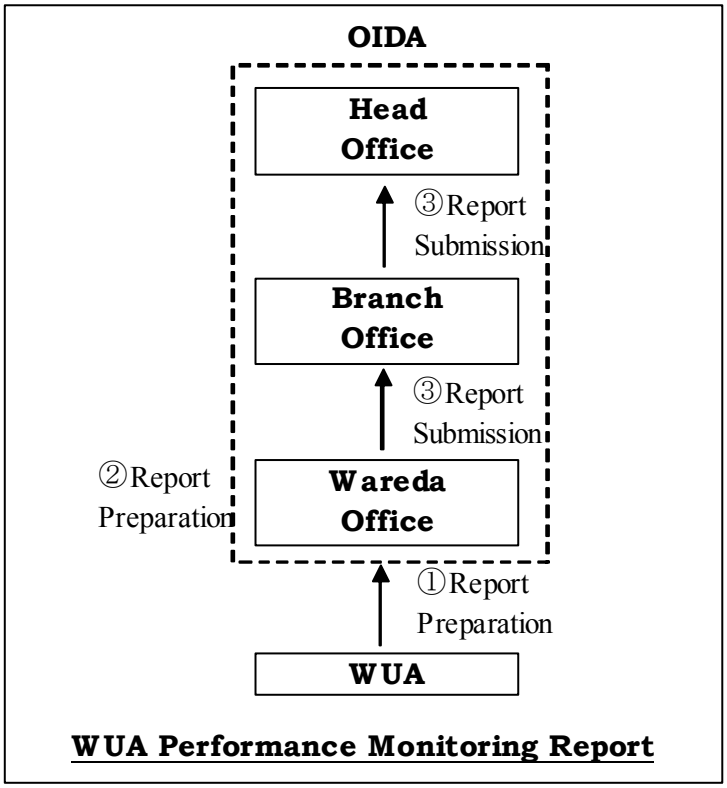
- The **Summary of WUA activities monitoring** (Form 8-3) can be used as a document control sheet to browse the activities of the OIDA Office taken for each WUA.
- The Original Copies of the monitoring sheets shall be file in the OIDA Wareda Office.

8.4.3 WUA Performance Monitoring Report



Step-1

- The WUA shall submit the **WUA Performance Monitiring Report** (Form 8-4) to the OIDA Wareda office twice a year in accordance with instruction of the OIDA office. It includes members list of WUA with farm plot No., irrigated area, names of cultivated crops, and status of contribution for pump replacement, and so on.
- In the Monitoring Report, WUA shall report the following problems, if any:
  - Vacancy of the committee member(s) for long time,
  - Existence of uncultivated area,
  - Conflicts to land exchange / transfer,
  - Conflicts on irrigation scheduling and water distribution, and

・ Trouble on pump operation.

Step-2

・ Based on the above-mentioned monitoring records, the OIDA Wareda Office shall prepare the **WUA performance monitoring report** (attachment 8-5) twice a year to report the results of the monitoring and evaluation to the OIDA Head Office.

Step-3

・ The Original Copies of the monitoring reports shall be forwarded to the OIDA Head Office while the copies shall be kept by the Wareda Office and the Branch Offices of OIDA.

8.5 Reference for Trouble-shooting

・ Possible problems related to the WUA management are listed hereinafter with actions to be taken.

8.5.1 WUA Organization Management

Problems	Major Causes	Actions to be taken
・ It takes long time to make a decision within the WUA members. ・ No decision is made in the WUA meeting. ・ The decision made in the meeting is not performed properly.	・ The committee members are vacant for a long time.	・ OIDA shall instruct WUA to elect the vacant committee members immediately. The results of the election shall be reported to the OIDA Office.
	・ Capacities of the Committee members for organisation management are still insufficient.	・ OIDA shall instruct the WUA committee members how to organise the meeting effectively and efficiently.
	・ Meetings are not held regularly.	・ OIDA shall instruct the WUA committee members to hold general meetings and committee meeting regularly..
・ Members are not informed decisions made in the meetings.	・ Minutes of meeting is not prepared.	・ OIDA shall instruct the WUA committee members how to prepare the minuets of the meetings.
	・ Minutes of meeting is not opened for the members.	・ OIDA shall instruct the WUA committee members to make the prepared minutes opened to the members so as to ensure transparency of the WUA management.

8.5.2 Land management

Problems	Major Causes	Actions to be taken
・Conflicts on land exchange / transfer take place.	・The agreement on land exchange / transfer is not performed properly.	・OIDA shall confirm the agreement on land exchange / transfer. ・OIDA shall make interviews from the members concerned. ・OIDA shall consult the PA chairman how to settle the disputes. ・According to needs, OIDA will ask the PA chairman to mediate the issue. ・OIDA shall conduct continuous monitoring until the dispute will be settled in collaboration with the PA chairman.
	・For new members, the agreement on land exchange / transfer is not made yet.	・OIDA shall instruct the WUA committee members to expedite to make the agreement witnessed by the PA Chairman. ・OIDA shall instruct WUA to submit the copies of the agreement to both OIDA and PA.
	・The irrigated farmlands, which were cultivated by withdrawn / dismissed members, have been transferred to other members or new members without any agreements.	・OIDA shall make a caution to the WUA committee members to make proper agreement for land use. ・According to needs, OIDA will ask the PA chairman to mediate the issue. ・OIDA shall send the warning letter to the WUA committee unless the situation on the issues is improved.
	・Some members cultivated over 0.25 ha, which shall violate the agreement between OIDA and WUA obviously.	・OIDA shall make a caution to the WUA committee members to solve the serious problem. ・According to needs, OIDA will ask the PA chairman to mediate the issue. ・OIDA shall send the warning letter to the WUA committee unless the situation on the issues is improved.
	・Some members have transferred their land within their blood-shed groups without making necessary agreements.	・OIDA shall instruct the WUA committee members to prepare the land transfer agreement even if the transfer is made within the blood-shed group.

8.5.3 Water Management

Problems	Major Causes	Actions to be taken
・There are some members who are not satisfied with water distribution.	・Water distribution is not decided in WUA	・OIDA shall instruct the WUA committee members to apply an irrigation rotation, dividing the command area into several irrigation blocks.
	・Water distribution is not conducted according to schedule decided by WUA	・OIDA shall instruct the WUA committee members to make the pump operator follow the water distribution schedule as decided.
	・The farmlands, which are far from water source, may result in poor irrigation performance.	・OIDA recommends the WUA committee members to re-exchange the irrigated land so as to improve the irrigation performance, if possible.
	・Irrigation water shortage is serious during the peak demand periods.	・OIDA shall instruct the WUA committee members to adopt flexible water distribution schedule during the periods.
・There are some farmlands in which irrigation is difficult.	・The elevation of the farmland is relatively higher that water level of irrigation canals.	・OIDA recommends the WUA committee members to change of canal alignments, to raise canal height, and to promote re-exchange of farmlands.
	・The water level elevation of the irrigation canals is relatively lower that elevation of farm lands.	・OIDA recommends the WUA committee members to change of canal alignments, to raise canal height.
	・The elevation of the farmland is relatively higher that water level of irrigation canals.	・OIDA recommends the WUA committee members to change of canal alignments, to raise canal height, and to promote re-exchange of farmlands.
	・Some of farmland are located far from water source.	・OIDA shall take a discharge measurement to estimate canal conveyance loss. ・If the loss takes place seriously, OIDA recommends the WUA committee members to promote re-exchange of farmlands.
	・Some irrigated farmlands are located out of the original command area	・OIDA recommends WUA committee members to promote re-exchange of farmlands.
	・Cross section of the canal is insufficient to flow required irrigation water.	・OIDA shall instruct to the WUA committee members to carry out maintenance of canal, such as clearing, desilting, and re-shaping.

8.5.4 Operation and Maintenance of Pump

Problems	Major Causes	Actions to be taken
・Fuel management is improper.	・Fuel consumption is not recorded properly.	・OIDA shall instruct WUA committee members to make the pump operators record fuel consumption quantities according to operation time of each member.
・Troubles on pump take place frequently.	・Maintenance of the pump is not conducted regularly.	・OIDA shall instruct WUA committee members to make the pump operator carry out regular maintenance according to the pump operation manual.
	・The serious damage of the pump may be observed.	・OIDA shall take an immediate arrangement to repair the pump.

8.5.5 Financial Management

Problems	Major Causes	Actions to be taken
・Accounting system on fuel cost recovery is not carried out properly.	・Fuel is not charged properly according to operation time of each member.	・OIDA shall instruct the WUA committee members to make the pump operators collect fuel cost by cash according to operation hours.
	・Records of cash receipt is unclear.	・OIDA shall instruct the WUA committee members to make the pump operators issue cash receipt to the members, and to keep copy of receipt for checking the accounts.
	・Communication between a casher and a pump operator is not satisfactory.	・OIDA shall instruct the WUA committee members to make the pump operators and cashers handle the money with cash receipt.
・Cash books is not kept properly.	・Unclear expenditure is observed in the cash books. ・There is discrepancy between cash book and cash balance in hands.	・OIDA shall instruct the WUA committee members to check the cash book periodically. ・OIDA shall instruct WUA committee members to make the casher to prepare financial report regularly.
・Savings for pump replacement are not made as scheduled	・Some of the members do not understand necessity of the saving system.	・OIDA shall instruct the WUA committee members to persuade the members to contribute the money.
	・Some of the members feel unfair to the contribution system.	・OIDA shall instruct the WUA committee members to adopt contribution system on the basis of area of irrigated farm lands.

8.6 Filing of Monitoring Records

- The monitoring sheets shall be filed in the following manner:

Monitoring Records	OIDA Office		
	OIDA Wareda Office	OIDA Branch Office	OIDA Head Office
Check list for field visit monitoring	◎	-	-
WUA activities monitoring sheet	◎	-	-
Summary of WUA activities monitoring sheet	◎	-	-
WUA performance monitoring report prepared by WUA	◎	○	○
WUA performance monitoring report prepared by OIDA	○	○	◎

Remarks: ◎:Original ○:Copy

8.7 Benchmark Farmer (BMF)s Farm Economy Survey

8.7.1 General

- In relation with WUA's Support Program, it is reaching a time when newly established WUAs are about to start the first crop production immediately after a handing over process. In this respect, it is useful to collect information and data of individual household economy of WUA member households as baseline survey, results of which can be used for comparative views on effects of household economy with and without project intervention.
- General purposes of benchmark farmers' farm economy survey can be summarized as follows;
  - to obtain baseline information of farm household economy to be used for assessment on effects of the project (irrigation scheme) at the household level through comparison between before and after project intervention in the context of household-level poverty reduction;
  - to provide both selected household and OIDA staff with an opportunity to understand each other on issues related to farm household management for attainment of household-level food security; and
  - to analyze collected basic information for (a) organizing appropriate monitoring activities to be regularly conducted by OIDA Wareda office and for (b) exploring possible technical interventions for sustained improvement of irrigation farming.

8.7.2 Criteria to Select BMFs

- Three BMFs shall be selected for each WUA . Their selection criteria are summarized below.
  - BFMs have relatively higher educational background by ensuring their sufficient capacity to accurately calculate, measure, write and read.

- BFMs have strong intention to be engaged in irrigation farming by using a pump as WUA members to enable OIDA to continue long-term monitoring. In this line the position of WUA chairperson shall be taken into special consideration, since he/she will among WUA members take leading role, although he/she might be less educational background.
- Those who have more dependent on irrigation farming rather than rain-fed farming shall be selected for BFMs.
- In case if a WUA consists of several blood-shed groups, one BMF shall be selected from those previously dependant member of the same blood-shed group with less economical and financial background of livestock assets.
- In case if many WUA members are somehow bloody related, one household who has no blood-shed relationship with other members shall be selected. This household shall have more economic and financial background ostensibly analyzed from livestock assets assessment.

8.7.3 Methodology

- The following information and data shall be collected
  - Household Characteristics
  - Household Annual Expenditure
  - Cropping Calendar
  - Crop Budget Analysis
- Survey forms are attached to Forms 8 - 6 to 8 - 9.
- Basic information and data in BFMs farm economy survey shall be collected in one month after completion of the construction works.
- An Expert of OIDA Wareda Office will collect the first hand information and data from the selected BMFs. He/she then will process and tabulate the data and information as per the forms

Form

Form 2-1

Announcement of the Project for Community-based Irrigation Development

OIDA _____ Wareda Office

1. Standard Size of the Project

- The standard command area and number of applicants per group shall be as the following table.

Water Resource	Command Area	Beneficiaries	Plot Size	Pump Capacities
River orLake	5 ha	20 HH	0.25 ha/HH	10 HP
Groundwater (Shallow Well)	3 ha	12 HH	0.25 ha/HH	5 HP

- The farming plot size per household shall be 0.25 ha.

2. Premises for the Project

- The applicants shall understand and agree with the following basic concept on pump use management (Premises).

Basic Concept of Agreement on Pump Use Management (Premises)

1)	Ultimate Goal of Agreement	: Food Security – Stability of and Increase in Agricultural Production by user household through irrigation farming
2)	Main Stakeholders in Agreement	: OIDA, Water Users Association and Peasant Association
3)	Specific Scope of Agreement	: Pump Use Management in Irrigation Farming (Implying no support to farm inputs is provided)
4)	Type of Agreement	: Contract Lease Agreement
5)	Basic Rights of Pump	: Ownership held by OIDA Usufruct right enjoyed by Water User Association
6)	Item in Lease Agreement	: Pump for Irrigation Use Only
7)	Cancellation of Agreement	: Existing due to Violation or Unjustifiable Application of Agreement
8)	Basic Principles of Lease	: One Time Investment of Pump by OIDA Cost Recovery by Water Users Association
9)	Contributions by WUA	: Physical contributions as labor by WUA (5 % of investment cost)
10)	Operational Conditions of Lease	: Effective, Efficient and Sustainable Use and Management of Pump by WUA
11)	Water Resources	: Water Resources Development under Communities' Responsibility (e.g. Construction and Maintenance of Lead

Canals to the Site and Shallow-Wells)

3. Responsibilities of both parties

Responsibilities of OIDA and farmer's group

OIDA's Responsibilities	Farmers' Group's Responsibilities
1. Before agreement on implementation of the project	
1) Distribution of application form 2) Selection of farmers' group 3) Field investigation and interview to applicant farmers 4) Meeting with farmers 5) Planning and design of irrigation facilities including topographic survey 6) Preparation of agreement form	1) Preparation of application and submission to OIDA wareda office 2) Coordination of irrigation farming size of 0.25 ha per household 3) Conducting land consolidation and exchange among members so that every member can make benefit with irrigated farming 4) Attending meeting with OIDA staff 5) Provision of necessary information for commencement of project to OIDA staff 6) Selection of leader, secretary, accountant, and auditor 7) Selection of a pump operator
2. After agreement	
1) In the case of using river water or lake water, procurement and installation of a small pump of 10 HP for irrigation, which enable them to irrigate to 5 ha of land 2) In the case of groundwater irrigation, procurement of a small pump of 5 HP for irrigation, which enable them to irrigate to 3 ha of land 3) Procurement of necessary materials, equipments, and skilled labor for construction of pump house and irrigation facilities 4) Provision of technical assistance and guidance for construction of pump house and irrigation canal 5) Provision of initial training of the pump operation 6) Provision of guidance for WUA establishment and management, such as WUA management, and financial management 7) Preparation of handing over documents	1) Construction of pump house and irrigation facilities under technical assistance of OIDA 2) Opening bank account in the name of WUA 3) Attending the training by OIDA 4) Preparation of by-law of WUA

OIDA's Responsibilities	Farmers' Group's Responsibilities
3. After handing over of irrigation facilities	
1) Provision of training of farming activities 2) Monitoring of performance of irrigation scheme	1) Operation and maintenance of the scheme, such as procurement and management of fuel, repair and maintenance of the pump, water distribution, maintenance of canals. 2) Saving money for replacement cost of the pump and PVC pipe (if using) 3) Keeping account records of WUA, income and expenditure 4) Keeping records of pump user's name, operation hours, and fuel procurement and consumption 5) Opening the account records to the member 6) Procurement of agricultural input, e.g. seed, fertilizer, pesticide 7) Marketing of agricultural products 8) Reporting irrigation performance regularly to OIDA

3. Submission of Application Form

- The applicants shall prepare the application form that is delivered at OIDA wareda office.
- The applicants shall fill it with assistance of OIDA staff and submit to OIDA wareda office.

Applicant No.

Form 2-2

To Mr. _____, OIDA Wareda Head

Date _____

APPLICATION FORM

1. General Information

(1) Wareda name : _____

(2) Peasant Association : _____

(3) Locality : _____

(4) Number of applicants : _____ Household

(5) Proposed command area : _____ ha

(6) Leader's name : _____

(7) Location of leader's house : _____

2. Project Information

(1) Water resource : _____

(2) Existing irrigation facilities : _____

_____

(3) Distance from Wareda office: _____ km

(4) Distance from main road : _____ km

Prepared by

_____

Attachment

1. List of the Applicant Farmers
2. Location Map
3. Proposed Layout Map

Form 2-2

Attachment-1

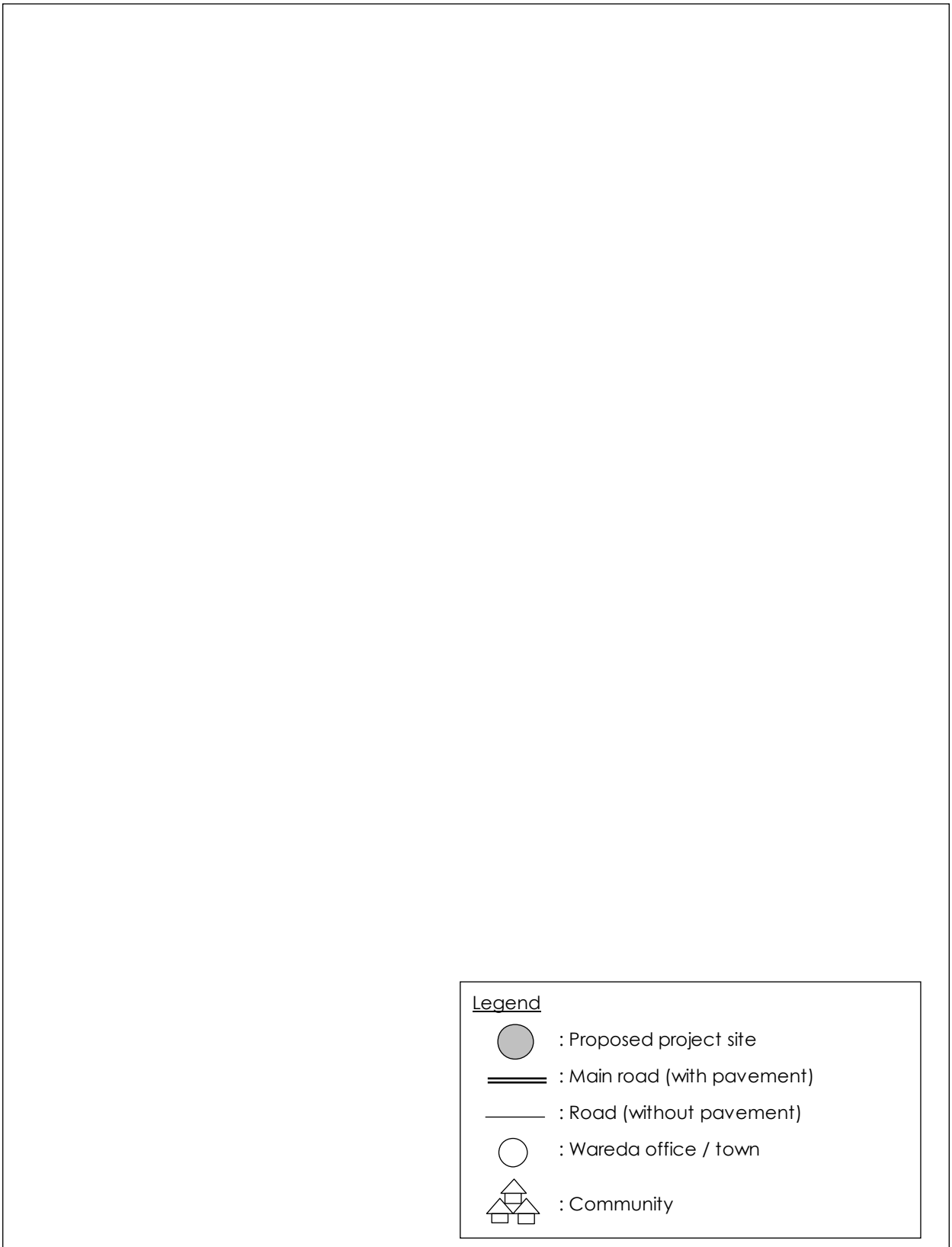
List of the Applicant Farmers and Irrigable Land Size

No.	Name	Sex (Male/ Female)	Age	Land Size (ha)	H.H Size		Signature
					Male	Female	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

Note: ◯ : Group Leader

Form 2-2

Attachment-2



Location Map of Proposed Project Site	Date:

Form 2-2

Attachment-3

Legend

: Command area

: Proposed pump house

: Irrigation canal (Existing / Proposed)

: Boundary of farming plot

: Lead canal (Existing / Proposed)

: Shallow well (Existing / Proposed)

Note: "Existing" or "Proposed" about facilities should be mentioned on the map

Proposed Layout Map	Date:

Form 2-3

List of Applicants

Wareda Name:

Applicant No.	Received Date	General Information					Project Information			
		PA Name	Locality	Number of Applicants (HH)	Command Area (ha)	Leader's Name	Water Resource	Existing Irrigation Facilities	Distance from Wareda Office(km)	Distance from Main Road(km)

Form 2-4

Check Sheet for Preliminary Survey

Applicant No. _____

a. General Information

- Name of PA

_____

- Location

_____

- Leader (Name, Education)

_____

_____

_____

- Accessibility

_____

- Road Condition

_____

_____

_____

- Name of Water Resource (Distance from River, Lake, or Shallow-well)

_____

_____

- Numbers of Applicants (Male and Female)

_____

_____

- Total Area of Cultivating Land (ha)

_____

_____

- Soil Condition in the Command Area

_____

_____

- Topography in the Command Area

_____

_____

_____

_____

b. History of the Group

- Experience of Irrigation Farming

Experience of Other Traditional Organization

c. Physical Information

- Present Condition of Irrigation Facilities

Facilities	Q'ty	Condition
1. Main Canal	m	Functional / Need repair / Deteriorated / None
2. Secondary Canal	m	Functional / Need repair / Deteriorated / None
	m	Functional / Need repair / Deteriorated / None
	m	Functional / Need repair / Deteriorated / None
3. Lead Canal	m	Functional / Need repair / Deteriorated / None
4. Pond		Functional / Need repair / Deteriorated / None
5. Shallow Well		Functional / Need repair / Deteriorated / None
		Functional / Need repair / Deteriorated / None
6. Others		Functional / Need repair / Deteriorated / None
		Functional / Need repair / Deteriorated / None
		Functional / Need repair / Deteriorated / None

- Approximate Length of Irrigation Canal

- Approximate Actual Head

i) Suction Head (Water surface to pump house) m

ii) Delivery Head (Pump house to field) m

- Necessity of special structures such as aqueduct or siphon

- Water Quality for Irrigation (Interview to Users)

d. Present Condition of Agriculture

- Present crops under cultivation

- Proposed crops under irrigation

e. Organizational Strength of Farmers' Group

- Willingness of Irrigation

- Leadership

f. Confirmation of Proposed Layout Map

(Draw the proposed layout including the following information, if revised)

- Location of pump and pump house
- Layout of canal (main / secondary / lead)
- Houses
- Command area and farm plots
- Location of shallow well

Form 3-1

Attendance Record of WUA Applicants Household Members											
Name of Peasant Association:											
Name of Previous Peasant Association:											
Name of Hamlet(*Safar)* :											
Name of Housing Block(*Akababi*):											
No.	Name of Participant	Position of Household	Applicant Yes/No	Sex	Attendance						
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

This information of local settlement patters varies from locality to locality. It is found that the present Peasant Association (PA) is emerged through amalgamation of several previsou PA. The previsou PA consists normally of several hamlet that may have area leaders for several households. Then, this hamlet is further comprized of housing block with a range from 12 - 30 households as housing block. The naming of such hamlet and housing block varis from place to place.

This is a colum on date. Make entry of each date when a PRA session is held.

This is a attendance record. In precisou reference with the same record in flip chart sheet, attendance record shall be made by entering either ' ○'as presence or '? ' as absence.

Form 3-2

1. Standard Size of the Project

Water Resource	Command Area	Beneficiaries	Plot Size	Pump Capacities
River or Lake	5 ha	20 HH	0.25 ha/HH	10 HP
Groundwater (Shallow Well)	3 ha	12 HH	0.25 ha/HH	5 HP

2. Premises for the Project

Basic Concept of Agreement on Pump Use Management (Premises)

1) Ultimate Goal of Agreement	:	Food Security – Stability of and Increase in Agricultural Production by user household through irrigation farming
2) Main Stakeholders in Agreement	:	OIDA, Water Users Association and Peasant Association
3) Specific Scope of Agreement	:	Pump Use Management in Irrigation Farming (Implying no support to farm inputs is provided)
4) Type of Agreement	:	Contract Lease Agreement
5) Basic Rights of Pump	:	Ownership held by OIDA Usufruct right enjoyed by Water User Association
6) Item in Lease Agreement	:	Pump for Irrigation Use Only
7) Cancellation of Agreement	:	Existing due to Violation or Unjustifiable Application of Agreement
8) Basic Principles of Lease	:	One Time Investment of Pump by OIDA Cost Recovery by Water Users Association
9) Contributions by WUA	:	Physical contributions as labor by WUA (5 % of investment cost)
10) Operational Conditions of Lease	:	Effective, Efficient and Sustainable Use and Management of Pump by WUA
11) Water Resources	:	Water Resources Development under Communities' Responsibility (e.g. Construction and Maintenance of Lead Canals to the Site and Shallow-Wells)

Roles and Education Background of Applicants							
Name of Peasant Association:							
Name of Previous Peasant Association:							
Name of Hamlet(*Safar)* :							
Name of Housing Block(*Akababi*):							
No.	Name of Participant	Education	Designated Social and Local Administrative Roles				
			Roles in Wareda	Roles in PA	Roles in Idir	Roles in other Development Sectors	Any other roles(elder etc)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Form 3-4

Historical Map of Community

Year	Events related to Agricultural Activities	Irrigated Farmers or area	Problems Arisen	Solution
E.C.				
E.C.				
E.C.				
E.C.				
E.C.				

Examples of Events:

Application submitted

Form 3-5

Past Experience of Irrigation and Lessons Leant

Items	Problem arisen	Cause	Action for solution	Results
Relation to Private Pump Owner / Contract				
Land Arrangement / Exchange				
Availability of Water Resource				
Water Distribution				
Maintenance of Canal and Structures				

Form 3-5

Items	Problem arisen	Cause	Action for solution	Results
Provision of Fuel				
Preparation of Farm Inputs				
Marketing of Products				
Access to Credit				
Financial Management				

Form 3-6

Calculation Sheet of Operation and Management Cost

Name of Wareda:	Name of Peasant Association:
Name of WUA:	
(a) Number of Member :	Households (HH)
(b) Command Area :	ha

No.	Item			Caluculation
1. Operation Cost				
1.1 Fuel and Lubricant Cost for Pump Operation				
(1)	Pump operation hour per time		hrs/time/HH	
(2)	Fuel consumption rate		lit/hr	
(3)	Diesel price at site		Birr/lit	including lublicant consumtion
(4)	Irrigation time		times/crop	
(5)	Fuel cost		Birr/crop/HH	(1) hr x (4) times x (2) x (3) Birr
1.2 Salary of Pump Operator and Guard				
(1)	Salary of pump operator		Birr/Month	
(2)	Salary of guard		Birr/Month	
(3)	Working month per crop		Month/crop	
(4)	Cost for operator & guard		Birr/crop/HH	((1) Birr + (2) Birr) x (3) / (a) HH
	1. Sub-total		**Birr/crop/HH**	**1.1 + 1.2**
2. Maintenance Cost				
2.1 Pump Maintenance Cost				
(1)	Repairing cost per year		Birr/year	
(2)	Cropping season		times/year	
(3)	Pump maintenance cost		Birr/crop/HH	(1) Birr / (2) / (a)
2.2 Irrigation Facilities Maintenance Cost				
(1)	Labor for maintenance per year		Man-day	
(2)	Labor unit cost		Birr/day	
(3)	Cement for maintenance		bag	
(4)	Cement unit cost		Birr/bag	
(5)	Cropping time		times/year	
(6)	Facility maintenance cost		Birr/crop/HH	((1)MD x (2)Birr+(3)x(4)) / (5) / (a) HH
	2. Sub-total		**Birr/crop/HH**	**2.1 + 2.2**
3. Replacement Cost for Pump and Pipes				
3.1 Pump Replacement Cost				
(1)	Pump Cost		Birr	
(2)	Life span		years	
(3)	Cropping time		crops/year	
(4)	Replacement cost		Birr/crop/HH	(1) Birr/(2)years/(3)crop/(a)HH
3.2 Pipe Replacement Cost				
(1)	Price of a pipe		Birr/piece	1 piece = 6.0 m
(2)	Price of a joint		Birr/piece	
(3)	Length of pipe (canal)		m	
(4)	Life span		years	
(5)	Cropping time		crops/year	
(6)	Replacement cost		Birr/crop/HH	((1)Birr+(2)Birr)x(3)/6m/(4)/(5)/(a)
	3. Sub-total		**Birr/crop/HH**	**3.1 + 3.2**
4. Others				
Total			**Birr/crop/HH**	**1. + 2. + 3. + 4.**

Name of Peasant Association:
Name of Previous Peasant Association:
Name of Hamlet(*Safar)* :
Name of Housing Block(*Akababi*):

Internal Strategy of WUA applicants

	Internal Solution	Vote	Propotion
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Note for PRA organizer:

1. OIDA shall explain that no farming input is provided WUA applicants with.

2. Upon an agreement with this condition in the discssion on the premises, it is important for OIDA to acquire information of thoughts on internal solutions that WUA applicants seeks. Such information is consequently subjected to be monitored as an extension activity by OIDA development agent as well as expert.

3. In this regard, WUA applicants shall be asked to present their ideas on internal solutions. In ranking, pair-wise ranking or general vote shall be used.

Preference on types of crops by WUA applicants

(a) Low input types of crops

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
(g)							x
(f)						x	
(e)					x		
(d)				x			
(c)			x				
(b)		x					
(a)	x						
Result of oting by Pair-wise ranking							

(b) High input types of crops

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
(g)							x
(f)						x	
(e)					x		
(d)				x			
(c)			x				
(b)		x					
(a)	x						
Result of oting by Pair-wise ranking							

Notes for PRA organizer:
As one of internal strategy of WUA applicants to secure farm-inputs, it has been found through the paset experiences that rural people shall prepare necessary financial resources to purchase farm-inputs by classifing crops into two groups; namely, (i) low input type of crops; and (ii) high input type of crop. Through pair-wising methods, their preference on types of crops shall be ranked.

Name of WUA applicant group: _____

Patterns of assets holdiing by WUA applicant members in order to make self-preparation to acquire farm-inputs for irrigation farming

	Name of Participant	Blood Relation	PPO	Livestock holdings								Monetary values of Livestock asset				No. of Farm Plots	Total Size of Farm Land	Irrigation Land Ratio	Sex
				Chicken	Ox	Veal	Cow	Heifer	Sheep	Goat	Donkey	Min. Value	Ave.Min. Value/HH	Max. Value	Ave.Max. Value/HH				
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			
24																			
25																			
Total																			

Form 3-9

Sample of Crop Budget Analysis 1 : [Irrigation: Tomato]

	Description					Unit	Amount	Remark
	Tomato	Farm gate Price variation ('00-'01)						
I.	Gross Revenue	Min	Mean	Max				
	(1) Yield [100 qts]/ ha					kg/ ha	8,000.00	Marketable rate of the
	(2)Unit Price	0.30	1.15	2.00		Birr/kg	0.45	produce is estimated
	(3)Gross Revenue(2)x(1)					Birr	3,600.00	to 80 %
II	Crop Production Cost							
	(1)Seed (250 gms/ha)					Brr/ha	113.00	
	Improved Variety (ex. Manglobe) Birr 450 /kg							
	(2)Fertilizers							
	1)Urea(100 kg/ ha, 1.8 Birr /kg)				1.8	Birr/ka	180.00	
	2)DAP(100 kg/ ha, Birr 2.75/kg)				2.8	Birr/kg	275.00	
	(3)Chemicals							
	Menkozeb(Fungicide) 2.0 kg/ ha x 2 =4 kg/ ha 74 Birr/kg				74.0	Brr/kg	296.00	
	Endsulphan(Pest) 3 Lt/ha x 2 =6 Lt/ ha 55 Birr/Lt				55.0	Brr/Lt	330.00	
	(4) Labor cost							
	Seed bed preparation (1-1.2 m width x 5-6 m length x 6 beds for 1 ha)				2	MD	0.00	
	Seeding/covering/mulching/watering				4	MD	0.00	
	3 times weeding for nursery period : 18 hrs 9hrs				2.3	MD	0.00	
	Watering for the nursery bed 10 times = 16 hrs				2	MD	0.00	
	Translanting:							
	Land preparation: disc plowing by tractor (240 Birr + 20 Birr for tip)				260	Birr/0.5 ha	0.00	
	1st Land clearing				16	MD	0.00	
	1 st plowing by oxen 2 oxen day				15	Oxen-day	0.00	
	2 nd plowing by oxen 2 oxen day				15	Oxen-day	0.00	
	Ridging by one oxen				15	Oxen-day	0.00	
	Leveling				14	MD	0.00	
	Pre Irrigation by pump				4	MD	0.00	
	Planting seedling into the main field:				18	MD	0.00	
							0.00	
	Hoeing 1 32 MD/ ha				32	MD	0.00	
	Hoeing 2 32 MD/ ha				32	MD	0.00	
	Hoeing 3 32 MD/ ha				32	MD	0.00	
	Supporting Plant by stick 80 MD/ ha- 72.4 MD (Family labor)=7.6 MD short				7.6	MD	60.80	
	Spraying chemical for nursery: 2 MD x 4 times =8 MD				8	MD	0.00	
	Spraying chemicals for main filed 4 MD x 5 times = 20 MD				20	MD	0.00	
	Spraying chemicals-2 (DDT) 2 MD x1 time = 2 MD				2	MD	0.00	
	Harvesting (16 MD x 8times = 128 MD/1.5 months, 85.3 MD/month) 13 MD sh				13	MD	104.00	
	(5) Irrigation							
	2man x 1 hr/each x 8 times = 8 hrs =2 MD (Nursery)				2	MD	0.00	
	Irrigation (ManDay x 20 times/every 7 days)							
	10 man x 5 hrs/each x 20 times = 1000 hrs = 125 MD				125	MD	0.00	
	(6)Diesel							
	10 liters/day/ ha x 20 times=200 Lts,				188.7	2.65 Birr/Lt	500.06	
	Change Engine oil (5 lt x 4 times = 20 Lts) 19.8 birr/lt x 20 =396/5 ha				4.0	19.8 Birr/lt	79.20	
	(7) Stick for tomato plant							
	Cost of stick to support Tomato plants							
	100 cm x 30 cm spacing = 33333 plants/ ha							
	No of sticks per ha = approx 6000 sticks Birr 0.25/stick							
	6000 x 0.25 Birr/pc =1500 Birr/ ha							
	(8) Hand sprayer (MEC 16 Lt cap) Birr 520 /unit							
	Total Crop Production Cost II						1,938.06	
III	Depreciation cost							
	(1) Pump							
	Birr 35000 /8 years/2 crops/5ha= Birr 437.5						437.50	
	(2)Sprayer							
	Birr 520 /6 years/2 crops/FH = Birr 43.3						43.30	
	(3)Stick							
	Birr1500 /6 crops = Birr250						250.00	
	Total Depreciation cost						730.80	
IV.	Net Revenue (I-II)					Brr/ha	1,661.95	
V.	Net Revenue (I-II-III)					Brr/ha	931.15	

Break Even price (without depreciation)=Birr 24.2 per 100 kg

Break Even price (with depreciation) = Birr 33.4 per 100 kg

Sample of Crop Budget Analysis 2 : [Irrigation: Papaya]

	Description					Unit	Amount	Remark
	Papaya	Farm gate Price variation						
I.	Gross Revenue	Min	Mean	Max				
	(1)Yield [500 qts]/ ha					500 qts/ ha	50,000.00	marketable rate is estimateds to 70 %.
	(2)Unit Sale Price	0.15	0.8	1		0.15 Birr/kg	0.15	Annual mean yield over
	(3)Gross Revenue(2)x(1)					Birr/ha	5,250.00	5 years is estimated to 500 qts/year.
II	Crop Production Cost							
	(1)Seed([ ]kg/ha :[ ] kg/ ha)					Brr/ha	0.00	
	local seed from matured fruits (no actual cost).							
	(2)Fertilizers							
	1)DAP([0] kg/ ha, Birr 2.75/kg)					Brr/ha	0.00	
	2)Urea([0] kg/ ha, 1.8 Birr /kg)					Brr/ha	0.00	
	No fertilizer is applied through the cropping years.							
	(3)Chemicals							
	No chemicals are sprayed through the cropping years.						0.00	
	(4) Labor cost							
	[Nursery]							
	Land clearing for shading					16.4 MD	0.00	
	Land preparation for nursery					16 MD	0.00	
	Sowing papaya seed on nursery					12 MD	0.00	
	Weeding 1					6 MD	0.00	
	Weeding 2					8 MD	0.00	
	Weeding 3					4 MD	0.00	
	[Main field]							
	Land Clearing					40 MD	0.00	
	1st plowing 2 oxen-day					15 Birr/oxenday	0.00	
	2nd plowing 2 oxen-day					15 Birr/oxenday	0.00	
	Transplanting (2 m x 2.0-2.3m)					40 MD	0.00	
	watering					8 MD	0.00	
	Replanting plant due to maile/femaile tree					12 MD	0.00	
	Harvesting (8 MD x 25 times/year = 200 MD					200 MD	0.00	
	(5) Irrigation							
	Irrigation (every 15 days during Oct-May amounted to 18 times)							
	12 MD/each x 18 =216 MD					216 MD	0.00	
	(6)Diesel							
	20 Lts/nursery	20lts x 2.65 =53				20 Lt	53.00	
	8 Lts for transplanting	8LTs x 2.65 =21.2				8 Lt	21.20	
	Fuel cost 26 Lt/each irrigation							
	26 Lt x 18 times =468 Lt (@=2.65 Birr/L 468 x 2.65 =1240.2					468 Lt	1,240.20	
	Oil consumption: changing oil every 45 days							
	3.5 Lt/each x 6 times = 21 Lts (@= 19.8 Birr/Lt x 21Lts = 415.8/5 ha					83 ha	83.00	
	Production cost total:						1,397.40	
III	Depreciation of the pump							
	Pump cost Birr [35000] /8 years//5 ha = 875 Birr/yr/ha						875.00	
IV.	Net Revenue (I-II)					Brr/ha	3,852.60	
V.	Net Revenue (I-II-III)					Brr/ha	2,977.60	

Break Even Price (without depreciation)=Birr [4] per 100 kg
Break Even Price (with depreciation) = Birr [6.5] per 100 kg

Sample of Crop Budget Analysis 3 : [Irrigation: Onion]

	Description					Unit	Amount	Remark
	Onion	Farm gate Price variation(Past 3 years)						
I.	Gross Revenue	Min	Max	Mean				
	(1)Yield [170 qts] /ha					kg/ha	15,300.00	Marketable production is estimated
	(2)Unit Sale Price	0.3	1.5	0.9	0.3	Birr/kg	0.31	to 90 %.
	(3)Gross Revenue(2)x(1)					Birr	4,743.00	
II	Crop Production Cost							
	(1)Seed([4000]gm/ ha				100	Brr/kg	400.00	
	Improved Variety :Adama Red Birr [100] Birr/kg x 4 kg =400							
	(2)Fertilizers							
	1)DAP([100] kg/ ha, Birr 2.75/kg)					Brr/0.5ha	275.00	
	2)Urea([100] kg/ha, 1.8 Birr /kg)					Brr/0.5ha	180.00	
	(3)Chemicals							
	Fungicide [Mencozeb , 334] gm/10 beds x [6]times = [2000gm]			Nursery		Brr/ 5beds	140.00	
	Fungicide [Mencozeb, 1000 gm]/ ha x [8]times = [8 kg]				75	Brr/kg	600.00	
	Pest cide [Tiodan, 166 cc]/10 Beds x[6]times = [1000 cc]				30	Brr/5beds	60.00	
	Pest cide [Tiodan, 1000 cc]/ha x[8]times = [8 Lt]				60	Brr/Lt	480.00	
	(4) Labor cost							
	Nursery:							
	Seed bed preparation (1 m width x 5m length x 10 beds for ha)				4	MD	0.00	
	Seeding/covering/mulching/watering				2	MD	0.00	
	3 times weeding for nursery period(60 days)			18 hrs	2.25	MD	0.00	
	Watering for the nursery bed 5 times = 40 hrs				5	MD	0.00	
	Main field							
	Land preparation: disc plowing by tractor (240 Birr + 20 Birr for tip)				260	Birr/ ha	0.00	
	Oxen plowing (2 oxen-day x 2 times=4 oxen-day)				8	Oxen-day	0.00	
	Ridging by oxen				2	Oxen-day	0.00	
	Translanting:(60 MD x 8 birr/day=480 Birr, Space: 15 cm x 5 cm)				60	MD	0.00	
	Weeding 30 MD/ ha x 2 = 60 MD				60	MD	0.00	
	Hoeing 40 MD/ ha x 3 times = 120 MD-72.4 MD(Family labor) = 47.6 MD short				47.6	MD	380.80	
	Spraying chemicals for nursery 2 MD x 6 times =12 MD				12	MD	0.00	
	Spraying chemicals for main field: 4 man x ha x 8 times = 32 MD				32	MD	0.00	
	Harvesting (100 MD - 72.4 MD)= 27.6 MD short				27.6	MD	220.80	
	(5) Irrigation							
	Pre irrigation before transplanting (6 MD x 8 Birr=48 Birr)				6	MD	0.00	
	Irrgation on transplanting day (6 MD x 8 Birr = 48 Birr)				6	MD	0.00	
	Irrigation (17 times/every 7 days)							
	6 man x 4 hrs/each x 17 times = 408 hrs = 51 MD				51	MD	0.00	
	(6)Diesel							
	Fuel for pre-irrigation+ cropping = 10 Lts/each x 19 times x 2.65 Birr/lt = 503.5				188.7	Lt	500.06	
	Oil 5 Lts x 5 times = 25Lts = 25 Lts x 19.8 Birr/Lt= 495/5 ha				5	Lt	99.00	
	(Engine Oil is scheduled to be replaced on every 45 days operation)							
	(7) Manual Sprayer							
	Cap.: 15 Lt 520 Birr/unit							
	Total Crop Production Cost II						3,335.66	
III	Depreciation cost							
	Pump cost: Birr [35000] /8 years/ 2 crops/5ha= Birr/yr/ha						437.50	
	Sprayer cost: Birr[520]/6 year/2 crops/FH = 43.3 Birr						43.30	
IV.	Net Revenue (I-II)					Brr/ ha	1,407.35	
V.	Net Revenue (I-II-III)					Brr/ ha	926.55	

Break Even Price (without depreciation)=Birr [21.8] per 100 kg
Break Even Price (with depreciation) = Birr [24.9] per 100 kg

Sample of Crop Budget Analysis 4 : [Irrigation: Chili]

	Description					Unit	Amount	Remark
	Chili	Farm gate Price variation(Past 3 years)						
I.	Gross Revenue	Min	Max	Mean				
	(1)Yield [62 qts]/ ha					kg/ ha	6200.0	Marketable rate of the produce is
	(2)Unit Sale Price	0.6	2.25	1.875		Birr/kg	0.7	estimted to 80 %.
	(3)Gross Revenue(2)x(1)					Birr	3224.0	
II	Crop Production Cost							
	(1)Seed([1500]gm/ ha					18 Brr/ha	18.0	
	Improved Variety Birr[12] /kg							
	(2)Fertilizers							
	1)DAP([0] kg/ ha, Birr 2.75/kg)					Brr/ha		
	2)Urea([0] kg/ ha, 1.8 Birr /kg)					Brr/ha		
	(3)Chemicals							
	Fungicide 1[Mencozeb, 150 gm]/6 Beds x [3]times = [450 gm]				Nursery	33.8 Brr/6 beds	33.8	
	Fungicide 2[Kocide, 150gm]/6 Beds x [3]times = [450 gm]				Nursery	29.2 Brr/6 beds	29.2	
	Fungicide [Mencozeb, 800 gm]/ ha x [4]times = [3.2 kg]					75 Brr/kg	240.0	
	Fungicide [Kocide, 800 gm]/ ha x [4]times = [3.2 kg]					65 Brr/kg	208.0	
	Pest cide 1[Tiodan, 166 cc]/6 Beds x[3]times = [500 cc]/6 Beds					30 Brr/6beds	30.0	
	Pest cide [Tiodan, 800 cc]/ha x[4]times = [3.2 Lt]					120 Brr/Lt	384.0	
	Pest cide [DDT, 1000 gm]/ha x[1]times = [1000gm]					40 Brr/kg	40.0	
	(4) Labor cost							
	Seed bed preparation (1-1.2 m width x 5-6 m length x 6 beds for ha)					2 MD	0.0	
	Seeding/covering/mulching/watering					2 MD	0.0	
	3 times weeding for nursery period(45 days) 18hrs					2.25 MD	0.0	
	Watering for the nursery bed 9-15 times = 24 hrs					3 MD	0.0	
	Translanting:							
	Land preparation: disc plowing by tractor (240 Birr +210 Birr for tip)					260 Birr/0.5 ha	0.0	
	1st Land clearing					16 MD	0.0	
	1 st plowing by oxen 2 oxen day					8 Oxen-day	0.0	
	2 nd plowing by oxen 2 oxen day					8 Oxen-day	0.0	
	Ridging by one oxen					4 Oxen-day	0.0	
	Leveling					14 MD	0.0	
	Pre Irrigation by pump					4 MD	0.0	
	Planting seedling into the main field:					18 MD	0.0	
	Weeding - 1 8 MD/ ha					8 MD	0.0	
	Weeding - 2 12 MD/ ha					12 MD	0.0	
	Hoeing 1 26 MD/ ha					26 MD	0.0	
	Hoeing 2 32 MD/ ha					32 MD	0.0	
	Hoeing 3 30 MD/ ha					30 MD	0.0	
	Spraying chemicals-1 2 MD x 5 times =10 MD					10 MD	0.0	
	Spraying chemicals-2 (DDT) 2 MD x1 time = 2 MD					2 MD	0.0	
	Harvesting					20 MD	160.0	
	(5) Irrigation							
	2man x 1 hr/each x 12 times = 24 hrs =3 MD (Nursery)					3 MD	0.0	
	Irrigation (ManDay x 16 times/every 7 days)							
	10 man x 5 hrs/each x 16 times = 800 hrs = 100 MD					100 MD	0.0	
	(6)Diesel							
	Fuel for cropping season: 24 Lts/day x 16 times=384 Lts x 2.65 Birr =					188.7 Lt	500.1	
	Oil 3.5 Lts x 4 times x 19.8 Birr/Lt = 277.2/5ha					2.8 Lt	55.4	
	(7) Manual Sprayer							
	Cap.: 15 Lt 520 Birr/unit							
	Total Crop Production Cost II						1698.5	
III	Depreciation cost							
	Pump cost: Birr [35000] /8 years/2 crops/ha = 437.5 Birr/crop/ha						437.50	
	Sprayer cost: Birr[520]/6 year/2 crops/FH = 43.3 Birr						43.30	
IV.	Net Revenue (I-II)					Brr/ ha	1525.5	
V.	Net Revenue (I-II-III)					Brr/ ha	1044.7	

Break Even Price (without depreciation)=Birr [27.4] per 100 kg
Break Even Price (with depreciation) = Birr [35.1] per 100 kg

Sample of Crop Budget Analysis 5 : [Irrigation: Cabbage]

	Description				Unit	Amount	Remark
	Cabbage	Farm gate Price variation					
I.	Gross Revenue	Min	Max	Mean			
	(1)Yield [120 qts]/ ha				120 kg/ ha	10800.00	Marketable rate of the produce is estimated to 90%.
	(2)Unit Sale Price	0.15	0.7	0.425	Birr/kg	0.30	
	(3)Gross Revenue(2)x(1)				Birr	3240.00	
II	Crop Production Cost						
	(1)Seed([700]gm/ ha, CV: Copenhagen Birr [220]/kg				154 Brr/ha	154.00	
	(2)Fertilizers						
	1)DAP([100] kg/ ha, Birr 2.75/kg)				2.75 Brr/kg	0.00	
	2)Urea([50] kg/ ha, 1.8 Birr /kg)				1.8 Brr/kg	0.00	
	(3)Chemicals						
	Fungicide 1[Kocide, 166 gm]/8 Beds x [3]times = [500 gm]				33 Brr/4 beds	33.00	
	Pesticide 2[Malatine, 150gm]/8 Beds x [3]times = [450 gm]				27 Brr/4 beds	27.00	
	Fungicide [Mencozeb, 800 gm]/ ha x [5]times = [4 kg]				75 Brr/kg	300.00	
	Fungicide [Kocide, 800 gm]/ ha x [5]times = [4 kg]				65 Brr/kg	260.00	
	Pest cide 1[Tiodan, 166 cc]/6 Beds x[3]times = [500 cc]/6 Beds				30 Brr/3beds	30.00	
	Pest cide [Tiodan, 800 cc]/ha x[5]times = [4 Lt]				60 Brr/Lt	240.00	
	Pest cide [DDT, 1000 gm]/ha x[1]times = [1000gm]				40 Brr/kg	40.00	
	(4) Labor cost						
	Nursery:						
	Seed bed preparation (1-1.2 m width x 5 m length x 8 beds for ha)				2 MD	0.00	
	Seeding/covering/mulching				4 MD	0.00	
	3 times weeding for nursery period(45 days)	12 hrs			1.5 MD	0.00	
	Watering for the nursery bed 9 times = 18 hrs				2.3 MD	0.00	
	Main field:						
	Land preparation: disc plowing by tractor (240 Birr + 20 Birr for tip)				260 Birr/ ha	0.00	
	Harrowing by hoe				10 MD	0.00	
	Clearing plant residue				6 MD	0.00	
	Plowing by oxen 2 oxen day x 2 = 4 Oxen days				15 Oxen-day	0.00	
	Operator 8 Birr/day				8 MD	0.00	
	Ridging by one oxen day				15 Oxen-day	0.00	
	+ operator one MD				2 MD	0.00	
	Finalizing ridge by hoe				16 MD	0.00	
	Pre Irrigation by pump (10 man x 5 hrs = 50 hrs)				6.3 MD	0.00	
	Transplanting seedling into the main field:				20 MD	0.00	
	Weeding - 1 6 MD/ ha				6 MD	0.00	
	Hoeing 1 24 MD/ ha				24 MD	0.00	
	Hoeing 2 24 MD/ ha				24 MD	0.00	
	Hoeing 3 24 MD/ ha				24 MD	0.00	
	Spraying chemicals-1 2 MD x 5 times =10 MD				10 MD	0.00	
	Harvesting (4 times: 16 MD/each x 4 = 64 MD)				23.63 MD	189.04	
	(5) Irrigation						
	Irrigation (10 Man x 5 hrs x 12 times in every 7 days = 600 hrs)				75 MD	0.00	
	(6)Diesel						
	Fuel for cropping season: 16 Lts/day x 12 times=192 Lts x 2.65 Birr =				188.7 Lt	500.06	
	Oil 3.5 Lts/each x 2 times x 19.80 Birr/Lt = 210/5ha				1.4 Lt	27.72	
	(7) Manual Sprayer Cap.: 15 Lt 520 Birr/unit						
	Total Crop Production Cost II					1800.82	
III	Depreciation cost						
	Pump cost: Birr [35000] /8 years/2 crops/5 ha=437.5/crop/ha					437.50	
	Sprayer cost: Birr[520]/6 year/2 crops/FH = 43.3 Birr					43.30	
IV.	Net Revenue (I-II)				Brr/ ha	1439.19	
V.	Net Revenue (I-II-III)				Brr/ ha	958.39	

Break Even Price (without depreciation)=Birr [16.7] per 100 kg
Break Even Price (with depreciation) = Birr [21.1] per 100 kg

Form 3-10

Name of Peasant Association:

Name of Previous Peasant Association:

Name of Hamlet(*Safar)* :

Name of Housing Block(*Akababi*):

(1) Group Fund Formation (1) - Revolving Fund : Birr _____ per applicant household

Notes for PRA organizer:
Through the session on cost breakdown for operation, maintenance and replacement of pump, WUA applicants will be asked on how to secure the fund for it. Especially, cash for operation cost is vitally necessary before the irrigation farming shall be started. Through the experiences, some of WUA will organize themselves into formation of revolving fund. Each applicant household shall contribute a certain amount of money for revolving fund.

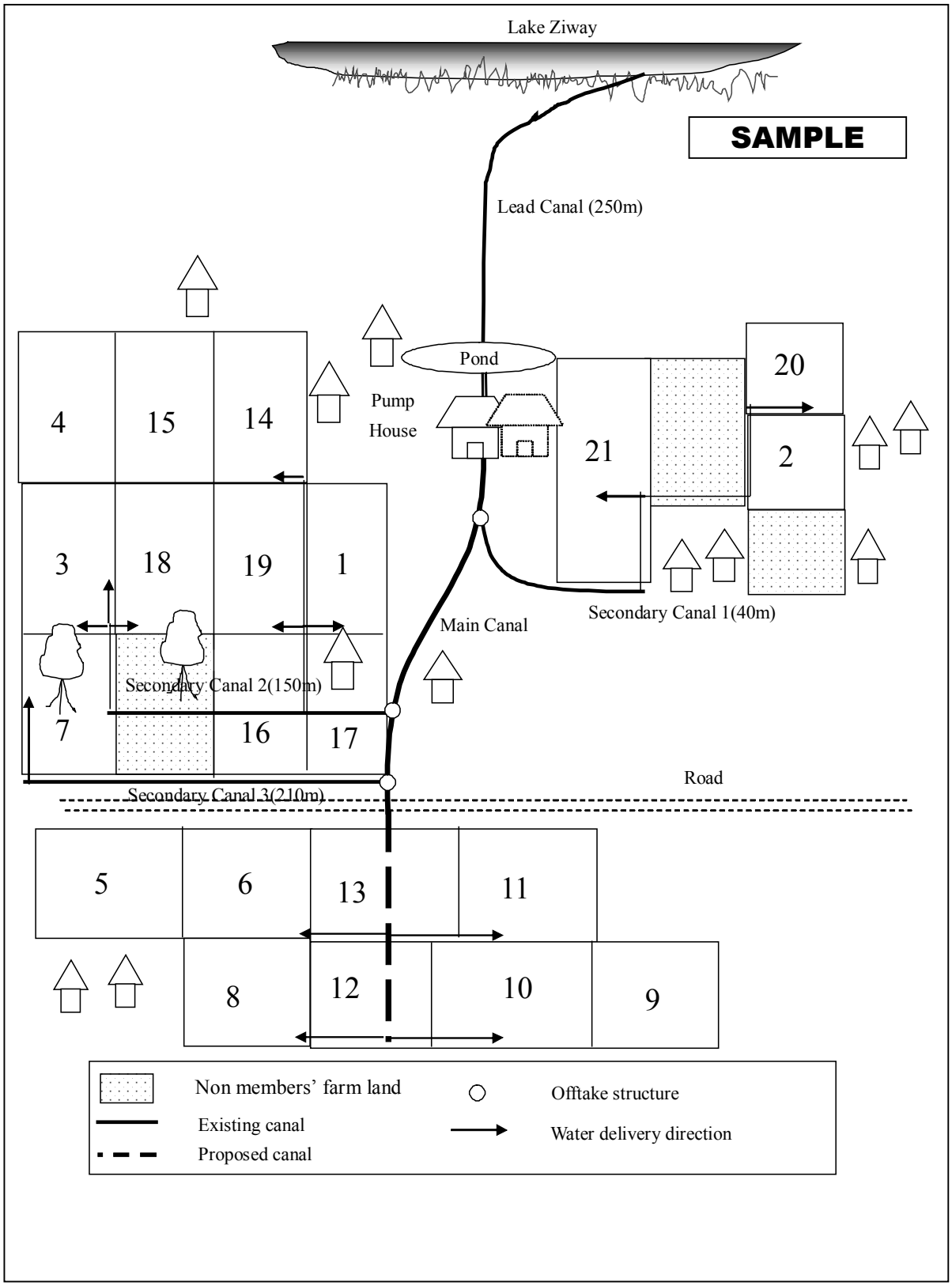
(2) Bank Account Opening

Notes for PRA organizer:
It is normally observed that WUA applicants may express un-necessity of bank opening, since they would think treasurer can handle cash manangement based on their experiences in Idri and the like. At the same time it is also found that such WUA might forget an estimated amount of replacement reserve at the end that will account for an equivalent amount of pump price (Birr 40,000.00 for 10 to 13 HP, while Birr 20,000 for 5 HP). Such estimated total amount of fund shall be reminded for WUA applicants, and then WUA applicants are found easily to accept an idea to open a bank account for safety operation of community fund.

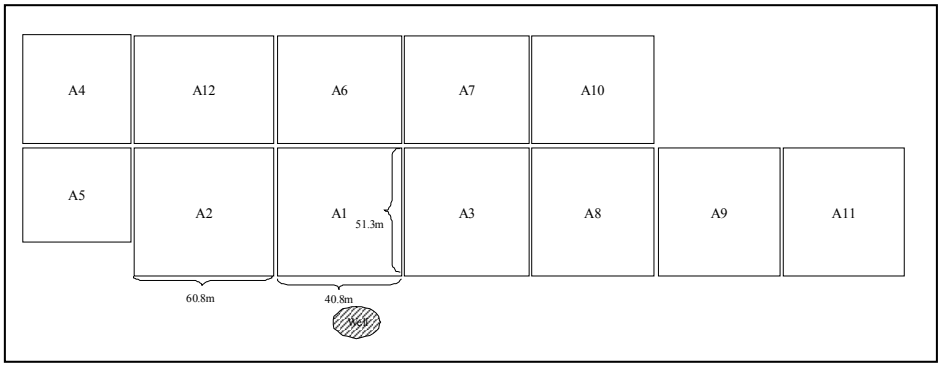
Form 3-11

Responsibilities of OIDA and WUA

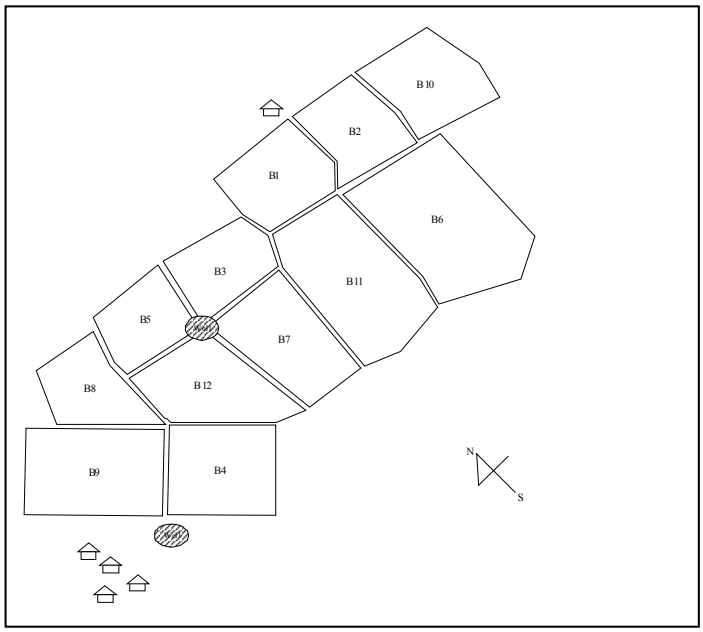
OIDA's Responsibilities	WUA Responsibilities
1. Construction Stage	
1) In the case of using river water or lake water, procurement and installation of a small pump of 10 HP for irrigation, which enable them to irrigate to 5 ha of land 2) In the case of groundwater irrigation, procurement of a small pump of 5 HP for irrigation, which enable them to irrigate to 3 ha of land 3) Procurement of necessary materials, equipments, and skilled labor for construction of pump house and irrigation facilities 4) Provision of technical assistance and guidance for construction of pump house and irrigation facilities 5) Provision of initial training of the pump operation 6) Provision of guidance for WUA establishment and management, such as WUA management, and financial management 7) Preparation of handing over documents	1) Construction of pump house and irrigation facilities under technical assistance of OIDA 2) Opening bank account in the name of WUA 3) Attending the training by OIDA 4) Preparation of by-law of WUA
2. Scheme Management Stage	
1) Provision of training of farming activities 2) Monitoring of performance of irrigation scheme 3) OIDA reserves the right to withdraw the pump and related equipment from WUA in any case described as below: - No cultivation is made during two consecutive years after installation of the pump. - Unfairness is observed for use of pump - Unfairness is observed for land distribution - Unfairness is observed for irrigation water distribution. - Saving money for replacement of pump is not carried properly. - Unclearness or dishonesty is observed in the account book.	1) Operation and maintenance of the scheme, such as procurement and management of fuel, repair and maintenance of the pump, water distribution, maintenance of canals. 2) Saving money for replacement cost of the pump and PVC pipe 3) Keeping account records of WUA, income and expenditure 4) Keeping records of pump user's name, operation hours, and fuel procurement and consumption 5) Opening the account records to the member 6) Procurement of agricultural input, e.g. seed, fertilizer, pesticide 7) Marketing of agricultural products 8) Reporting irrigation performance regularly to OIDA 9) The farmers should not entrust the right of cultivation in their land to an outsider without consent of WUA committee. 10) The WUA should not resell or lease of the pump or equipment in any case. In such case happened, those should be compensated by WUA.

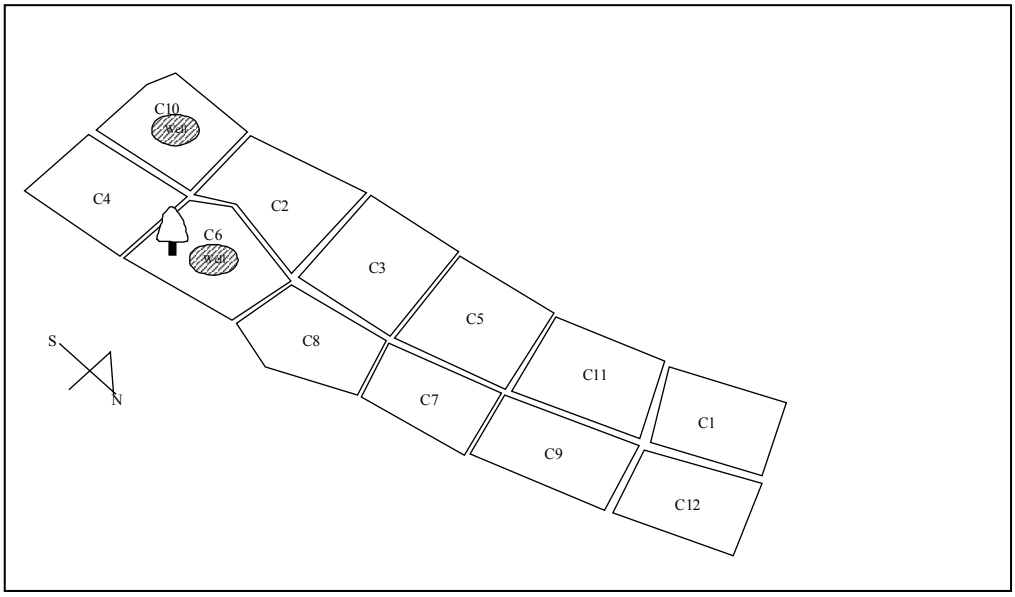


Sample of Proposed Layout (Lake Water)



SAMPLE

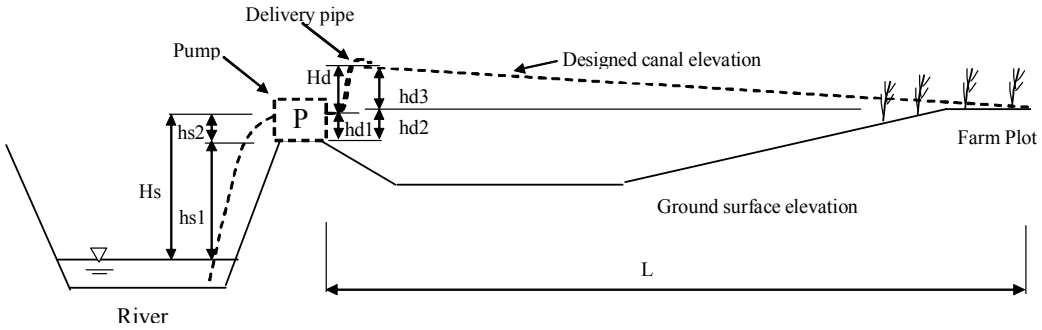




Sample of Proposed Layouts (Groundwater)

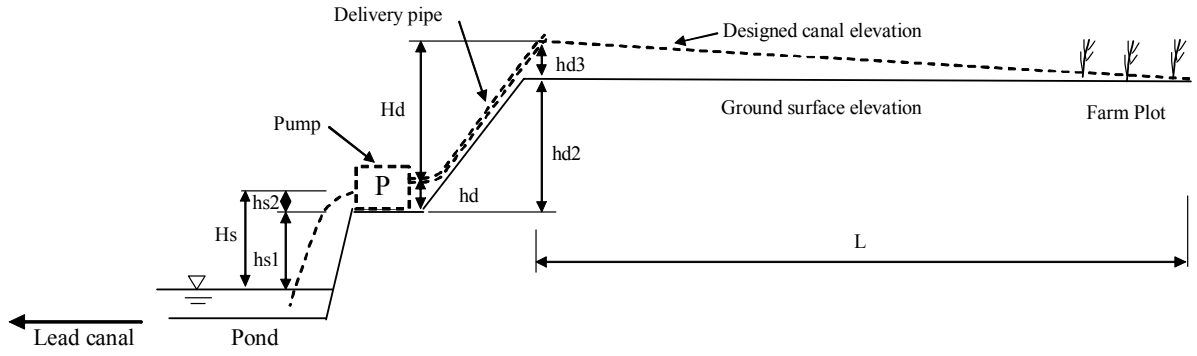
Field Survey Information

Water Resource : River



Mark	Description	Data	Remarks
1. Suction Head			
hs1	Water height	m	River bank EL. - Water EL.
hs2	Pump height	m	Pump inlet EL. - River bank EL.
Hs	Suction head	m	hs1 + hs2
2. Dellivery Head			
L	Canal length	m	
hd1	Pump height	m	Pump outlet EL. - River bank EL.
hd2	Difference elecvation	m	Farm plot EL. - River bank EL.
hd3	Designed canal height	m	L x 1/500 (Standard canal slope)
Hd	Delivery head	m	hd2 + hd3 - hd1

Water Resource : Lake

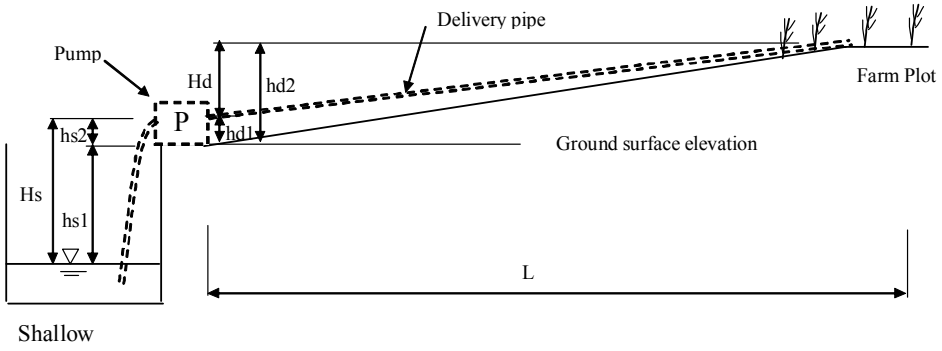


Mark	Description	Data	Remarks
1. Suction Head			
hs1	Water height	m	Pump house ground EL. - Water EL.
hs2	Pump height	m	Pump inlet EL. - Pump house ground EL.
Hs	Suction head	m	hs1 + hs2
2. Dellivery Head			
L	Canal length	m	
hd1	Pump height	m	Pump outlet EL. - Pump house ground EL.
hd2	Difference elecvation	m	Farm plot EL. - Canal BP ground EL.
hd3	Designed canal height	m	L x 1/500 (Standard canal slope)
Hd	Delivery head	m	hd2 + hd3 - hd1

Form 4-2(2/2)

Field Survey Information

Water Resource : Ground water



Mark	Description	Data	Remarks
1. Suction Head			
hs1	Water height	m	Pump set EL. - Water EL.
hs2	Pump height	m	Pump inlet EL. - Pump set EL.
Hs	Suction head	m	hs1 + hs2
2. Dellivery Head			
L	Pipe length	m	
hd1	Pump height	m	Pump outlet EL. - Pump set EL.
hd2	Difference elecvation	m	Farm plot EL. - Pump set EL.
Hd	Delivery head	m	hd2 - hd1

Form 4-3

Levelling Surveying Data Sheet

Site_____Observer _____Ins. Type _____Page

Description: Date: Weather:

Point	Chainage	B.S	H.I	I.F.S	F.S	Elevation	Remark

Form 4-4 (1/3)

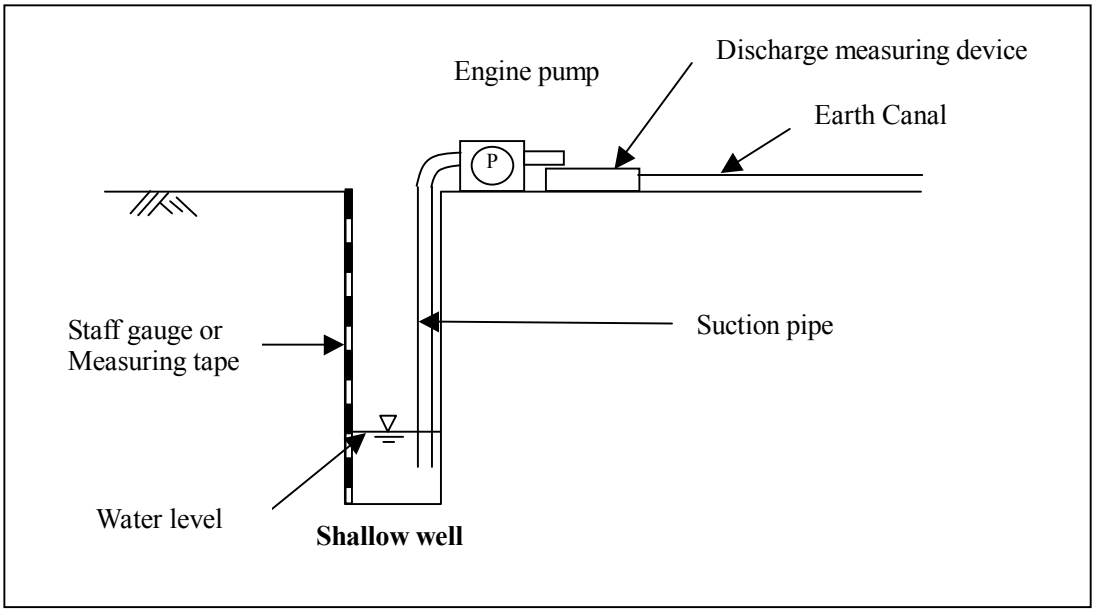
Program of Pumping Test for Groundwater

1. Objectives

The objective of pumping test is to check water yield in shallow well and feasibility of pump irrigation for 3 ha farm land. The test should be performed before starting PRA. This program is made in order to execute the pumping test smoothly and shows required items to be performed.

2. Methodology

(1) Explanation Figure



(2) Procedure

The continuous pumping test can be applied for shallow well. The test shall be conducted as following procedure.

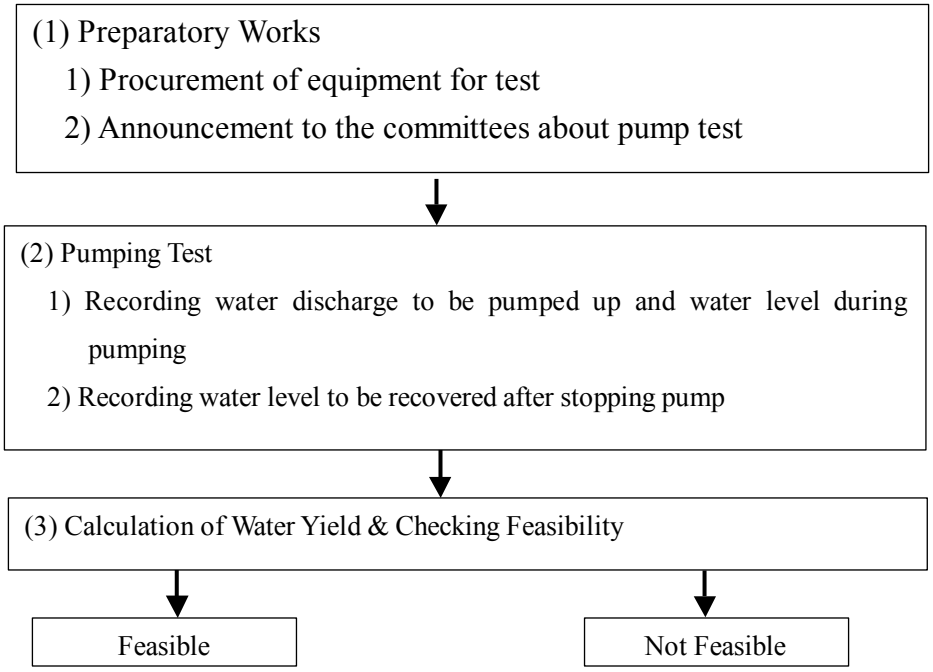
1) Water shall be continuously pumped up more than 2.0 hours.
2) During pumping up, water discharge and groundwater level shall be observed.
3) After 2.0 hours is passed, pump shall be stopped. Then water level to be recovered shall be observed.
4) Standard observing interval shall be followed as below.

Standard Observing Interval

Observation item	Elapsed time after pumping and stopping pump			
	0 - 5 min.	5 min - 30 min	30 min. - 1 hr.	After 1 hr.
1. Discharge	Two time (starting and ending)			
2. Water level	every 15 sec.	every 1 min.	every 5 min.	every 10 min.

5) For observation record "Observation Sheet" shall be used. This form is shown in attachment-1.

3. Work Flow



4. Preparatory Works

(1) Procurement of equipment for test

For implementing pumping test the following equipment is required.

Required equipment

No.	Equipment	Q'ty
1	Portable Diesel Engine Pump (around 10 HP)	1 no
2	Suction pipe	Length is depending on site situation
3	Delivery pipe	Length is depending on site situation
4	Staff gauge or measuring tape(50m)	1 no
5	Measuring device	1 no
6	Diesel	25 lit
7	Stopwatch	1 no

(2) Announcement to the community about pumping test

Implementation of pumping test shall be announced to the committees who own the shallow well, and the following issues shall be discussed.

1) Date of pump test
2) Availability of material and equipment at the site
3) Assistant persons (3) from community
4) Presence of existing canal

Form 4-4 Attachment-1

Observation Sheet for Pumping Test

Page

Site: Date Observer

Shallow well data Diameter m Depth m

Observation time	Elapsed time (min)	Interval (min)	Measuring device (m)	Water level (m)	Remark

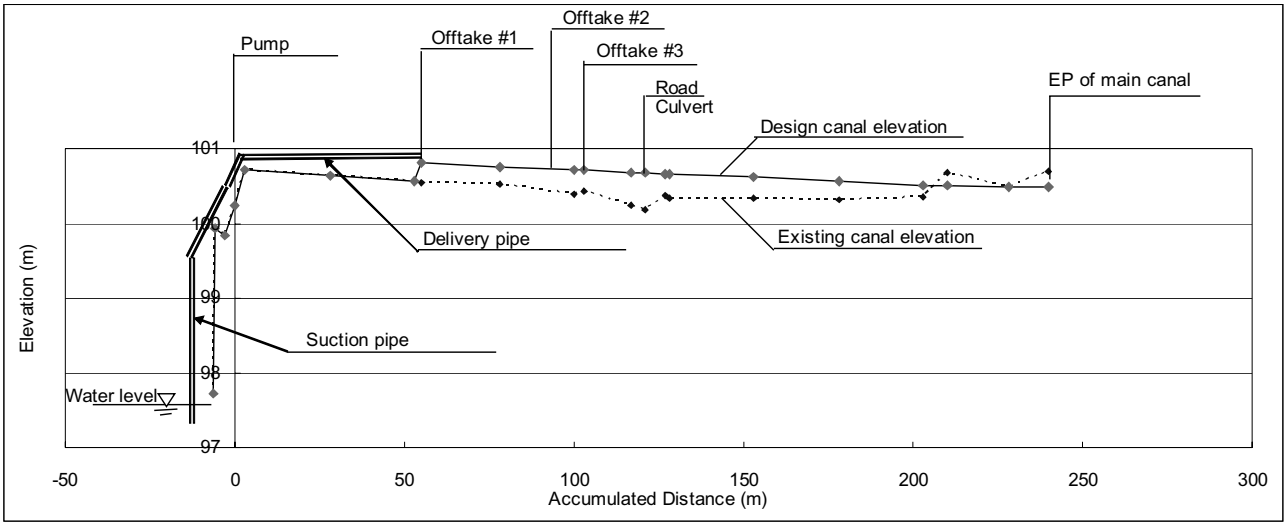
Form 4-5

Comparison between Earth Canal and Pipeline

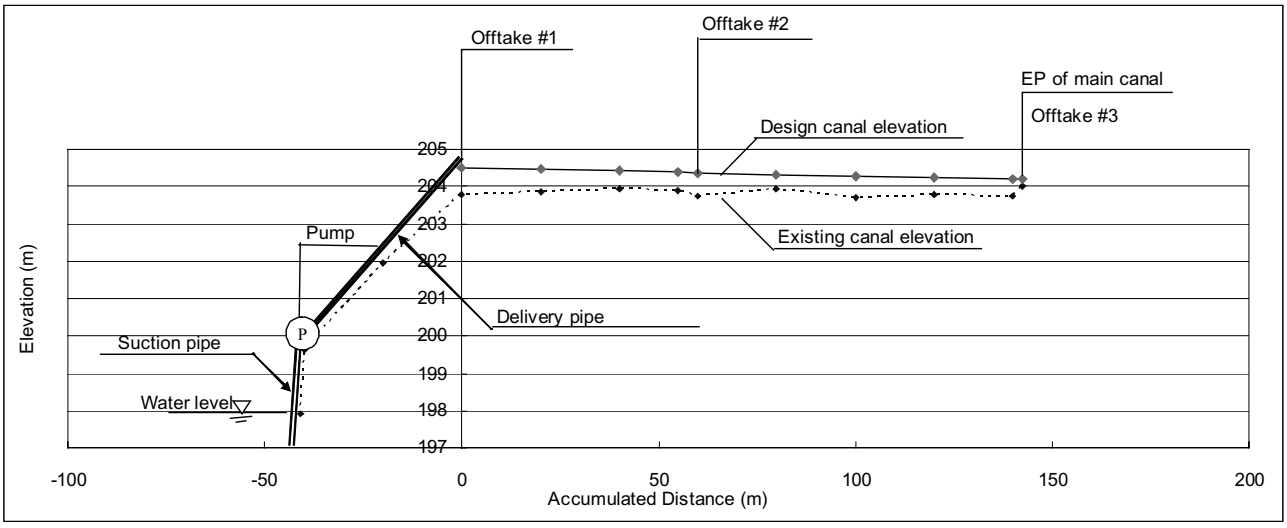
Description	Earth Canal	Pipeline
Technical Aspects	① Existing irrigation canals system can be re-used to the new system. ② Construction materials are available in the field. ③ Large extent of area should be reserved for irrigation canals. ④ There are considerable gaps between upstream and downstream farm plots in terms of fuel consumption and time for irrigation. ⑤ Canal route and commanding area could be restricted by topography. ⑥ Special attention shall be made for quality control for filling materials. ⑦ Current knowledge for open channel hydraulics can be applied to planning and design of schemes.	① Less conveyance loss than earth canal could lead to save fuel cost for operation. ② Procurement of the pipe shall be supported by OIDA because it is only available in Addis Ababa. ③ Intensive land use plan can be realized by the embedded pipeline system. ④ There is little gap between upstream and downstream farm plots in terms of fuel consumption and time for irrigation ⑤ Flexible canal alignment can be realized regardless of topographic condition of command areas. ⑥ It is possible to mitigate farmers' labor inputs during construction period. ⑦ It is necessary for the engineers to acquire knowledge of hydraulic calculation for pipeline.
Economic Aspects	① Construction cost is lower than pipeline unless the much volume of hauling earth materials are required ② High water seepage from canals may increase fuel cost for pump operation. ③ Maintenance cost is cheaper than pipeline system because most of the works will be carried out by manpower of WUA members. ④ In terms of total cost, consisting of construction and operation & maintenance, an earth canal has an advantage if total length of the canal is short and little soil transportation is required for filling materials.	① Construction cost is rather higher than open channel system except that total length of canal is long. ② Water conveyance loss is less than open channels, resulting in less fuel costs. ③ Operation & maintenance cost is higher than open channels due to saving for pipe replacement. ④ In terms of total cost, consisting of construction and operation & maintenance, pipeline system has an advantage except that total length of the canal is short and little soil transportation is required for filling materials.
Operation and Maintenance	① The farmers have an experience for construction and operation & maintenance of the canals.	① Guidance to WUA members is necessary for operation and maintenance of pipes.
Social Aspects	① Execution of land exchange and consolidation is prerequisite for efficient water management by WUA. ② Between OIDA and farmers, discussion and consensus is necessary for selection of borrow area ③ The gap between upstream and downstream will be unavoidable in terms of water discharge and time for irrigation.	① Execution of land exchange and consolidation is not needed strictly. ② Less attention is necessary for selecting borrow area ③ The gap between upstream and downstream can be mitigated in terms of water discharge and time for irrigation.

Form 4-6

SAMPLE

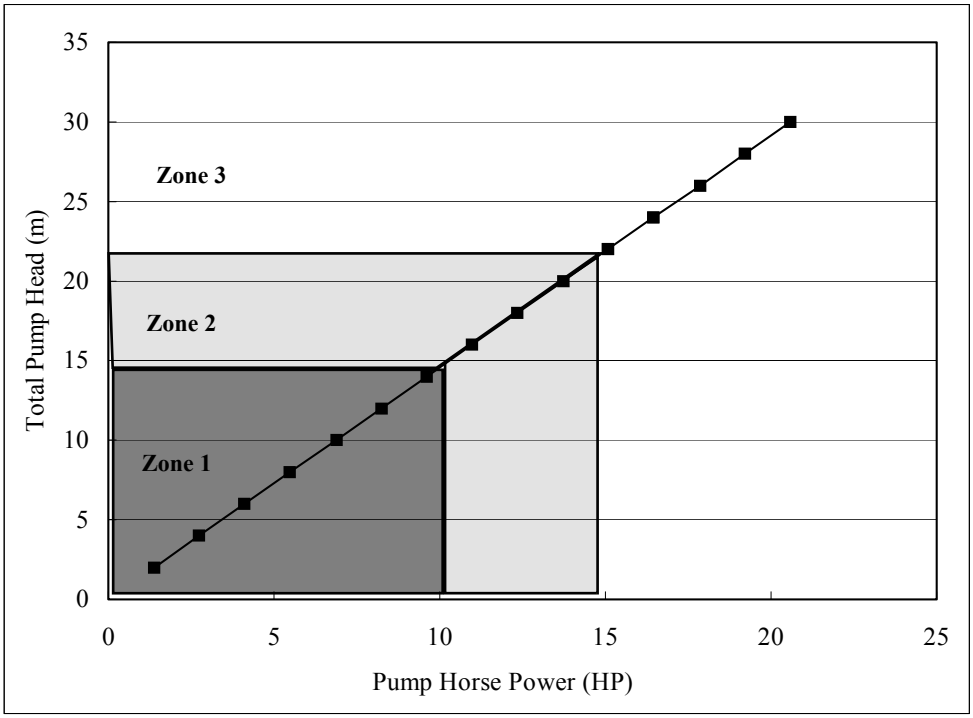


Sample 1 : Profile of Irrigation Canals



Sample 2 : Profile of Irrigation Canals

Command Area : 5 ha **Design Pump Discharge : 22 l/s**



Zone 1: Capacity of standard pump (10HP) is adequate for designed irrigation facilities.

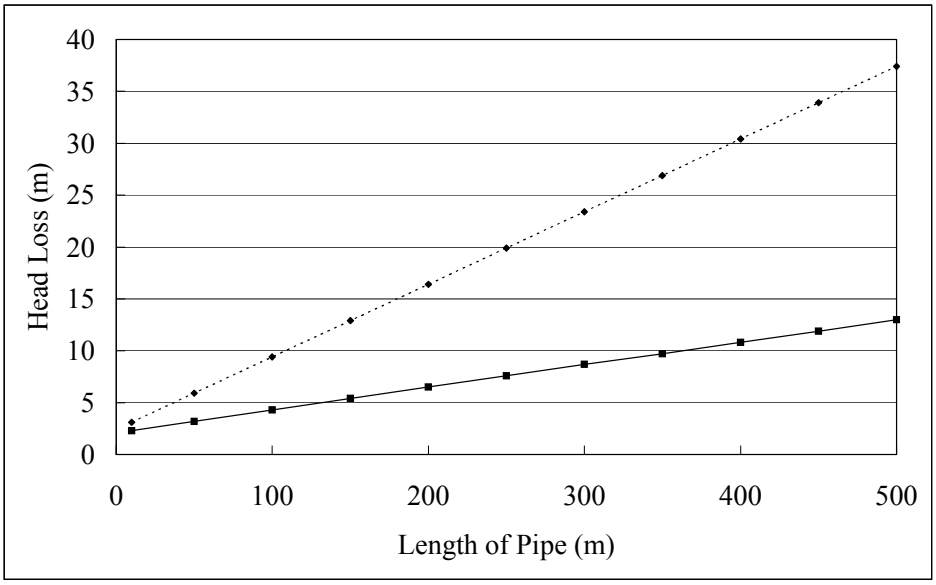
Zone 2: Design of irrigation facilities shall be reviewed, or it shall be explained to the farmers that pump discharge become smaller than designed discharge.

Zone 3: Total pump head is beyond capacity of standard pump. Design of irrigation facilities shall be revised.

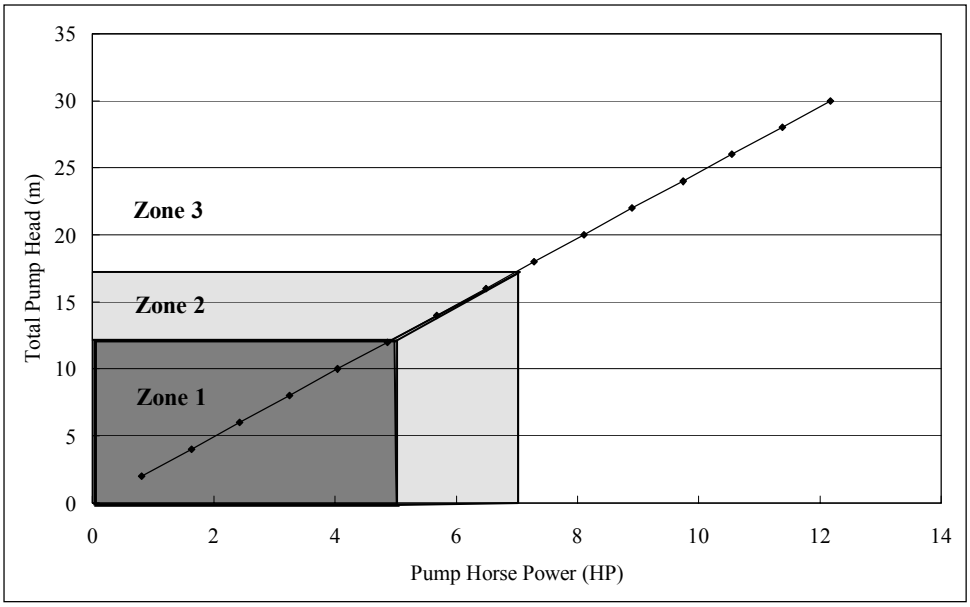
Total Pump Head = Actual Head + Head Loss

Actual Head = Actual Suction Head and Actual Delivery Head

The relation between head loss and pipe length and diameter is shown in the following figure.



Command Area : 3 ha **Design Pump Discharge : 13 l/s**



Relation between Pump Horse Power and Total Pump Head

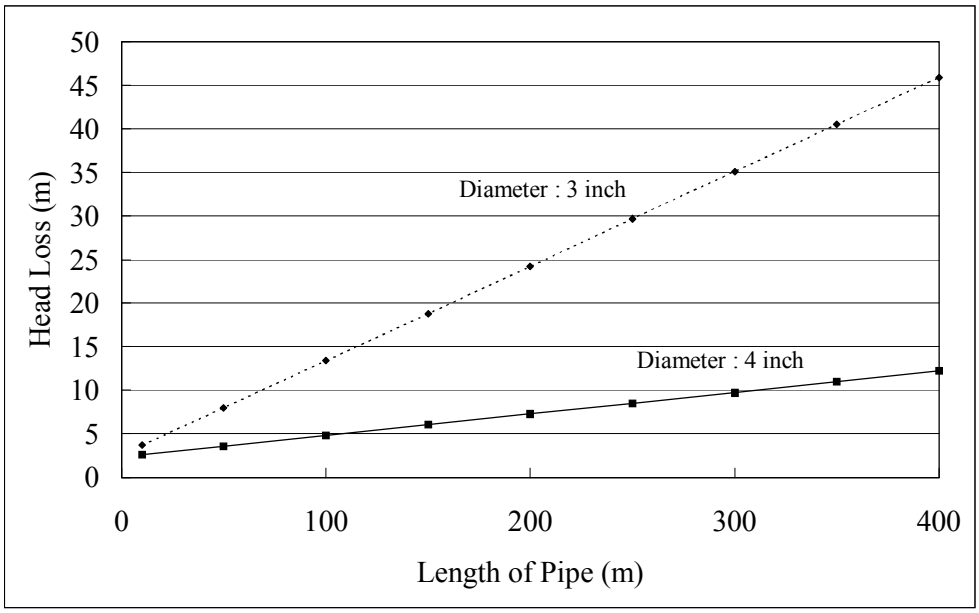
Zone 1: Capacity of standard pump (5HP) is adequate for designed irrigation facilities.

Zone 2: Design of irrigation facilities shall be reviewed, or it shall be explained to the farmers that pump discharge become smaller than designed discharge.

Zone 3: Total pump head is beyond capacity of standard pump. Design of irrigation facilities shall be revised.

Total Pump Head	**= Actual Head + Head Loss**
Actual Head	**= Actual Suction Head and Actual Delivery Head**

The relation between head loss and pipe length and diameter is shown in the following figure.



Relation between Pipe Length and Head Loss

Form 4-8

Total Pump Head Caluculation Sheet

SAMPLE

Site: Tuchi Dembel

Description	Mark	Unit	Input	Output	Remarks
1. Discharge					
(1) Discharge(lit/s)	q	l/s	22		
(2) Discharge(lit/min)	q1	l/min	1,320		
(3) Discharge(m^3/s)	Q	m^3/s	0.022		
(4) Discharge(m^3/min)	Q1	m^3/min	1.320		
2. Pipe size determination					
2.1 Suction pipe					
Standard verosity	V_{s0}	m/s	2.000		
Caluculated diameter	D_{s0}	m		0.118	=(4Q/vs･π)^(1/2)
Actual diameter	D_s	m	0.100		from pump specification
Verosiry	Vs	m/s		2.801	=4Q/π･Ds^2
2.2 Delivery pipe					
Diameter	Dd	m	0.100		from pump specification
Verosity	Vd	m		2.801	=4Q/π･Dd^2
3. Pump head determination					
3.1 Total suction head					
(1) Actual suction lift head	has	m	2.500		from survey result
(2) Friction loss in suction pipe					
Suction verosity head	hvs	m		0.400	=Vs^2/2g
Suction pipe length	Ls		6.000		
effective roughness size	k	m	0.00005		Steel pipe
Friction loss cofficient	f			0.017	=1/(1.14+2log(Ds/k))^2
Friction loss in suction pipe	hfs	m		0.408	=fLsVs^2/2gDs
(3) Head loss on fittings of suction pipe					
a)Foot valve with strainer	k		1.80		
Head loss of valve	hfst	m		0.720	=k･hvs
b)Bend loss	k		0.60		
Head loss of bend	hfb	m		0.240	=k･hvs
c)Entrance loss	k		0.45		
Head loss of entrance	hfe	m		0.180	=k･hvs
(4) Total suction head	Hs	m		4.448	=has+hvs+hfs+hfst+hfb+hfe
3.2 Available NPSH					
(1) Available NPSH					
Atomosphere pressure	P	m	8.470		at 1600m
Static suction head		m		-2.500	
Vapor pressure		m	-0.360		at 26℃
Suction loss		m		-1.548	
Energy head		m		-0.400	
Theoretical available NPSH	hsv	m		3.662	
Safety Margin		m	-0.500		
Available NPSH		m		3.162	
(2) Required NPSH					
Rotational speed	n	min-1	2,700		determined from pump specification
Suction specific speed	S0		1,400		
Required NPSH	Hsvo	m		2.889	=(n･Q1^0.5/S0)^4/3
(3) Judgement				OK	NPSHA>NPSHR
3.3 Total delivery head					
(1) Actual delivery lift head	had	m	5.500		from survey result
(2) Friction loss in delivery pipe					
Delivery velocity head	hvd	m		0.4	=Vd^2/2g
Delivery pipe length	Ld	m	40.0		
effective roughness size	k	m	0.00005		Steel pipe
Friction loss cofficient	f			0.017	=1/(1.14+2log(Dd/k))^2
Friction loss in delivery pipe	hfd	m		2.722	=fLdVd^2/2gDd
(3) Head loss on fittings of delivery pipe					
a)Bend loss	k		0.60		
Head loss of bend	hfb	m		0.240	=k･hvd
b)Exit loss	k		0.45		
Head loss of exit	hfe	m		0.180	=k･hvd
c)Joint loss	k		0.03		
Number of joint	n			6.667	=Ld/6
Head loss of exit	hfj	m		0.080	=k･hvd
(4) Total delivery head	Hd	m		9.122	=had+hvd+hfd+hfb+hfe+hfj
3.4 Total head	H	m		13.570	=Hs+Hd
Say	H	m		**14.000**	

Form 4-9

Pump Power Requirement Caluculation Sheet

SAMPLE

Site: Tuchi Dembel

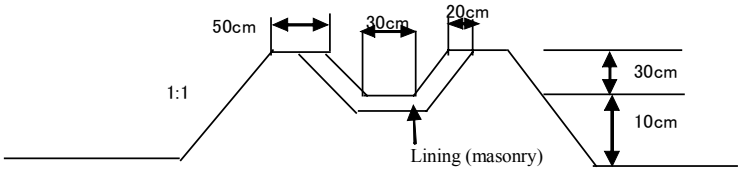
Description	Mark	Unit	Input	Output	Remarks
1. Total pump head	H	m	14.000		
2. Discharge					
(1) Discharge(lit/s)	q	l/s	22		
(2) Discharge(lit/min)	q1	l/min	1320		
(3) Discharge(m3/s)	Q	m^3/s	0.022		
(4) Discharge(m3/min)	Q1	m^3/min	1.320		
3. Power requirement					
3.1 Water horse power					
Water density	p	kg/m^3	1000		
Water horse power(kW)	W.H.P	kW		3.02	=pgQH/1000
Water horse power(HP)	W.H.P	HP		4.05	0.746kW=1HP
3.2 Shift horse power					
Pump efficiency	ηp	%	65		
Shift horse power	S.H.P	HP		6.23	=W.H.P/ηp
3.3 Brake horse power					
Motor efficiency	ηg	%	90		
Brake horse power	B.H.P	HP		6.92	=S.H.P/ηg
3.4 Actual brake horse power					
(1) De-rate engine horse power					
a) De-rating 1% for each 100m above sea level					
Elevation	EL	m	1600		
De-rate	dr1	%		16	=EL/100*1%
b) De-rating 1% for each 5℃ above 15℃					
Average temperature	T	℃	25		
De-rate	dr2	%		2	=(T-15)/5*1%
c) De-rate for continuous load operation	dr3	%		10	10hour operation
(2) Total de-rate	dr	%		28	=dr1+dr2+dr3
(3) Actual brake horse power	A-BHP	HP		9.61	=B.H.P/(1-df)
Say.		HP		**10.00**	

Form 4-10

Work Quantity Calculation Sheet

Work	Main Canal (Proposed Canal 0+110 - 0+240)

SAMPLE



Sta. 0+110-0+240
Proposed Canal

Activities	Spec.	Formula	Quantity
Filling	0+110-0+240	(1.9*2+0.4*2)*0.4/2	0.92 m2
	Canal Portion	(0.4+1.3)*0.5/2	0.425 m2
	Refilling	(0.92-0.425)*130/2	32.18 m3
Massonry	0+110-0+240	0.2*(0.3+0.3*1.4*2)*130	29.64 m3
Plastering	0+110-0+240	(0.3+0.3*1.4*2)*130	148.2 m2

Form 4-11

Bill of Quantity

SAMPLE

Site:

Activities	Unit	Quantity	Unit Rate (Birr)	Total (Birr)	Remark
1. Main Canal (Existing)					
1.1 Compaction Filling	m3	0	20	0	
1.2 Massonry	m3	26	300	7,800	
1.3 Plastering	m2	126	25	3,150	
2. Main Canal (Proposed)					
2.1 Compaction Filling	m3	33	20	660	
2.2 Massonry	m3	0	300	0	
2.3 Plastering	m2	0	25	0	
3. Secondary Canal					
3.1 Compaction Filling	m3	232	20	4,640	
4. Turnout & Outlet					
4.1 Excavation	m3	12	15	180	3m3 x 4nos
4.2 Massonry	m3	8	300	2,400	2m3 x 4nos
4.3 Compaction Filling	m3	4	20	80	1m3 x 4nos
5. Culvert					
5.1 Concrete Pipe	pcs	6	200	1,200	1m x 6pcs
5.2 Road Filling	m3	32	20	640	2m3 x 8m x 2
5.3 Massonry	m3	2	300	600	2m3x 1no
6. Pump house	L.S.	1	4,500	4,500	
7. Soil & Material Transportation					
7.1 Dump Track	day	5	2,000	10,000	50m3/day
7.2 Wheel Loader	day	2	2,000	4,000	50m3/day
8. Diesel Engine Pump (12.5 HP	set	1	40,000	40,000	with accessarry
Total				79,850	

Form 5-1

AGREEMENT

FOR

IMPLEMENTATION OF COMMINITY-BASED

SMALL-SCALE PUMP IRRIGATION PROJECT

_____, 19

between

Oromia Irrigation Development Authority (OIDA)

and

_____ Water Users' Association

AGREEMENT

Implementation of Community-based Small-scale Pump Irrigation Project

This *AGREEMENT ON* **Implementation of Community-based Small-scale Pump Irrigation Project** (hereinafter referred to as ***WORK***) is made between Oromia Irrigation Development Authority (hereinafter referred to as ***OIDA***) and _____ Water Uers' Association (hereinafter referred to as ***WUA***) on the date of _____, 199__ (_____, 200__). The terms and conditions set for performance of the WORK are as follows:

WITNESS

Whereas:

1. Both OIDA and WUA shall undertake the WORK complying with the "Condition of Agreement" attached herewith.

2. Both OIDA and WUA agree to the terms and conditions in respect to the WORK as specified hereunder.

(i) The following documents are considered as a part of this agreement, viz.:

(a) The General Conditions of the Agreement, and
(b) List of Applicants with their Signatures

(ii) The Contract shall be effective on the date the agreement is signed by the OIDA and the WUA.

Both OIDA and WUA agreed in witness hereof, and the Agreement is being effective on the date of _____, 199__ (_____, 200__) through signing of the authorised representatives.

Signature of OIDA	Signature of WUA
_____	_____
Mr. Oromia Irrigation Development Authority. (OIDA)	Mr. Representative of _____ Users' Association

Implementation of Community-based Small-scale Pump Irrigation Project

General Condition of Agreement

1. Obligations of OIDA

1.1 OIDA is responsible for:

- Procurement and installation of a small pump of some ___**HP** for irrigation with spare parts;
- Procurement of necessary materials, equipments, and skilled labor for construction of pump house and irrigation facilities;
- Provision of technical assistance and guidance for construction of pump house and irrigation facilities;
- Provision of initial training of the pump operation;
- Provision of guidance for WUA establishment and management, such as water management, financial management;
- Preparation of handing over documents;
- Provision of training of farming activities;
- Monitoring of performance of irrigation scheme.

2. Obligations of WUA

2.1 WUA is responsible for:

- Selection of committee members, such as leader, secretary, accountant, and auditor, and other committee members required;
- Selection of pump operators;
- Coordination of irrigation farming land size of **0.25 ha** per each member;
- Conducting land exchange among farmers so that every member can make benefit equally with irrigated farming;
- Construction of a pump house and irrigation facilities under technical assistance of OIDA;
- Attending the trainings by OIDA;
- Preparation of by-law;
- Operation and maintenance of the scheme, such as procurement and management of fuel, repair and maintenance of the pump, water distribution, maintenance of canals;
- Opening bank account for communal money saving;
- Saving money for replacement cost of the pump and PVC pipes;
- Keeping account records of WUA, income and expenditure;
- Keeping records of pump user's name, operation hours, and fuel procurement and consumption
- Opening the account records to the member
- Procurement of agricultural input, e.g. seed, fertilizer, pesticide;
- Marketing of agricultural products
- Reporting irrigation performance regularly to OIDA

3 Cautions

3.1 The performance of irrigation scheme shall be monitored regularly by WUA and OIDA, especially in financial status of the scheme.

3.2 If, in the opinion of OIDA, WUA shows that he is unable to perform the Works due to any following reason, OIDA reserves the right to withdraw the pump from community:

- No cultivation is made during two consecutive years after installation of the pump,
- Unfairness is observed for use of pump,
- Unfairness is observed for irrigation water distribution,
- Unfairness is observed for land consolidation and exchange,
- Saving money for depreciation reserve is not carried out properly, and
- Unclearness or dishonesty is observed in the account book.

3.3 The farmers should not entrust the right of cultivation in their land to an outsider without consent of WUA committee.

3.4 The WUA should not resell or lease of the pump or equipment in any case. In such case happened, those should be compensated by the WUA. The act will be illegal and accused.

3.5 The WUA shall not transfer the Work or the benefits or obligations to any other person.

4 Construction

4.1 The schedule of procurement and installation of the pump shall be decided by OIDA taking into consideration progress of the construction works.

4.2 The work quantity and specification for construction of irrigation canal and related structures, if any, shall be specified in other documents.

4.3 The amount or labor wage rate for participation in the construction works shall also be specified in other documents

4.4 The time of completion for construction of irrigation canals and related structures, if any, shall be specified in other documents.

5. Others

5.1 If there are some issues, which are not specified in the agreement, it shall be settled by mutual discussion between both parties.

5.2 If any dispute shall arise between OIDA and WUA in connection with the agreement, it shall be settled by mutual discussion between both parties.

Form 5-2

Naannoo Oromiyaatti
Qorannoo pirojakktii Jallisii fi Misooma Baadiyya Maqii
Waligaltee ijaarsa Jallisii paampii xixiqaa ummataan
Bulan.

Waligalteen kun kan taasifame
Abbaa Taayitaa Misooma Jallisii Oromiyaa fi
WIBJ _____ Giddutti.

_____199__

WALII GAITEE

Naanno oromiyaatti, qoranno projektii jallisii fi misooma baadiyyaa maqii keessatti, projektii Jallisii paampii xixiqaa unmataan bulan ijaaru.

Walii galteen kun ijaarsa projektii jallisii paampii xixiqaa ummataan bulan, kanaan boodatti hojii pirojektii jedhamani kan fudhataman Abbaa Taayitaa Misooma Jallisii Oromiyaa (ATMJO) fi WIBJ _____ giddutti _____ bara 199__ godhamee jira.

Haali fi sagantaan hojii ijaarsaa akka armaan gadii ta'a.

Haala waligalaa

1. A.T.M.J. fi WIBJ hojii kann kan raawatan “haaluma wallgaltee” mallataa’ee kana irratti hundaa’udhan ni ta’a.
2. A.T.M.J. fi WIBJ Lameenu haalaa fi saganta hojii armaan gaditti tuqamaniin waliigalani jiru.
    i) Haalli asii gadditti ibsamanii fi dikumeentiin kantti qabate akka qaama waliigalteetti fudhataman:
        (a) Haali dokumeentii waliigalaa irratti ibsame
        (b) Maqaa itti fayyadamtoota mallattoo wajjin
    ii) Waligalteen kun hojiirra kan oolu guyyaa A.T.M.J.O. fi WIBJ mallateesan irraa kaase ta’a.

Kan kenee A.T.M.J.O. Maqaa B/B	Kan fudhate W.I.B.J _____ Maqaa Dura ta’a fi malattoo
_____	_____
Malattoo	Maqaa Barreesaa fi malattoo
_____	_____
Guyyaa	Maqaa to’ataa koree fo malato
_____	_____

Tajabtoota

Maqaa	Bakka hojii
1. _____	_____
2. _____	_____
3. _____	_____

Itti Gaafatamummaa A.T.M.J.O/ JICA/ fi Garee Ittifayadamtootaa

1. ATMJO /JICA/

1-1. Paampii huumanii isaa HP ta'e bitee dhiyeesuu fi dhaabuu.

1-2. Baasii ijaarssa mana pampi tiif barbaachisu kennuu.

1-3. Baasii leenjii operetera pampii dandaa'uu (yeroo duraa tiif qofa)

1-4. Qajeelfama woldaan Itti. Fayadamtoota Bishaanii /WIBJ/ itti dhaabatuu fi ittiin, bulu kkf. Haala bulchiinssa fi itti fayadama bishaanii, bulchiinssa maallaqaa, toftaalee qonnaa fi gabaayaa fi kkf. Qophesee dhiyeesuu.

1-5. Ijaarsa bo'oo jallisii fi kkf gaggeesu, hordofu fi to'achu .

1-6. Raawwii hojii misooma jallisii yeroo yerodhan too' achuu, qajelfama barbaachisu kennuu fi kkf.dha.

2. Ittigaafatamummaa W.I.B.J.

2-1. Dura taa'aa koree isaani, Barreesa,hojjata herreegaa fi to'ata filachu.

2-2. Oporeetara paampii filachuu.

2-3. Baldhinna lafa jallisiin misoomuu, mataa-mataa ittifayyadamtootaatiin gara ha. 0.25 hirachuu.

2-4. Lafa jallisiin misoomuu irraa akka qoteebulaan hundinuu walqixxedhan akka fayyadamuu danda'amutti waljiijjiira lafa raawachu.

2-5. Booyii Jalljisicha qotu, ijaaru fi qopheesu.

2-6 Meeshaalee mana paampii ijaaruuf barbaachisu kan naannoo sanitti argamuu danda'an dheyeesuu fi mana paampii ijaaruuf humnaan gargaaruu.

2-7. Meeshaa harkaa kan akka akaafaa, doomaa yeroo ijaarsatti dhiyeefachuu.

2-8. Hojii oporeeshiniif suphaa pirojakkticha hunda danda'ee adeemsisuu, FK

-bittaa fi seera ittifayyadama boba'a.
-Suphaa fi bakka bu'insa "spare partii" adda addaa kan paampii
-Bishaan seeran walii hiruu.
-Bo'oo qulquleesuu fi kkf.

2-9. Lakkoofsa Herreega Baankii banachu.

2-10. Qarshii paampiin yoo dulloome ittiin bakka buufatan kuufachu.

2-11. Galii fi Baasii W.I.B. iiaalchise odeefannoo fi galmee gaya qabachu

2-12. Baay'ina bittaa fi ittifayyadama boba'a irriatti odeefanoo fi galmee gahaa qabachuu.

2-13. Gabaasa herreega Baankii isaani yeroo yeroon miseensotaf ibsuu.

2-14. Sanyii filatama, xaa'oo, qorichaa fi kkf. qonnaa isaani tiif bitanii dhiyeesu.

2-15. Yeroo murtayetti A.T.M.J.O tti gabaasa dhiyeesu.

2-16. Gatii human namaa fi kan yeroo ijaarsaa hirmaanaa ummataatti shaalagame gara ATMJO tiin kan kanfalamu Baank tti kuufachu fi akka ka'umsa kaapitaala godhachudhan naanefatani itti fayyadamu.

2-17. Seera ittin bulmaata pirojakkticha kan keessaa baafachuu fi hojii irra oolchu fi kkf.dha.

2-18.Waa'ee gabaa calla qonna jallisii irraa argamuu hordofuu xinxaluu fi murteesuu.

3. Akeekkachiisa

3-1 Qabeenyi faayinaansi fi hojiin misooma jallisii ATMJO dhan ni to'atama.

3-2 ATMJOn dhimmoota asii gaditti dhiyaatan kana irratti hundaayudhaan paampii isaa deebisee fudhachuudhaaf mirga qaba.

3-2-1. Yoo qarshiin paampiin dulloome ittin bakka bu'u seeraan hin qusatamne ykn hin kuufatamne ta'e.

3-2-2. Paampiin kennamee waggoota walitti aanu lamaaniif hojii irra haala gaariin kan hin oole yoo ta'e.

3-2-3. Lakk. Heerrega baankii isaanii irratti qulqullinni yoo dhabame, ykn malaa-maltummaan adda addaa yoo hojjetame.

3-2-4 Itti fayyadama fi qabeenya lafaa irratti rakkoon gara WIBJ kanaattin hiikamu kan hin dandeenye yoo ta'e

3-3 Itti fayyadamtoni /miseensonni/ walii galtee WIBJ alatti lafa jallisii isaani namoota alaa dhufatiif kireessuu hin danda'an.

3-4 WIBJ paampii kana haaluma kamiinuu gurguruu fi kiraa kennachu hin danda'u yoo godhee argamee seeratti dhiyaatee adabama.

3-5 WIBJ bu'aa fi diraqama walii galtee kanaa nama biraa tiif dabarsuu hin danda'u

4. Ijaarsaa

4-1 Haalaa daeemsa ijaarsa irratti hundaa'uun yeroon bittaa fi dhaabuu paampii A.T.M.J.O. tiin murtaawa.

4-2 Baay'ina hojii fi gosni hojii jallisii jechuun qonna bo'oo kkf yoo jiraatan waligatee biraa keesatti ni dhiyaata.

4-3 Gatiin human namaa kan hirmaanaa ummata kan ijaarsa keessatti barbaachisu dokumeenti biraa keessatti ni dhiyaata.

4-4 Yeroon jalqaba fi xumura ijaarsa jallisicha dokumeenti biraa keessatti ni qophaa'aa.

5. Kan biraa

5-1 Walii galtee kana keessatti wanti hin gale yoo jiraate, marii qaamolee lamaanitti ni hiikama.

5-2 Walii galte kanaan wal qabatee rakkooleen ATMJO fi WIBJ gidduutti yoo uumame marii qaamolee lameenittin furmani ni kennamaaf.

ATTACHMENT 1:

FINALIZED LIST OF APPLICANTS FOR WUA MEMBERSHIP

Guyyaa _____

Waajila Misooma Bishaan Jallisii Aanaa _____ tiif
Maqii

Dhimmii:- Waayee xalayaa deegarssaa barreesuu ilaalchiisa.

Akkuma armmann oliitii ibssuuf yaalameeti namoonnii _____ misooma bishaan jallisiitiin fayadamanii jaarmiiyaa OIDA jedhamuun gargaaramanii misoomssuu akka dandaaniif jiraataa gandaa taluufii misooma irraatii akka bobbaanu xalayaan deegarssaa nuuf baaraa'u jedhanii iyyannoo isaanii quyyaa _____ waajira keenyaatii iyaatanii jiru.

Nutiis iyyannoo isaanii xiinzall'ee ilaallee iyyattoonnii jiratoota ganda kenyaa ta'uu isaanii waan mirkaneesiineef misoomatii bobba'anii hajachuu ni-danda'u jechuun ni beeksiifnna

Nagaa Wajjin

Dura taa'aa ganda qolbulaa
_____

Guyyaa _____

Waajjira Bulchisaa ganda qotabulaa _____

_____

Iyyattoonnii 1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

Yootaanu teesson keenya _____

Dhimmii iyyannoo keenyaa arimmaan gadiitii barreefamee argama nuiyyattoonnii jechaaniis namoonnii 20 kanaan duratii guyyaa bara 199___ waajjira misooma jallis Aanaa _____ tiin gargaaramnee misoomssuu akka dandeenyu_____ fi _____ malee jiraataa ganda kaanaa ta'uu keenyaa fi hojachuu akka dandeenyu iyyannoo keeny galfannu isiiniis xalayaa deegarssaa nuuf barreesitan jarmiyaa nugargaaru (OIDA).

ATTACHMENT 2:
AGREEMENT ON LAND EXCHANGE
BY INDIVIDUAL HOUSEHOLDS CONCERNED
WITH OFFICIAL ACKNOWLEDGEMENT OF PEASANT ASSOCIATION

Guyyaa _____

Waajjira Misooma Bishaan jalliisii Aanaa _____ tiif
Maqii

Dhimmii:- Waa'e xalayaa deegarssaa barreessuu ilaala

Akkuma armmaan Oliitii ibssnuuf yaalameetii

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____

_____tiif lafa jijiirradhaan walii mallateessanii waajjira keenyaatii milleettan isaanii nubiiraatii waan argmuff miseenssa missooma bishaan jallisii ganda qotebulaa _____ naanoo _____ ta'anii yemmuu misomaa irraatii boba'anii hojatan rakkiinnii hinjiru jechuudhaan ni yaadachiifan.

Nagaa Wajjin

Dura taa'aa ganda qlbulaa
_____

ቀን_____ዓ/ም

መሬትን ለሌላ ሰው አሳልፎ የመስጠት ውል

ሀ/ የእርሻ መሬትን ለሌላ ሰው አሳልፎ የመስጠት የውል ስምምነት

ስም_____ሲሆን አድራሻዬ _____

ለ/ የእርሻ መሬት ለሌላ ሰው አሳልፎ የመስጠት የውል ስምምነት ተቀባይ

ስም_____አድራሻ _____

1/ እኔ ውል ስም _____በዚሁ በ_____
ቀበሌ ገ/ማህበር ካለኝ የግል ይዞታዬ ውስጥ_____ቀርጥ በሜትር _____
በ_____ የሆነውን

በሰሜን፡ _____

በደቡብ፡ _____

በምስራቅ፡ _____

በምዕራብ፡_____የሚያዋስነውን ለ_____
በዛሬ ቀን ማለትም _____ ዓ/ም ያለምንም አስገዳጅነት በራሴ ፍላጎት የሰጠሁኝ ሲሆን ይህንን መሬት አስመልክቶ ሌላ ወገን ተከራካሪ ቢመጣ ተጠያቂው እኔ እራሴ ነኝ ስል በፊርማዬ አረጋግጣለሁኝ።

2/ እኔም የእርሻ መሬት በስጦታ ተቀባይ _____ ከዚህ በላይ በፅሑፍ የተጠቀሰውን ሀሳብ ሙሉ በሙሉ ተቀብዬ መሬቱን የተረከበኩኝ ለመሆኔ በፊርማዬ አረጋግጣለሁኝ

የስጦታው ዋና ዓላማ የኦሮሚያ መስኖ ልማት ባለሥልጣን (OIDA) አማካይነት ከጃይካ ጅርጅት በተሰጠን ሞተር እየታገዝን ልናለማ ስለሆነ ውላችንም የሚያቆየው የዚህ ድርጅት ህልውና እስከሚያበቃ ጊዜ ድረስ ነው ።

ውሉ ፍ/ብ/ህ/ቁ 1731-1764-2005 መሠረት በህግ ፊት የፀና ሆኖ ውል ያፈረሰ ለመንግስት ብር 500 /አምስት መቶ ተቀጥቶ በፍ/ብ/ህ/ቁ 2028 መሠረት ወጪና ኪሣራ ተከፍሎ ውሉ ውል ለፈረሰበት ወገን የፀና ይሆናል።

ውሉን ስንዋዋል የነበሩት ነባሪዎች

1/ _____

2/ _____

3/ _____

እኛም ነባሪዎች ሲዋዋሉ አይተናል ሰምተናል ስንል በፊርማችን እናረጋግጣለን

የውል ስም _____

የውል ተቀባይ _____

የነበሪዎች ፊርማ 1/ _____

2/ _____

3/ _____

ATTACHMENT 3:

MEASUREMENT-RESULT OF INDIVIDUAL PLOTS TO BE IRRIGATED

በ _____ ቀበሌ ገበሬ የ_____አካባቢ የ____ሰዎች በጃፓን ተራድኦ ድርጅት ሞተር ሊለማ የታቀደ መሬት ከነ ሥራቱ።

ተ ቁ	ቀን	ሥም ከነአባት	የመሬት ሥፋት በሜትር	መግለጫ
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

ATTACHMENT 4:

WUA MINUTES OF MEETING ON SELECTION OF EXECUTIVE MEMBERS

Guyyaa _____

Gaboo Yaa'ii

Qaboo yaa'ii filannoo koree hojii raawachiistu fi opireetaran waldan itti-fayadmtoota bishaan jallisii _____walgahiin guyyaa.
keessaa filannoon gaggefameraa.

1- Filnnoo koree hojii raawachiistuu waldiichaa haalumna arman gadiitti filatama jiiraa.

	Maqaa	Sagalee argntee	Hojii isaa
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

ta'aanii yeroo filatemen nanoota (miseensoota) _____ garuu sagalee gadii aaraa waan argataniin filanno aala ta'aanii jiiru.

2. Sadarkaa lamaffaan filanno opireetaraa paampii godhamee nanoonii (miseennoo) _____ akka armaan gadiitti filatamaniiru.

Maqaa		Gahee hojii
_____	_____	_____
_____	_____	_____

Ta'aanii miiseensootaan filatamudhaan waliigahiin kanaa filanno kanaa xumuramee jiira. Dabalataan missensoota walgahii kana irrtti argaman maqaa fi mallattoo isaan qaboo yaa'ii kana wajjiin fula _____ walqabsisnee jira.

Guyyaa _____

Lakk	Maqaa	Mallaattoo
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

ATTACHMENT 5:
WUA MINUTED OF MEETING ON
SELECTION OF SIGNATORY-MEMBERS
TO OPERATE BANK ACCOUNT

ቃለ ጉባኤ

ቀን _____

እለት _____

የስብሰባው ቦታ_____

በስብሰባው ላይ የተገኙት፡

1/ _____

2/ _____

3/ _____

4/ _____

5/ _____

ሂሳብ ሠራተኛ ሲሆኑ የእለቱ መነጋገሪያ ሃሳቦች /አጀንዳ/

1ኛ/ ስለ ባንክ ሂሳብ አንቀሳቃሽ 3/3 ሰዎችን መምረጥ ይሆናል፡፡

ውይይቱ በተራ ቁጥር የሰፈረው ሂሳብ አስመልክቶ ስብሰባው ከወረዳው መስኖ ልማት ጽ/ቤት በተሰጠው መመሪያ መሰረት እኛ የ_____መስኖ ተጠቃሚዎች ማህበር ከኮሚቴው ውስጥ ሶስት ሰዎችን መርጠን የባንክ ሂሳብ እንዲያንቀሳቅሱ በተለገጸው መሰረት በሚገባ ውይይት ካደረግን በኃላ፡

1ኛ/_____

2ኛ/_____

3ኛ/_____

ገንዘብ ያዥ ሆነው በሙሉ ድምጽ መርጠን የባንክ ሂሳባችንን እንዲያንቀሳቅሱ በሙሉ ድምጽ ወስነናል፡፡

Form 5-3

Misseernsota Waldaa Ltti Fayyadamtoota

Bishaan Jallissi _____

Lakk	Maqaa miseensota waldicha	Lafa qaban(ha)	Lafa Projektii kanaan misoomu (ha)	Mallatoo
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
Total				

Work Program and Schedule

Work Items	Year															
	Month															
	Week	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th
1. Signing of Agreement																
2. Construction of Pump House																
2.1 Procurement of Materials																
2.2 Construction Work																
3. Construction of Irrigation Canals																
3.1 Procurement of Materials																
3.2 Earth Work																
3.3 Lining Works																
3.4 Canal Structures																
3.5 Installation of Pipe																
4. Installation of Pump																
4.1 Procurement of Pump																
4.2 Installation of Pump																
5. Water Running Test																
6. WUA Training																
7. Handing-Over																

□ : Scheduled ■ : Actual

Farmers Attendance Sheet

from to

	Date															Total Days	Signature
		Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
	Total																

Prepared by _____

Checked by _____

Note: / : Half day
x: Full day
-: Absent

Form 6-2

Daily Labour Payment Sheet

from to

	Date															Total Days	Rate per day (Birr)	Amount (Birr)	Signature
		Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun				
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			
24																			
25																			
	Total																		

Prepared by _____

Checked by _____

Note: / : Half day
x: Full day
-: Absent

Form 6-3

Form 6-4

Weekly Working Records

WUA

Date		Description
	Monday	
	Tuesday	
	Wednesday	
	Thursday	
	Friday	
	Saturday	
	Sunday	

Prepared by: _____

Form 6-5

Irrigation Scheme Handing Over Certificate

- Project Name _____
- Location Aana _____ Zone _____ PA _____
- Funding Agency _____
- Construction by _____
- Construction Completed _____
- Total project cost _____

Handed Over by
OIDA side
Name

_____

Signature _____

Date _____

Received by
WUA side
Name of chair person

_____

Signature _____

Date _____

General Information about the Beneficiaries and Land Holding per Household.

No	Name	Sex	Age	Irrigation land owned in the scheme (ha)	Signature
	WUA Committee				
1					
2					
3					
4					
5					
6					
7					
	Beneficiaries				
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

The Existing Prevailing Situation

1. The current situation of land holding must be described (problems and solution to be mead)

_____

_____

_____

2. The scheme management system preferred by the beneficiaries is

"Simple Irrigation water users association"

3. Irrigation water distribution system

    1. As per irrigable land area per household ☐

    2. Equal distribution among the all beneficiaries ☐

4. Schemes expansion work in the future

_____

_____

_____

5. Available structures and systems

    5.1 Motor house _____

    5.2 Pump _____ HP _____ L/S

Duties and Responsibilities

A. Duties and Responsibilities of OIDA

1. Carry out major maintenance
2. Assist in extension and Water management
3. Co-ordinate community management.
4. Issue guidelines on land holding and irrigation water use.

B. Duties and Responsibilities of WUA

1. Carry out maintenance
2. Carry out canal clearing and scheme safety.
3. Implement by low.
4. Implement guidelines given by OIDA.
5. Purchase fuel and lubricants for pump.
6. Safe guard and maintain pump.
7. Create pump replacement fund from the beneficiaries and deposit on bank account

Wittiness

From Branch Office

1. From Extension and W. management Team.

   Name _____

   Signature _____

2. From Community mobilization team

   Name _____

   Signature _____

3. From Study and design team

   Name _____

   Signature _____

Observers

1. From Funding Agency

   Name _____

   Signature _____

2. From Aana Administration Office

   Name _____

   Signature _____

3. From PA

   Name _____

   Signature _____

Form 6-6

WARAQAA RAGAA WALHARKAAFUDHINSAA

PROJEEKTI _____

ABBA FUNDII _____

KAN IJAARE _____

GUYYA JALQABAME _____

GUYYAA XUUMURAME _____

GATII ITTIN HOJJETAME (QAR) _____

KAN KENNEE

ATMJO

MAQAA B/B ATMJO

_____

MALLATOO _____

GUYYAA _____

KAN FUDHAATE

WIBJ

MAQAA D/TA AA WIBJ

_____

MALLATOO _____

GUYYAA _____

Ragaa yeeroo walharkaa fudhinsa Skimmii

Lakk.	Maqaa	Sala	Uumnii	Balina lafaa Jallisi qabni	Malatto
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	**Koree WIBJ** **Missenssoota**				

Qabxii gurguddaa hubatame

1. Waa'ee ittifayadama lafaa (Haali qaveenya lafa amma jiru ha ibsamu)

   _____

   _____

   _____

   _____

   _____

   _____

2. Waa'ee Bulchinsa Skimmii Ilaalchise Murtini fi Filannoon Ummat ha ibsamu:

   Waldaa Itti fayyadamootani Bishaan Jallisiittin bulu dha.

3. Waa'ee ittifayadama Bishaani (Qodannoon bishaan jallisii haala walqixaaten ta'u ykn haala qabeenya lafaatin ta'u isaa ha ibsamu)

   _____

   _____

   _____

   _____

   _____

4. Gara fuldurratti fooyyesuuf babal'isuuf hojiileen yoo jiraatan ha ibsaman)

   _____

   _____

   _____

   _____

5. Ijaarsa ijaaramee xumuram

   5.1 Mana Motora _____

   5.2 Paampi Motora _____ HP _____ L/S

Imaanyota fi taajjabtoota
Walharkaa fuudhinsa Projektii

Immaanyota	Taajabtoota
1. Garee Eksteenshinii fi manaj.Bishaanii irraa. Maqaa _____ Mallattoo _____	1. Wajjira fundii kenne irraa Maqaa _____ Mallattoo _____
2. Garee Hirmaanaa Ummataa Maqaa _____ Mallattoo _____	2. Waajjira Bulchinsaa irraa Maqaa _____ Mallattoo _____
3. Garee Qorannoo fi Dizaayinii Maqaa _____ Mallattoo _____	3. Bulchinsa Araddaa Maqaa _____ Mallattoo _____

Itti Gaafatamumma Jajjaboo

A. Kan ATMAJO

1. Suphaa sadarkaa gurgudaa raawwachuu
2. Hojii Eksteenshinii fi manaajimentii bishaanii gaggeesuu
3. Hojii Hirmaanaa Uummataa qindeesuu, hordofuu fi jajjabeesuu
4. Qajeelfama itti fayyadama lafaa fi bishaanii yeroo barbaachisaa ta'etti kennuu.

B. Kan WIBJ

1. Suphaa saderkaa xixiqaa raawwachuu
2. Bo'oo ququleesuu fi staakcharoota hunda eegu.
3. Seera bulmaata WIBJ hojii irra oolchuu
4. Qajeelfama ATMJO irraa kennamu hojii irra Oolchuu.
5. Boba'aa fi laafisaa paampif barbaachisu bitachuu.
6. Paampi kunuunsuu, eegu suphisiisu fi haaromsuu.
7. Buusii bakka bu'iinsa paampi wali irra osoo hin-citin busuu dhan herreega Baankitti Olkaawachuu

Form 7–1

Sample By –law of IWUA

Art 1 Name of the scheme /Project _____

Art 2 Location:

Zone _____District / Aanaa_____

PA _____ Locality Name _____

Art 3 Number of Beneficiaries M_____ F _____ Total

Art 4 Size of the command area of the scheme _____ ha

Art 5 Irrigation system

☐ Diversion ☐ Pump ☐ Shallow Well ☐ Micro Dam

Art 6 Operating Boundary of IWUA

To the North: adjacent to Obbo /Addee_____

_____

_____

Land holding.

To the south: adjacent to Obbo / Adda_____

_____

_____

To the East: adjacent to Obbo / Adda _____

_____

_____

The West: adjacent to Obbo / Adda _____

_____

_____

Art 7 Objectives

- To use irrigation water commonly
- To solve the problem that can't be solved individually
- To carry out maintenance of irrigation scheme
- To build-up self-management and strength self reliance
- To increase production and productivity by using modern irrigation and there by improve the standard of the members.
- To use modern agricultural technology and inputs.
- To use pump as common wealth & take care of it.

Art 8 Duties

This IWUA has the following duties

a. Prepare water usage programs for members
b. Carry our scheme maintenance and conduct its management
c. Conduct new irrigation technologies
d. Purchase fuel and lubricants for the pump
e. Carry out pump maintenance
f. Establish replacement fund from for the pump and it on the bank account.
g. Pay salary for pump operator and guards
h. Give decision on marketing of the products together

Art 9 Legibility to be a member of IWUA

a. Who has got land from the command area
b. He / she has to be above 14 years of age
c. Who has participated in study and construction of the scheme.

Art 10 Right of the members

a. Has got the right to use irrigation water
b. Has got the right to elect or to be elected in different committees. But a member whose age is less than 18 years can't be elected.
c. Give ideas, comments and decision on the meetings.

Art 11 Obligation of the members

a. Respect the bye-law the rules, regulation and decisions of the general meeting and executives committee.

b. Every member should take care of the schemes and other properties of association.
c. Give service requested by the committee
d. Purchase fuel and lubricant for pump and pay salaries for operator and guards
e. Contribute money for pump replacement.
f. To obey the agreement on land distribution.

Art 12 General Assembly

a. The G.A is an assembly in which all members are presented during a meeting.
b. The G.A is the highest decision making.
c. There will be a G.A meeting twice a year, but in case of necessity an emergency meeting can be called.
d. In case of necessity 1/3rd of the total member can call an emergency meeting 30 before its effective date.
e. 15 days before G.A meeting, the agenda of the meeting shall be prepared and distributed for member.
f. If the quorum is not full the meeting will called in 15 days postponed and again the meeting will called in 15 days, If the quorum is not full again, the meeting will carried out by those who are present.
g. In case of a need for special decision making meeting, the quorum should not be less than 2/3 of the members.
h. One member has got only vote.
I. A member vote cannot be represented by any other member or outsider.
J Any decision of G.A meeting will be carried out based on the number of the votes counted on the meeting. If the votes have equal number the chairman vote will have the decisive vote.
k Dismiss member from association or allow to enter the association.
l Pass the right of land ownership to legal inheritors.

Art 13 Authority and Responsibility of G.A

A Elects or dismisses the executive committee.
B Elects or dismisses other committee.
C Evaluate the activities of association and make higher decisions.
D Solves the problems created among the members.
E Decides on the amount of contribution

Art 14 Executive committee (EC)

a. Number of EC will be _____
b. Their term of service is 2 years, but they can be elected again or dismissed and any time by G.A.
c. Member of EC shall give notice of 15 days before G.A meeting about his leaving out the committee.
d. EC carry out meeting when the number of the EC is 50%
e. Decision of EC carried out on the majority base of the vote. If both side votes are equal, the chairman vote will be the winner.

Art 15 Authority and Responsibility of EC

a. Prepares annual irrigation plan
b. Prepare irrigation water distribution program and control it's implementation.
c. Prepare schemes maintenance schedule and control it's implementation.
d. Produces and presents the rules and regulation of the association of irrigation water, disobey of laws, of not participate in maintenance activities.
e. Prepare report for G.A
f. Executes the decision and directives made by the GA
g. Checks whether the minutes of every meeting is properly filed.
h. Will create good relationship between members and IWUA and surrounding community, solves the problems happened.

Art 16 Authority and responsibility of chairman of IWUA chairman is elected by GA and will have the following authorities.

- Chairs the EC and GA meetings
- Plans and manage activates of IWUA.
  Follows up and creates good relationship between members and also between IWUA and surrounding community.
- Controls coordinated and organizes the works of sub-committees
- Will find out, searches and subjects new ideas toward the use of modern irrigation technologies and marketing management.
- Controls the common wealth of the IWUA, i.e. the use of money, materials and etc is controlled and monitored by chairperson, if these resources as used illegally by members or by him self or by any other from out side the member of IWUA will be responsible for the damages happened.
- Controls whether the minutes of EC and GA is recorded properly.

- ❋ Prepares report for GA
- ❋ Approve the expenses of IWUA.

Art 17 Authority and Responsibility of secretary of IWUA

The secretary of IWUA is elected GA and has the following authorities

- ❋ Keeps minutes of meetings of EC and GA
- ❋ Approves the expenses of IWUA.
- ❋ Gives the responses to letters and requests by writing letters.
- ❋ Administrates the office of IWUA
- ❋ Keeps documents, records and information about IWUA.
- ❋ Keeps IWUA's only cash receipts voucher.

Art 18. Authority and Responsibility of cashier of IWUA

The cashier of IWUA is elected by GA and has the following authorities.

- ❋ Collects income and deposits on IWUA Bank account.
- ❋ Pays cash after approved by chairman /secretary
- ❋ Withdraw cash from the bank for the payment of IWUA activities.
- ❋ Keeps all documents of payments, revenue and relevant letters and payments orders.
- ❋ Prepares report for the finance head monthly.

Art.19 Authority and responsibility of Auditor of IWUA

The auditor of IWUA is elected by GA and has the following Authorities.

- ❋ Inspects the activities of IWUA at all level.
- ❋ Inspects the activities of EC.
- ❋ Audits financial and material resource i.e. income, expenses and material resource.
- ❋ Prepares report for GA.

Art.20 Authority and Responsibility of Finance Head of IWUA

The finance head is elected by GA and has the following authorities.

- ❋ Registers and keeps records of the income and expenses of IWUA.
- ❋ Keeps payment vouchers and income receipt voucher and gives new once to the cashier when the cashier returns the previously taken and used vouchers' pads contains account copy, only and recording it.
- ❋ Prepares Bank reconciliation monthly.

❋ Prepares financial reports for EC monthly and annually.

Art 21. Amendment of the Bye-law

This Bye-low can be amended, if not less than 2/3 of the total member shall hand over the total member are presented in the meeting.

Art 22. General

Any out going committee member shall hand over the property of the association to new committee members.

Art23 Internal Regulations

Depending on this Bye-low, the EC shall produce rules, guidelines and regulations.

Art 24. Effective Date

This Bye-low shall enter in to force after GA discussed and approved it on _____ 199_____ EC.

Internal Regulation of
IWUA

1. Name Location and Number of the beneficiaries

1.1 Name of the scheme _____

1.2 Zone _____District _____

PA _____

1.3 Number of Beneficiaries _____

M_____

F_____

1.4. Size of the command area _____ha

2. Objectives

2.1. Efficient use of irrigation water to produce crops 2-3 times in the year.

2.2 To manage water resource, protect and maintain the scheme commonly.

2.3 To increase irrigated crop production as to ensure food self-sufficiency and poverty reduction.

3 Pays membership contribution_____Birr

4 Contributes pump replacement fund _____Birr

5. Un accepted acts and level of penalties

5.1 Coming late and being absent from meeting is not allowed

5.1.1 A member, who is late, from the meeting for 0.30minite shall pay ____ Birr penalty.

5.1.2 A member, who is not attended the meeting shall pay___Birr penalty

5.2.3 Any GA starts at ___ and ends at ____hrs

5.2.4 Beneficiary group work starts at ___ and ends at ____hrs

5.2.5 A member, who is late from beneficiary group work for 0.30 shall pay ___ Birr penalty.

5.2.6 A member who is not participated in beneficiary group work shall pay ___ Birr penalty.

5.2.7 If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA"S court and PA EC the land will be transferred to any other PA member

6 Illegal use of irrigation water consumption and level of penalties

6.1 A member, who loots, irrigation water out of his time schedule shall pay 50 birr penalty.

6.2 A member shall not take irrigation water by cutting canal and other structures, if so,

6.2.1 For the first time he/she shall pay 30 Birr,

6.2.2 For second time he/she shall pay 60 Birr

6.2.3. If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA"S court and PA EC the land will be transferred to any other PA member

6.3. The schemes command area, structure shall be strictly protected from cattle. If the member allowed his/her cattle grassing in command area, crossing over the canal with out using with out culverts and fetching from canal; so:

6.3.1 For the first time pays 50 Birr

6.3.2 For the second time pays 100 Birr

6.3.3 If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA"S court and PA EC the land will be transferred to any other PA member

6.4. If members cattle graze or destroy the crops in the field, he/she shall pay ___2 Birr per cattle.

6.5. A member coming to the group work with out hand tool shall pay _____Birr penalty.

6.6. If a members elected in different committees will not carry out their duties:

6.6.1 For the first time he/she shall pay 10 Birr

6.6.2 For the second time he/she shall pay 20 Birr.

6.6.3 For the third time case will be brought to General meeting and she/he exempted from the position.

6.7. If the member does not cultivate his/her irrigable land:

6.7.1 For the first season he/she will be advised.

6.7.2 If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA"S court and PA EC the land will be transferred to

any other PA member

6.8 A member who does not contribution on time for pump replacement salaries of pump operator and guards in accordance with agreement made with IWUA and OIDA shall pay the following penalties

6.8.1 If she/ he does not pay up to one month after harvest sales of crops will pay ____Birr

6.8.2 If she/ he does not pay up to tow month after harvest sales of crops will pay ____Birr

6.8.3 If She/ he does not respect the above mentioned corrective measures and acts of the members not improved and repeated it for the third time he/she will be dismissed from the membership, by the decision of PA's court and PA EC the land will be transferred to any other PA member

We, the member of _____ Irrigation scheme beneficiaries ratified and accepted this internal regulation putting our signature.

C.C

_____ Aana Irrigation Development Desk

_____ Aana Coopreative Promotion Desk

Obbo _____, _____Irrigation scheme DA

Source:
TRAINING MATERIAL FOR CONSTRUCTING WUA'S BYLAW
IN COMMUNITY-BASED IRRIGATION DEVELOPMENT,
(English Version), Prepared by Obbo Berhanu Hirpo, November 2003

Form 7–2

Operation Records of Pump

Date	Name of operator	Time to start	Time to end	Total Hours (hrs)	Record of Maintenance	Signature of Operator

Form 7–3

Periodical maintenance Schedule

Operation	Component		INTERVAL (HOURS)								
				10	50	100	200	500	1000	2500	5000
CLEANING	Air Cleaner			●							
	Fuel Feed pump filter						●				
	Head & Cylinder fills		●				●				
	Oil Cooler Fins						●				
	Fuel Tank								●		
	Injectors							●			
	Interval of Filter									●	
CHECK	LEVEL	Air Cleaner Oil		●							
		Crankcase Oil		●							
		Battery electro light			●						
	Fan belt tension					●					
	Valve and Rocker arm Clearance							●			
	Injector- Calibration							●			
Replacement	Oil	Air cleaner	(●●)	●							
		Crankcase					●				
	Oil Filter						●				
	Fuel filter						●				
	Dry air cleaner element		(●●●)					●			
	Fan Belt									●	
Overhaul Inspection	Partial		(●●●)								●
	Complete										

(●) Under sever working condition clean daily
(●●) Under externally dusty condition clean every 45hours
(●●●) When clogging indictor shows the need for replacement
(●●●●) Includes checking cylinders, piston rings, springs, grinding valve seats, scaling heads and cylinders as well as checking injection pump and injectors.

Source:
OPERATOR'S TRAINING MANUAL Based on Diesel Engine
Prepared by Abebe Dissussa
SEPTEMBER 2003

Form 7-4

Fuel & Lubricant Stock Control Ledger

Date of Purchase	Receipt No.	Type	Quantity /lit/	Total Cost	

Fuel & Lubricant issue

Date	Name of Recipient	Gas Oil Issued (lit)	Lubricant Issued (lit)	Amount (Birr)	Signature of Recipient

Form 7-5

Date ……

Cash Payment Order

To : Cashier

Pay for Mr/Mrs _____ Birr_____
(_____) for
_____ Payment

Signature of Chairman/Secretary _____ Date _____

I Mr/Mrs _____ received Birr_____

Signature _____ Date _____

Form 7-6

Cash Register

No.	Date	Name of Depositor	Amount		Cashiers Signature

Cash Payment Journal

Date	Name of Recipient	Reason of Payment	Amount	

Staff Debtor Ledge

Name of the Debtor _____

Period of Loan _____

Date	Name	Type of Loan	Amount of Loan/Birr	Loan Paid Birr	Balance Birr

Type of loan is described & it can be money, Fertilizer, Chemical & etc.

Form 8 - 1

Date: _____

Ref. No:_____

Check List for Field Visit Monitoring

Name of Irrigation Scheme:	Name of WUA:
Wareda:	Zone:

Category	Check Items	Yes/No
WUA Organization Management	Are the committee members changed recently?	
	Are any committee members vacant for long time?	
	Are the general meetings held regularly?	
	Are minutes of the general meetings prepared?	
	Are the committee members' meetings held regularly?	
	Are minutes of the committee meetings prepared?	
	Was the by-laws amended recently?	
	Are there any entries of the members?	
	Are there any withdrawals of the members?	
	Are there any members who violate the by-law?	
	Are the salaries for the pump operator and guard paid properly?	
	Are there any disputes among the members?	
	Are there any members who failed to cultivate currently?	
Land Management	Is the land exchange / transfer performed as per the agreement?	
	Are there any members who irrigate the land over 0.25 ha?	
Water Management	Is there serious water shortage during dry season?	
	Is irrigation water distributed according to the decided schedule?	
	Are there any farm plots which have difficulty in irrigation?	
	Are there any conflicts on water distribution among the members?	
Operation and Maintenance	Is the record of pump operation kept properly?	
	Are there any problems on fuel management?	
	Is the regular maintenance of the pump conducted according to the operation manual?	
	Are there any conflicts between pump operator and the members in terms of fuel management?	
Financial Management	Is the cash books kept in proper manner?	
	Is the balance of bank account understood by the committee members?	
	Are the saving moneys for pump replacement collected from all members?	
	Is there inaccuracy in account?	
	Are there any conflicts between casher and pump operator in terms of fuel management?	
Communication and Conflict Management	Are there any problems with other government agencies?	
	Are there any problems with other WUAs?	
	Are there any conflicts with private pump owners?	

Prepared by:_____

Form 8 - 2

Date: _____

Ref. No:_____

WUA Activities Monitoring Sheet

<table>
<tr><td>Name of WUA:</td><td>Wareda:</td></tr>
<tr><td colspan="2">Category: (Please check category)
a) WUA Management
b) Land Management
c) Water Management
d) Operation and Maintenance
e) Financial Management
f) Communication and Conflict Management</td></tr>
<tr><td colspan="2">Events:</td></tr>
<tr><td colspan="2">Date : _____
Name :_____</td></tr>
<tr><td>Suggestion / Recommendation to WUA</td><td>Action taken by WUA</td></tr>
<tr><td>Date : _____
Name :_____</td><td>Date : _____
Name :_____</td></tr>
<tr><td colspan="2">Follow-up Study by OIDA</td></tr>
<tr><td colspan="2">Date : _____
Name : _____</td></tr>
</table>

Summary of WUA Activities Monitoring

Name of WUA: Name of Scheme: Wareda Office :

Year		2003														2004																			Remarks
Month		August			September			October			November			December			January			February			March			April			May			June			July		
Categories	Activity																																		
WUA Organisation Management	Interview																																		
	Suggestion/ Recommendation																																		
	Follow-up																																		
Land Management	Interview																																		
	Suggestion/ Recommendation																																		
	Follow-up																																		
Water management	Interview																																		
	Suggestion/ Recommendation																																		
	Follow-up																																		
Operation and Maintenar	Interview																																		
	Suggestion/ Recommendation																																		
	Follow-up																																		
Financial Management	Interview																																		
	Suggestion/ Recommendation																																		
	Follow-up																																		
Communication etc.	Interview																																		
	Suggestion/ Recommendation																																		
	Follow-up																																		

Remarks: Check the cell when the events related to each category take place

WUA performance Monotoring Report

Name of Water Users Association:	Period of the last main crop season for irritated farming: _____month to_____month	Bank Account in Total _____Birr

No.	Name of WUA member	Irrigated Plot in ha	Irrigation Period		Crop Selection			Payment of pump Replacement Reserve	
			Date of Start	Date of End	Crop (1)	Crop (2)	Crop (3)	Amount in Birr	Date of Payment
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

No.	Name of WUA member	Irrigated Plot in ha	Irrigation Period		Crop Selection			Payment of Pump Replacement Reserve	
			Date of Start	Date of End	Crop (1)	Crop (2)	Crop (3)	Amount in Birr	Date of Payment
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Note: Bank journal shall be attached

Prepared by: (Name) _____

Signature _____

Authorized by: (Name) _____

Signature _____

WUA Performance Monitoring Report

Name of Wareda: _____ Name of Zone: _____

No.	Name of Scheme	Name of WUA	Irrigation Area (ha)		Crop Selection			Bank account in Total (Birr)		Outstanding Issues 1)						Remarks
			Planned	Actual	Crop (1)	Crop (2)	Crop (3)	Planned	Actual	Organisation	Land	Water	O&M	Financial	Others	
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

Remarks: Please check the cell if outstanding issues ramain in the scheme.

Date _____

Prepared by: (Name) _____

Signature _____

Date _____

Authorized by: (Name) _____

Signature _____

Household Characteristics

WUA Name: _____ Surveyor: _____

Name: _____ Date: _____

Survey Items			8. Expenditure (July, 2002-July, 2003)
1 Beneficiaries	Name		Meal (Item, Amount, Cost)
	Age		
	Sex		Maize
	Academic Career		Teff
	Month/Year to join WUA		Wheat
	Position/WUA Board		Meat
2 Family member	Member / Age / Education/occupation		Vegetables and spice
			Chicken and eggs
			Sub-total:
			Clothes (Item, Amount, Cost)
			for Head
			for wife/husband
			for children
			Sub-total:
			Medical (Item, Amount, Cost)
			Medicine
			Medical service
3 Farm Land	Total area (ha)		Sub-total:
	Rain fed area (ha)	Area / Crop	School (Item, Amount, Cost)
	Irrigated area (ha)		School fee
	Remark		School bus fare
			Sub-total:
4 Farming Tool	Cart		Livestock (Amount, Cost)
	Hoe		Purchase / Sale
	Sickle		Ox
	Axe		Veal
	Shovel		Cow
	Spryer		Heifer
	Knife		Donkey
	Other( )		Chicken
5 Livestock	Ox		goat
	Veal		sheep
	Cow		
	Heifer		Sub-total:
	Donkey		Irrigation Service fee
	Chicken		1st season / 2nd season
	Goat		Guard wages (Birr)
	Pig		Replacement cost (to Bank) (Birr)
	Sheep		
	Other( )		
6 Item of non farm income			Sub-total:
			Others (Item, Amount, Cost)
7 Farm income (Birr)			Sub-total:
Livestock income (Birr)			Expenditure Total:
Non farm income (Birr) (Nov.2001~Mar.2003)			10 Site of your irrigation field
Net Revenue (Birr)			1. Upper stream, 2. Middle stream, 3. Lower stream

Agricultural Calender

Name: _____ Surveyor: _____ Date: _____

Year				2002					2003						
Month				August	September	October	November	December	January	February	March	April	May	June	July
Crop /ha Variety	Irrigation or Rainfed	Farm lot No	Activity	Rainy Season					Dry Season				Rainy Season		
			Plowing												
			Sowing												
			Transplanting												
			Basal Dressing												
			Topdressing												
			Chemical application												
			Irrigation												
			Intertilling												
			Weeding												
			Harvesting												
			Plowing												
			Sowing												
			Transplanting												
			Basal Dressing												
			Topdressing												
			Chemical application												
			Irrigation												
			Intertilling												
			Weeding												
			Harvesting												

Yield (qts/ha)
For sale (qts)
self consump. (qts)
For seeds (qts)
Sale Price: Birr/qt

Legend: ▽ Land Clearing
○ Plowing by Oxen
● Sowing
◎ Transplanting
◇Bsal Dressing
■Intertilling
◆Topdressing
▲ Weeding
□Harvesting

CF: Clearing weed/crop residue in field
PL: Plowing by oxen
PT: Plowing by Tractor
HO: Harrowing by oxen
HT: Harrowing by Tractor
IT: Intertillage

SL: Line Sowing
BP: Broadcast sowing
HS: Hill Sowing
NS: Nursery Sowing
T: Transplanting

BF: Basal Dressing
TD: Top Dressing
HA: Herbicide Application
CS: Chemical Spray
(Insecticide, fungicide

W: Weeding
IR: Irigation practice
BS: Bird Scaring
BMS: Bending Maize Stem
MH: Manual Harvesting

HM: Harvesting by machine
TH: Threshing
PK: Packing
TP: Transporting

Cropping Calendar

WUA: _____ Surveyor: _____

Name: _____ Date: _____

Irrigation or Rained land	2002															2003																							
	Aug			Sep			Oct			Nov			Dec			Jan			Feb			Mar			Apr			May			Jun			Jul		
1ha																																						
2ha																																						
3ha																																						
4ha																																						
5ha																																						

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Form 8 - 8

Crop Budget Analysis

WUA: _____ Surveyor: _____

Name: _____ Date: _____

Crop: _____ .2003 ~ . 2003	Crop: _____ .2003 ~ . 2003
1.. Income	1.. Income
(ha) qts × Birr/qt = Birr	(ha) qts × Birr/qt = Birr
Sub-total(a) Birr	Sub-total(a) Birr
2.. Expenditure	2.. Expenditure
(1) Seed Birr	(1) Seed Birr
(2) Fertilizer Birr	(2) Fertilizer Birr
Birr	Birr
(3) Agro-chemical Birr	(3) Agro-chemical Birr
Birr	Birr
Birr	Birr
Birr	Birr
Birr	Birr
(4) Labor Birr	(4) Labor Birr
Birr	Birr
(5) others Birr	(5) others Birr
Birr	Birr
Sub-total(b) Birr	Sub-total(b) Birr
3.. (a) — (b) = Birr	3.. (a) — (b) = Birr
(Birr /1ha)	(Birr /1ha)

ANNEX VI

REHABILITATION OF EXISTING SCHEMES (PROGRAM III)

ANNEX VI

REHABILITATION OF EXISTING SCHEMES (PROGRAM III)

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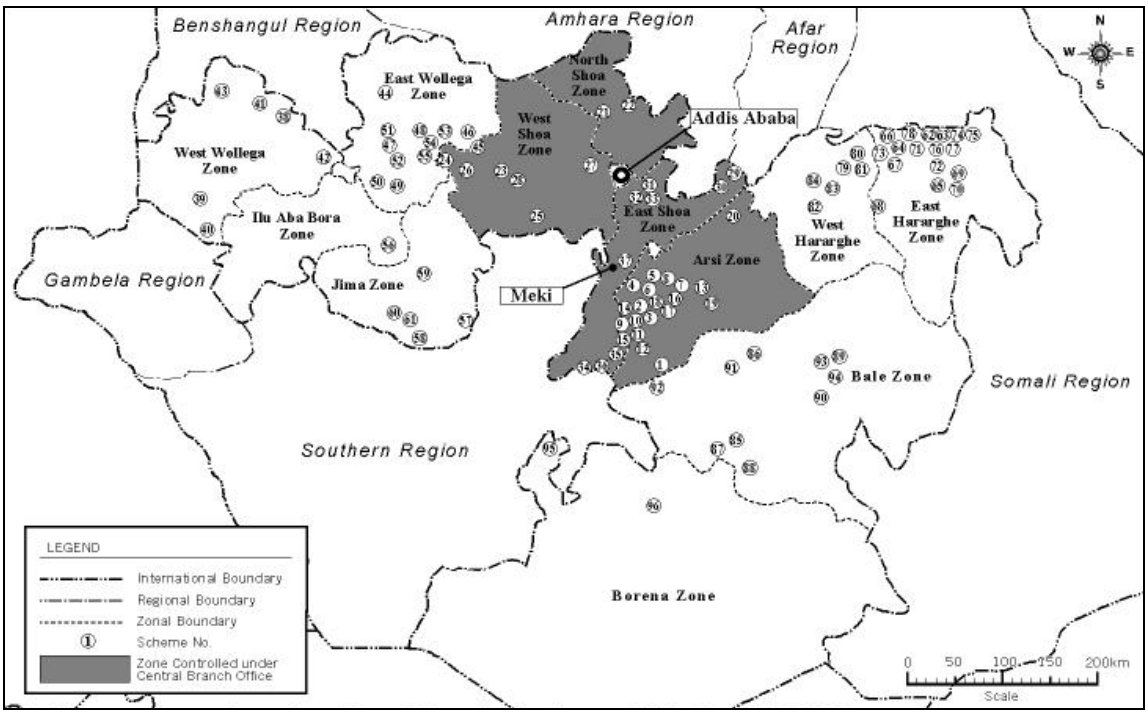
CHAPTER 1 OBJECTIVES

1.1 Objectives of Model Rehabilitation Works

OIDA takes major responsibilities for control of 132 existing schemes in Oromia Region. The summary of 132 existing schemes is listed in Table 1.1.1. Out of 132 schemes, 96 schemes were inspected in 2001 through the study for Meki Irrigation and Rural Development Project in Oromia Region Ethiopia (hereinafter "the Meki study") in association with four (4) branch offices, namely Central Branch Office in Adama, Eastern BO in Harar, Western BO in Nakamte and Southern BO in Arsi Robe. The location of the 96 schemes is illustrated below.



Location Map of Existing Schemes

Source: Meki Irrigation and Rural Development Project (JICA, 2002)

Out of 96 schemes, 37 schemes are located within five Zones, namely East Shoa, North Shoa, West Shoa, Southwest and Arsi Zones, which are service area of Central Branch Office of OIDA.

Program III aims to promote capacity building of the OIDA staff and standardize rehabilitation works through pilot project. The Study selected typical schemes and implement actual rehabilitation works on pilot basis under Program III. A wide range of information and experiences to be obtained will be fully reflected to the master plan.

1.2 Capacity Building of OIDA under Program III

The OIDA cadres and engineers in both the headquarters and branch offices are generally highly qualified with higher educational background. It is important, however, to accumulate systematic work experiences through actual irrigation and drainage development. Program III aims at provision of the training program to the OIDA engineers. The small-scale irrigation development for poverty alleviation is main stream of the irrigation sector of Ethiopia. Therefore, the OIDA engineers are required to take basic knowledge for participatory development approach. The following capacity building programs were carried out;

1) Participatory approach to rehabilitation works
2) Practices on inventory survey of irrigation facilities by joint walk through with WUA members
3) Practices on irrigation planning, designing and construction supervision
4) Lectures on environmental and watershed management including engineering protection measures
5) Study on budgetary arrangement and financial management
6) Capacity building for project benefit monitoring and evaluation
7) Capacity building for report preparation

CHAPTER 2 APPROACH TO REHABILITATION WORKS

2.1 OIDA Database

2.1.1 Establishment of OIDA Database

The Meki study established OIDA database for the 96 schemes. The database was expected to be applied to systematic monitoring and evaluation for identification of problems and constraints prevailing in the existing schemes. In order to verify the cause of low irrigation performance, the site information and questionnaire survey were carried out form July to November 2000 to obtain the following information.

1) Name of scheme
2) Location
3) Irrigation performance in May 2000 and October 2001
4) No. of beneficiaries in May 2000 and October 2001
5) Construction period
6) Construction cost
7) Water source
8) Intake structure
9) Headworks : type, crest length, weir/dam height, intake size, water duty, etc.
10) Design discharge
11) Conveyance structure (km) : main, secondary and tertiary canals
12) Drainage structure (km) : main, secondary and tertiary canals
13) Headworks (problems)
14) Main canal (problems)
15) SC, TC, FD and drainage canals (problems)
16) Availability of design documents and working drawing
17) Status of construction works: completed or not completed
18) Dispatch of OIDA DA (development agent/extension worker)
19) Involvement of beneficiaries in project O&M and their training
20) OM manual
21) OM charge and bank account
22) Farm input shortage
23) Water shortage, dispute in water use, conflict between upstream and downstream areas
24) Full use of the scheme
25) Crop selection against scheduled cropping patterns
26) Salinity problem
27) Water Users Association (WUA): members, establishment, registration/legal status, water master, by-law, frequency of meeting, meeting record keeping, etc.

The preliminary analyses were made on the basis of collected data and the results of analyses are presented in Attachment - 1.

2.1.2 Development Constraints in Existing Schemes

(1) Causes of Low Irrigation Performance

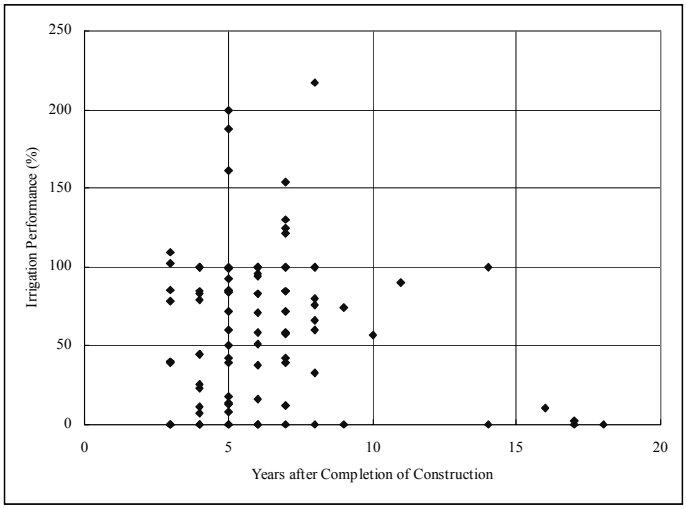
According to OIDA database only 5,560 ha or 58% out of 9,644 ha of the 96 schemes were irrigated as of 2000, while over 4,000 ha were under utilization although irrigation facilities were available. As well, actual beneficiaries amounted to 15,763 households or only 58% out of 26,984 households of expected beneficiaries. The status of the OIDA schemes as of 2000 was summarized below.

Status of Irrigation Schemes by Branch Office (as of 2000)

Branch Office	Nos. of Scheme	Developed Irrigation Area (A)		Actual Irrigated Area (B)		Irrigation Performance
		(ha)	(%)	(ha)	(%)	B/A (%)
Western	24	1,685	17%	514	9%	31%
Eastern	23	1,948	20%	1,456	26%	74%
Southern	12	1,188	12%	556	10%	47%
Central	37	4,823	51%	3,034	55%	63%
Total/Average	96	9,644	100%	5,560	100%	58%

Source : Meki Irrigation and Rural Development Project (JICA, 2002)

Irrigation performance is defined as a ratio of actual irrigated area against developed irrigation area. The overall irrigation performance was as low as 58%. Unexploited land and water resources are significant. Analysis of prevailing constrain based the OIDA database which was prepared by the Meki study was made to improve the irrigation performance. First of all, the relationship between irrigation performance and years after completion of construction, i.e. the age of scheme, is plotted below.



Relationship between Years after Completion and Irrigation Performance

Source : Meki Irrigation and Rural Development Project (JICA, 2002)

Some schemes older than 15 years show extremely low irrigation performance probably due to defects and deterioration of facilities. However, no clear relationship is recognized among majority of schemes less than ten years old. This result implies that irrigation performance is dependent not only upon defects and deterioration of irrigation facilities but also other factors including insufficient skills for water management and poor maintenance, etc.

Another cause is water shortage. As seen in the following table, farmers complain water shortage in 27 schemes or 40% of 96 schemes although reasons of water shortage are not clearly identified. In such schemes, uneven water distribution is often observed between upstream and downstream areas. Unfair water management directly induces dispute among farmers. Finally farmers in downstream area are discouraged to contribute to O&M.

Water Shortage and Dispute

Unit : No. of Schemes

Branch Office	Water Shortage			Dispute in Water Use		
	Exist	Not	Unknown	Exist	Not	Unknown
Central	12	6	4	5	13	4
Western	5	17	1	4	17	2
Eastern	7	3	0	8	2	0
Southern	3	10	0	3	10	0
Total (No.)	27	36	5	20	42	6
(%)	40%	53%	7%	29%	62%	9%

Source : Meki Irrigation and Rural Development Project (JICA, 2002)

The facts mentioned above remind us an extreme importance of periodical project monitoring in order to know performance of irrigation schemes handed over to farmers and formulate a rational rehabilitation plan.

(2) Vague Demarcation of Responsibility for O&M of Facilities

Out of 92 schemes surveyed, 52 schemes face damaged gates and 22 schemes face damaged intake body. The responsibilities for such damages were not clearly defined when the facilities were handed over from the government to WUA. Repair and replacement of damaged gates are beyond farmers' ability. The technical assistance by the government is essential.

The most prevailing problem of main canals is leakage. It is difficult for farmers to take full responsibility for O&M of seriously damaged canals without government supports. On the other hand, farmers need more education for appropriate use of irrigation facilities. Watering livestock and cropping on canal bank should totally be prohibited. The JICA Study Team often observes that banana and maize are planted on canal embankment resulting in piping problems along crop roots. Illicit water use by breaking canal embankment is also observed. Weed control is a duty of the WUA members.

It is noted that 11 schemes or 16% out of 68 schemes which was answered to questionnaire are not yet completed and not officially handed over to farmers.

Project Status (October 2001)

Unit : No.

Branch Office	Completed	Not Completed	Unknown	Total
Central	18	3	1	22
Western	17	3	3	23
Eastern	8	2	0	10
Southern	7	3	3	13
Total (No.)	50	11	6	68
(%)	74%	16%	10%	100%

Source : Meki Irrigation and Rural Development Project (JICA, 2002)

Although farmers have already benefited by irrigation farming for a long time, they are not serious to maintain the facilities and excuse by referring to inconclusive ownership of the scheme. Farmers never accept their responsibilities for O&M of the facilities which are not yet officially handed over. The official handing-over in written form is extremely important issue to ensure demarcation of responsibilities.

(3) Weak Organizational Set-up and Management Capacity of WUA

The establishment of WUA is not yet completed in all the OIDA schemes. Out of 68 schemes surveyed, 22 schemes or 32% have no farmers' management body. Only two schemes are given the legal status, while 42 schemes or 62% are still unregistered as presented below.

Establishment and Registration Status of WUA

Unit : No. of Schemes

Branch Office	WUA Establishment			Legal Registration		
	Confirmed	Not	Unknown	Registered	Not	Unknown
Central	3	0	19	0	1	21
Western	20	0	3	2	18	3
Eastern	1	9	0	0	10	0
Southern	0	13	0	0	13	0
Total (No.)	24	22	22	2	42	24
(%)	36%	32%	32%	3%	62%	35%

Source : Meki Irrigation and Rural Development Project (JICA, 2002)

Lack of O&M manual and O&M charge is also one of constraints against execution of regular maintenance works. O&M charge is collected only one scheme under Central Branch Office.

Preparation of O/M Manual and Execution of O/M Charge Collection

Unit : No. of Schemes

Branch Office	O&M Manual			O&M Charge		
	Exist	Not	Unknown	Collected	Not	Unknown
Central	0	14	8	1*	9	12
Western	4	18	1	0	22	1
Eastern	0	10	0	0	10	0
Southern	3	7	3	0	11	2
Total (No.)	7	49	12	1	52	15
(%)	10%	72%	18%	1%	77%	22%

Source : Meki Irrigation and Rural Development Project (JICA, 2002)
Remarks : * Lemi Scheme in North Shoa Zone (Birr 3 per HH per year)

(4) Insufficient OIDA's Supports

WUAs are to be supported by regular visits of development agents (DA) of OIDA as well as farmers training program. Over 70% of the schemes have been provided both services as presented below.

OIDA DA and Farmers Training

Unit : No. of Schemes

Branch Office	OIDA DA			Farmers Training		
	Exist	Not	Unknown	Done	Not	Unknown
Central	20	2	0	16	3	3
Western	20	2	1	20	3	0
Eastern	8	2	0	0	10	0
Southern	5	4	4	13	0	0
Total (No.)	53	10	5	49	16	3
(%)	78%	17%	9%	72%	24%	4%

Source : Meki Irrigation and Rural Development Project (JICA, 2002)

Most of farmers in the irrigation schemes need more training for wide range of irrigation farming techniques including crop selection, farming practices, farm input procurement, on-farm irrigation water management, marketing of farm products, etc. Technical capacity of DAs is not sufficient to meet these requirements.

It is high time to review the on-going OIDA's services as a whole. Under recent decentralization policy, DAs will be dispatched to and mobilized in all 197 waredas of Oromia Region. It is expected that WUAs will be able to receive appropriate supports more frequently if clear instruction is given to DAs.

(5) Lack of Engineering Information Essential for Rehabilitation Planning

One of crucial problems for rehabilitation planning is lack of design documents and drawings, when rehabilitation plan and design are prepared. The engineering information including design documents and drawings is not available for over 50% of the schemes as presented in the following table.

Availability of Design Documents and Drawings

Unit : No.

Branch Office	Design Documents			Design Drawing		
	Exist	Not	Partial	Exist	Not	Partial
Central	1	16	0	2	6	12
Western	9	12	1	9	8	4
Eastern	0	9	1	0	9	1
Southern	8	1	4	1	10	2
Total (No.)	18	38	6	12	33	19
(%)	29%	61%	10%	19%	51%	30%

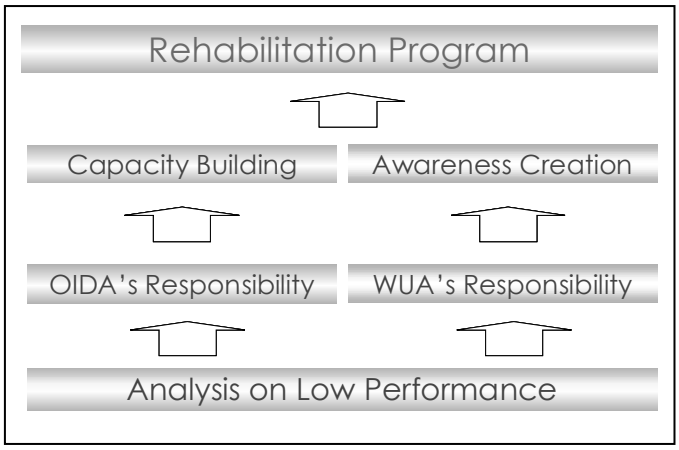
Source : Meki Irrigation and Rural Development Project (JICA, 2002)

2.2 Approach to Rehabilitation

As mentioned in Section 2.1, the development constraints in the existing OIDA schemes resulting in low irrigation performance are summarized below.

1) Defects and deterioration of existing irrigation facilities
2) Water shortage
3) Vague demarcation of responsibility for O&M of facilities
4) Weak organizational set-up and management capacity of WUA
5) Insufficient OIDA's supports
6) Lack of engineering information essential for rehabilitation planning

In this context, the rehabilitation works are defined as integrated practices to improve the irrigation performance. An approach required includes analysis of prevailing constraints, formulation of an optimum rehabilitation plan and implement. Such integrated rehabilitation works can be completed only by joint efforts of OIDA and WUAs. Therefore, the Study proposes to execute capacity building of OIDA staff and technical guidance and training to WUA in parallel. The concept is illustrated below.



Approach to Rehabilitation Program

2.3 Procedure of Rehabilitation Program

The rehabilitation of existing schemes under Program III was implemented according to the following steps.

Procedure of Rehabilitation Program

Step 1	Selection of model schemes
Step 2	Inventory survey of existing irrigation facilities
Step 3	Baseline survey to WUA
Step 4	Initial environmental examinations (IEE)
Step 5	Formulation of rehabilitation plan and detail design
Step 6	Preparation of rehabilitation schedule
Step 7	Procurement and rehabilitation works
Step 8	Preparation of plot map and plot list
Step 9	Handing-over of irrigation facilities
Step 10	Training for DA and WUA for O&M of irrigation facilities

The overall work progress is presented in Figure 2.3.1 and summarized below.

2.4 Selection Criteria

Program III selected three (3) model schemes among 37 existing irrigation schemes under OIDA Central Branch Office. In order to select model schemes, the JICA Study Team set up the selection criteria as mentioned below.

1) Selected schemes face common technical problems prevailing among the OIDA schemes.
2) Selected schemes are located within the area of good accessibilities to ensure study efficiency and high demonstration effects.
3) Selected schemes require small-scale but urgent rehabilitation.
4) Cost performance of rehabilitation is high.

2.5 Selection of Schemes

The Study recognizes an importance to standardize the rehabilitation works. For this purpose, the irrigation schemes are categorized on the basis of prevailing problems. The preliminary assessment for 37 schemes under the control of Central Branch Office was made as presented in Table 2.5.1 and summarized below.

Problem Category and Number of Schemes

Symbol	Category	Nos. of Scheme
A	Deterioration of facilities	5
B	Weak WUA management	7
C	A+B or other constraints	15
-	Functioning at reasonable level	10
Total		37

Approach to Category A : Low irrigation performance of Category A is caused directly by serious defects and deterioration of irrigation facilities. On the basis of engineering information, PRA was held to confirm the rehabilitation plan with WUA. The priority works were selected through detailed engineering study and PRA. PRA was focus on participation of WUA in rehabilitation works and cost sharing. Replacement of gates and repair of intake body was priority works for headworks, and repair of canal leakage and clearing (weeds and sediments) were prioritized for canal.

Approach to Category B : Irrigation activities of Category B are stagnant due to weak WUA management resulting in low irrigation performance. Awareness creation and problem analysis were intensively done among WUA so as to verify prevailing causes of low irrigation performance. Necessary measures were taken to

eliminate constraints among the community and for strengthening WUA capacity will be selected.

Approach to Category C : The majority of schemes, i.e. 15 schemes out of 37 schemes, is under this category. Causes of low irrigation performance vary by scheme. Instead of quick action-taking for rehabilitation purposes, PBME is required at least for two (2) years to identify major case-effect relationship prevailing in a scheme. Unfair distribution of land and water resources often causes conflicts among WUA members resulting in weak WUA management. Low incentives for O&M among WUA members accelerate deterioration of irrigation facilities. In addition to complex constraints of Categories A and B, external factors often adversely affect. For instance, change in marketing circumstances often directly hinder smooth operation of an irrigation project. Both water and land use change in upstream area of water source of a project will also affect a project performance.

Out of 37 schemes, 20 schemes were selected within 100 km distance from both Adama and Meki as summarized below.

Number of Schemes in Category

Category	Description	Nos. of Scheme
A	Deterioration of facilities	5
B	Weak WUA management	4
C	A+B or other constraints	8
-	Functioning at reasonable level	3
Sub-total		20
Out of target (out of area, pump scheme)		17
Total		37

2.6 Selected Model Schemes

Rehabilitation of the existing projects is one of important mandates of OIDA. OIDA has strong incentive for establishment of the systematic approach to the rehabilitation works through Program III. Based on the selection criteria mentioned above, the JICA study team and OIDA had the meeting for selection of model scheme. Finally the following three schemes were selected from each category.

Selected Schemes

No.	Description	Category
1	Ketar	A
2	Gedamso	B
3	Sadi Sadi & Lafa	C

2.7 Setting of Design Standard for Rehabilitation Works

The Ministry of Water Resources of the federal democratic Republic of Ethiopia prepared the following guidelines in 2002.

1) Guideline, Manuals & Standard Design of Small & Medium Scale Irrigation Projects
2) Procedural Guidelines for Study of Small & Medium Scale Irrigation Projects in Ethiopia

The planning and design works for rehabilitation under this study shall comply with the above guidelines.

CHAPTER 3 INITIAL ENVIRONMENTAL EXAMINATION (IEE)

3.1 Scope and Objectives of IEE

The IEE is a requirement of the Environmental Policy of the FDRE based on Environmental Impact Assessment Guideline Document, July 2000 of the Environmental Protection Authority (EPA) of the FDRE. The IEE has two components: screening and scoping. Screening is a preliminary environmental review to assess whether EIA is necessary or not for a proposed development project. And if needed, to decide the nature and magnitude of the proposed project's potential environmental and social impacts and assigns the project to one of the three categories (schedules) according to the EIA Guidelines of the FDRE. Once a project is categorized, a scoping process defines the project's likely environmental impacts and the area of influence more precisely and develops terms of reference (TOR) for the EIA. As part of this process, information about the project is disseminated to local communities and NGOs, followed by consultations to help to focus the EIA on issues of concern at the local level.

3.2 Process of IEE

The IEE for irrigation projects in the Region has been conducted according to check lists prepared by the executing agencies. Study and Design Department of OIDA responsible for IEE applied to the following two (2) guidelines;

1) ESRDF's Small Scale Irrigation Project (Gravity) Technical Handbook, Component I on Guideline on SSIP Project Formulation (Nov. 1997), and
2) Study of Small & Medium Scale Irrigation Projects in Ethiopia, Part H Study Guideline on Environmental Impact Assessment, Ministry of Water Resources of FDRE (Aug. 2002).

According to the check lists proposed by the above-mentioned guidelines, the IEE was conducted to assess potential impacts of rehabilitation works for three (3) selected schemes, namely Ketar, Gedamso and Sadi Sadi & Lafa schemes were examined. The results are presented in Table 3.2.1 to 3.2.2 and summarized below.

1) Conflicts with water supply rights

The diversion discharges from the relevant rivers are already fixed and will not be reduced by implementation of rehabilitation works. It will not lead to any of competition and conflicts among water users in downstream areas.

2) Social impacts

Land ownership is currently subject to the recent proclamation by the Oromia

Regional State Government on the maximum land holding size at 0.5 ha/HH in an irrigation project area. Large land holders of over 0.5 ha in the Gedamso scheme will be advised to re-allocate parts of their lands to the peasants and the landless farmers. This will bring significant social impacts among the WUA members of the scheme. It is recommended to monitor its progress and impact through PBME.

3) Change of river flow regime

The rehabilitation works will not cause a change of current flow regime in the relevant rivers. Although there is no government policy on maintenance flow requirements in the rivers and minimum water levels in lakes at present, a guideline should be set up in future to ensure equitable apportionment of water resources. The Study recommended continuing hydrological review for all the existing schemes to optimize the diversion discharge.

4) Water quality change

Water quality deterioration is expected through additional pollution loads from the irrigation area. This would contain chemical fertilizers, insecticides and herbicides with deleterious effect on human and animal health. The possibility and magnitude of these impacts should be clarified based on the data related to river flow discharge and water quality analysis in future. The technical guidance to farmers will be required.

5) Impacts on precious ecology

Precious ecology that is host to phytoplankton, zooplanktons, fish and water fowls in the water bodies in downstream areas will be disturbed if water flow regime is changed. Environmental monitoring should be carefully continued to control water flow regime of the relevant rivers.

6) Positive impacts

Despite the above potential negative impacts of the proposed rehabilitation works, the overall effect on the people within the scheme area is expected to be positive. The environmental conservation component will ensure environmentally sustainable development. Afforestation and water conservation should be promoted in parallel to the rehabilitation works. They will ensure sustainability of the irrigation development by reducing soil erosion and sedimentation in the watershed as well as by improving river flow regime and water supply. Also, the environmental monitoring and management plan to be developed in the EIA is expected to effectively mitigate the negative environmental and social impacts of the proposed irrigation development. Overall, Program III is expected to improve the livelihood of the target group

through increased food production and availability of water for crop production, human and livestock use.

3.3 Conclusion and Recommendation

It is assessed that potential environmental impacts of the proposed rehabilitation works under Program III are low or negligible. Therefore, the Study will not request OIDA to proceed to full Environmental Impact Assessment (EIA). However, it is recommendable for OIDA to continue the environmental monitoring as a part of regular PBME

CHAPTER 4 CONDITIONS OF MODEL SCHEMES BEFORE REHABILITATION

4.1 General

The JICA Study Team carried out baseline survey to WUAs as well as inventory survey of existing irrigation facilities of three schemes in August 2003. The conditions of WUAs are summarized below.

Summary of Rehabilitation Schemes (before rehabilitation)

Category	Scheme	WUA	Irrigation Area(ha)			Beneficiaries (HH)		
			Actual	Plan	%	Actual	Plan	%
A	Ketar	Ketar Genet WUA	107	110	97%	277	276	100%
		Golja WUA	170	200	85%	190	180	105%
		Hamsa Gasha WUA	90	90	100%	175	114	149%
		Sub-Total	367	400	92%	642	570	112%
B	Gedamso	Gedamso WUA	100	170	59%	117	134	87%
C	Sadi Sadi	Sadi Sadi WUA	35	60	58%	223	210	106%
	Lafa	Lafa WUA	53	80	66%	140	50	280%
Total			555	710	78%	1,122	964	116%

Source: WUA baseline survey, JICA Study Team, August 2003

4.2 Ketar Irrigation Scheme

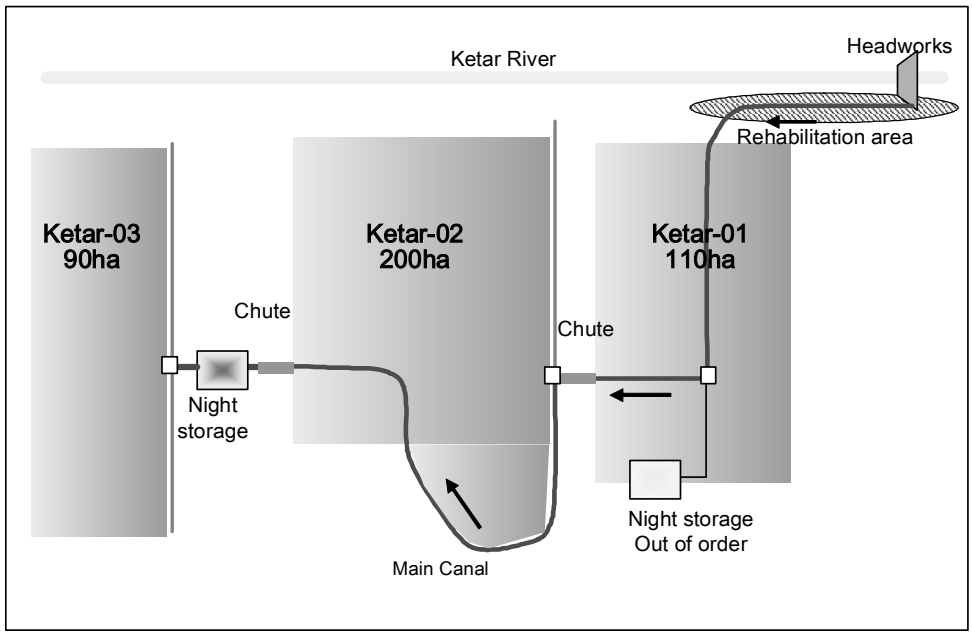
4.2.1 Overview of Irrigation Scheme

Ketar irrigation scheme is located in Tiyo wareda of Arsi zone. The elevation of the scheme area varies from El. 2,200 m to El. 2,060 m. The scheme is located at 23 km south of Asela or 105km south of Adamma, where Central Branch Office is located. The site is accessible through:

Adamma → Meki → Ziway → Kersa → Ketar (250km)
Adamma → Assela → Ketar (105km)

This scheme consists of three sub-schemes with the total irrigation area of 400 ha, which are called Ketar-01 (Ketar Genet), Ketar-02 (Golja) and Ketar-03 (Hamsa Gasha). All three sub-schemes are served with one headworks on the Ketar river and main canal system including an aqueduct of about 200 m long.

The scheme layout is illustrated below.



Layout of Ketar Scheme

4.2.2 General Conditions of Irrigation Scheme

The Ketar river is one of the biggest river in Arsi zone. The river drains to the Ziway lake with large amount of water collected from 3,460 km^2 catchments area including the highlands of Meraro and partly Chilalo mountain. The design discharge for the scheme is about 860 lit/sec to irrigate about 400 ha according to previous design report. This design discharge includes domestic demand and consumption by animals. There is a night storage just at the out let of Ketar-01 along the main canal, which is used to supply domestic water to Golja town through pipe system.

The total length of the main canal system is 12 km, of which the first 5 km is a headrace from the diversion point to the beginning of Ketar-01. Although further confirmation is required, only 460 lit/sec flows at the beginning point of Ketar-01 area against the design discharge of 860 lit/sec.

The main canal was constructed with lining treatment of wet masonry work. However, many cracks are developed at joints of mortar. The deterioration process is accelerated by steep topographic conditions. The main canal passes on middle of steep slope of the Ketar river valley. Soils retaining the canals especially behind their right embankment (valley side) are seriously eroded. As a result of lack of retaining materials, canals suffer from elongated horizontal cracks place to place.

The related facilities including two large chutes between Ketar-01 and 02 as well as 02 and 03, night storage, secondary and tertiary canals are also functional. On-farm

facilities including division boxes, drop structures, etc. are operational according to the site inspection. Irrigated farmland is fully utilized for potatoes, onion, sugar beats, maize, teff, etc.

4.2.3 Conditions of WUA

The number of WUA members is summarized as below.

Number of WUA members (As of August 2003)

Scheme	WUA	Number of Members	Year of Establishment
Ketar - 01	Ketar Genet	277	1999
Ketar - 02	Golja	190	1999
Ketar - 03	Hamsa Gasha	175	1999
Total		642	

Source: WUA baseline survey, JICA Study Team, August 2003

The WUA members frequently carry out the maintenance and repairing works of the main canals by themselves. At the site inspection, many repair works done by the members were observed. In order to reduce seepage, they tried to refill mortal along horizontal cracks. The catch-drains were also constructed in hilly side in parallel to the main canal to reduce surface run-off attacking the main canal.

Hamsa Gasha WUA was already organized and got legal certificate, while organization set-up of both Ketar Genet and Golja WUAs are still in process under cooperative association. The Ketar scheme is under the management of one common board executive committee and all of three sub-schemes have their own executive committees and block leaders. In addition, two WUAs of Ketar Genet and Hamsa Gasha have inspection committees.

All three WUAs regularly collect irrigation water use fees from members depending on the plot size and utilize those budgets for canal maintenance works and salary for gate keepers. They strictly manage accounts, and collected money is deposited to the bank and total amount is as follows.

Total Amount of Account (As of August 2003)

Scheme	WUA	Balance in Bank Account (Birr)	Cash in Hand (Birr)	Total Amount (Birr)
Ketar - 01	Ketar Genet	1,900	300	2,200
Ketar - 02	Golja	200.7	87	287.7
Ketar - 03	Hamsagasha	1,850	1,000	2,850

Source: WUA baseline survey, JICA Study Team, August 2003

4.2.4 Required Rehabilitation Activities

The main critical problem of these schemes is main canal maintenance, and some excess land redistribution issues particularly in Golja irrigation sub-scheme. The major irrigation components up to the end of main canal and pond inlet, which requires due attention in the sustainability of the entire project has been discussed in this section. Findings in existing facilities and required rehabilitation works are shown in the Table 4.2.1.

4.3 Gedamso Irrigation Scheme

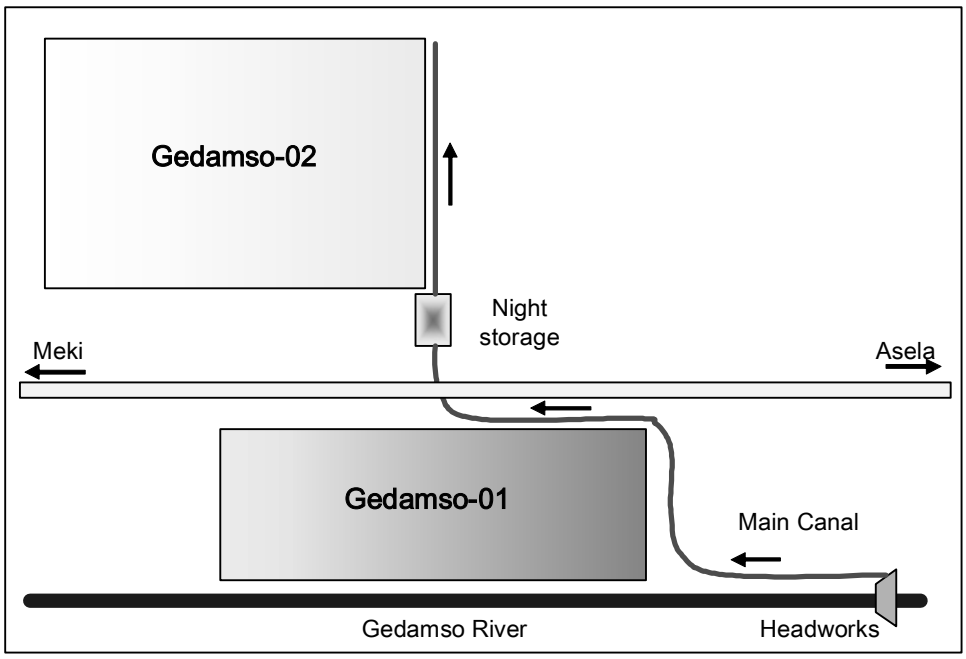
4.3.1 Overview of Irrigation Scheme

Gedamso scheme is located in Buku Waldya PA, Munessa wareda of Arsi zone at about 90 km south of Meki town and at a distance of 180km from Adamma through Assela. The elevation of the scheme area is around El. 1,600 m. The site is accessible through:

Adamma → Meki → Ziway → Gedamso (170 km)
Adamma → Asela → Kersa → Gedamso (180 km)

This scheme consists of two sub-schemes, Gedamso-01 and Gedamso-02, with one headworks on the Gedamso river flowing into the Langano lake. Total irrigation area is 200 ha. The project has fairly gentle slope, which is suitable for irrigation and drainage projects, with a land use of cultivated land.

The general layout of the scheme is illustrated below.



Layout of Gedamso Scheme

4.3.2 General Conditions of Irrigation Scheme

The water source is the Gedamso river. The design discharge is 185 lit/sec to irrigate 200 ha. During the site inspection, no serious problems of the main facilities, i.e. headworks and main canal, were observed. However it was identified some symptoms implying weakness of WUA in Gedamso-02. They are;

1) Much siltation inside canals (i.e. main, secondary, tertiary, and quaternary canals)
2) Heavy weed infestation and erosion of slope inside canals
3) Damaged fence around the night storage and division boxes left for long period
4) No stop-logs or gates at the division boxes
5) Some parts of canal embankment are eroded and no maintenance

4.3.3 Conditions of WUA

The WUA members amount to 156 HHs Both Gedamso- 01 and Gedamso-02 have independent WUAs respectively. The WUAs were organized in 1997. However, they have dissolved their committee members in 2001 and amalgamated to one Water Users Cooperative (WUC). Only 20 members are on the leading position of the scheme. All the executive committee members are elected from those 20 members.

Canal clearing and cash contribution are expected from all 156 WUA members when necessaries arise. Non-cooperative members have no interest to contribute their money to WUA. There is a feeling of minority domination over majority, and some sort of conflicts has been created between them.

Farming practices were not well developed since the members were semi-pastoralists in the past. However, they have been shifted their livelihood style to sedentary agriculture at present. There is also unequal allocation and distribution of irrigation land among the WUA members that widely range from 0.13 ha. to 4.0 ha. Only 70 ha or 50% of irrigation land has been developed, while rain fed farming is practiced within the scheme. Limited farm family labor is also a constraint. Since the unity of WUA is adversely affected by such unfavorable landholding conditions, the members are too demoralized to maintain their scheme facilities with mind of ownership. Lack of operation rule accelerates deterioration of facilities.

4.3.4 Major Findings, Problems and Recommendations in WUA Management

The main problem in this scheme is weak WUA management. The findings, problems and recommendations are described below:

Findings and Recommendations in WUA Management

Issues	Findings / Problems	Recommendations
1) Conflicts of interests between cooperative and non-cooperatives members	All the positions of executive committee are placed by cooperative members with less harmonization with non-cooperative members. This creates sense of minority domination over majority. Non-cooperative members are reluctant to understand a new idea of cooperatives and hence to make a challenge to irrigation farming through the provision of credits on farm inputs as well as information of marketing by cooperatives.	Cooperatives promotion campaign in collaboration with wareda cooperative promotion office and preparation of guide line, rules and regulations to keep interests of WUAs and organize water users cooperatives side by side with cooperation of concerned bodies is seems crucial.
2) Unproportional land allocation to WUA members	The number of WUAs members, i.e.156 HH, is too small compared to 200 ha of irrigable land. There is no common norm among WUA members to regulate size of land holding by individual households, and as a result large size of land holding by WUA members is ranging from 4.0 ha. To 0.13 ha. Most members know about a new proclamation of Oromia Regional State that restricts irrigation land holding to 0.5 ha/HH at maximum. It is founded that they are reluctant to conduct land exchange with small holders or rain fed farm households.	Great attention should be given to the land redistribution issues, and should be practiced in collaboration with concerned bodies (e.g. peasant association, and wareda administration office) in short period of time as much as possible.
3) Absence of regular contribution for O&M activities and bank account for WUA	They are not aware of necessity of regular contribution. Fund is raised when necessary. The 20 leading members are in the process of opening bank account.	Training on the need of permanent contribution and proper financial management seems very important.
4) Difficulties in acquiring farm inputs	Most of WUA members have difficulties in procurement of farm inputs including like, seeds, fertilizers and chemicals at the period of irrigation farming due to lack of proper suppliers with proper price. All non-cooperative WUA members have no access to credit service offered through cooperative promotion office for their financial constraints.	System of proper input supply and credit facilities for irrigation farming should be designed and practiced.
5) Less experience in agriculture in general and irrigation farming in particular	Resulted from their lifestyle in the past on semi-pastorals most of them have no basic knowledge and skills on agriculture in general as well as irrigation farming in particular. Average yield of irrigated maize is slightly higher than ones of rain fed maize.	Intensive training and systematic extension service seems necessary to upgrade .the scheme performance.

4.3.5 Required Rehabilitation Activities

Gedamso project is modern irrigation project and it has every components required for gravity irrigation and drainage system. The components of this system are listed below:

Existing Facilities of Gedamso Scheme

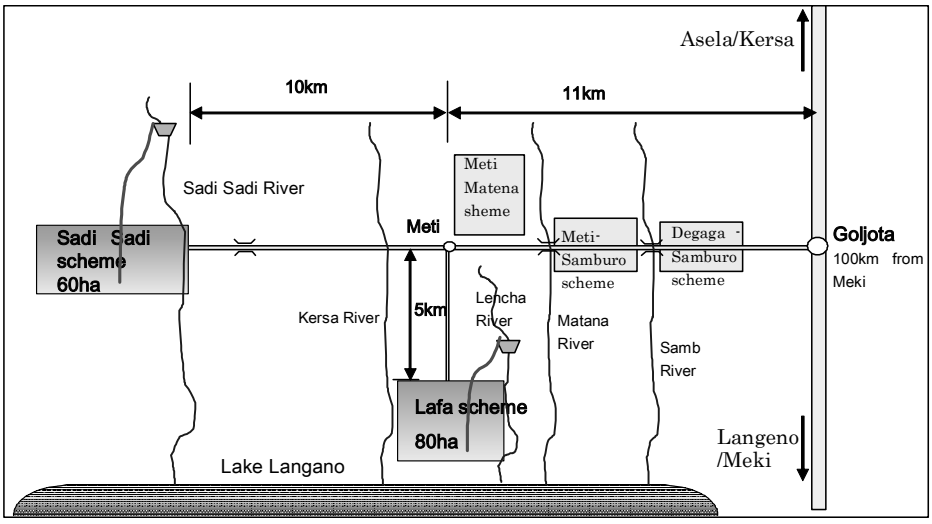
No.	Irrigation Facilities	Related Facilities
1.	Head work	Weir body, Wing walls, Flood protection wing wall, Intake gate, and Sluice gate
2.	Conveyance and Distribution canals	Main, Secondary, Tertiary and Quaternary canal and Silt trap basin
3.	Field structures	Culverts, Division Boxes, Drops, Off - takes (Turnouts)
4.	Night Storage	Pond body, Inlet Structure, Out let Gate and Spillway
5.	Drainage ditches	Field, Tertiary, Secondary, Main drains and Escape structure
6.	Farm roads	

Major irrigation components, which requires due attention in the project operation and maintenance has been discussed in the Table 4.3.1.

4.4 Sadi Sadi & Lafa Irrigation Schemes

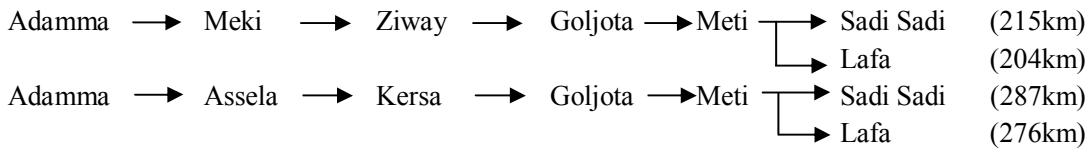
4.4.1 Overview of Irrigation Schemes

The rural road network within Arsi zone is relatively good as a result of enormous investment made under Arsi-Bale Rural Development Project. There is a road of 6 m wide paved by local materials (red ash) between Langano and Kersa passing in parallel to the southern fringe of the Langano lake with WE direction. Along this road, OIDA has developed several irrigation schemes by utilizing small streams flowing into the Langano lake, namely Gedamso, Argata and Shoba. This road is branched at Goljota town, which is located 115 km south west of Asela. Along this branch road, there are five small-scale irrigation schemes of less than 100 ha/scheme including both Sadi Sadi and Lafa irrigation schemes as illustrated below.



Location of Sadi Sadi and Lafa Schemes

The sites are accessible through:



Sadi Sadi and Lafa irrigation schemes are located in Ambagoda Sade PA and Sanbaro Rogicha PA respectively in Munessa wareda of Arsi zone. The distance from Goljota to Sadi Sadi and Lafa are 27 km and 17 km through Meti. The elevation of Sadi Sadi scheme is El. 1,750m, while the elevation of Lafa scheme is El. 1,700 m.

4.4.2 General Condition of Irrigation Scheme

Sadi Sadi and Lafa irrigation schemes are ones of irrigation projects conducted by Arsi WMERDO in 1995 and completed in 1997. Their main water sources are the Sadi Sadi and Lencha rivers, respectively.

Sadi Sadi scheme was incidentally started by traditional irrigation farming. The project planned to irrigate 60 ha of which only 35 ha are currently irrigated and the rest is occupied by homestead. Due to disordered fencing and expansion of farm plots, canal network is not efficiently aligned. The headwork of Sadi Sadi scheme is situated in the hilly land to divert 80 lit/sec from the Sadi Sadi river. The river discharge is supplemented by quite substantial amount of spring water flowing into the river. The main canal of 350 m long passes through vertical cliff and big boulders canal route.

The intake weir of the Lafa scheme was constructed on the Lencha river with diversion discharge of 120 lit/sec in order to irrigate 80 ha for 140 HH, but only 53 ha of land has been irrigated. Main and secondary canals except for one secondary canal were constructed across the contour built by stone masonry. Maintenance has not been conducted since the project completion.

Poor road conditions are main constraints against project operation for both schemes. According to the farmers, sugarcane and maize are currently main crop of the schemes because bad roads do not allow them to produce horticultural crops, which bruise easily. Due to remoteness and poor road conditions, any government supports to both schemes are too limited. OIDA has strong intention to extend their support to road repairing.

4.4.3 Conditions of WUA

(1) Number of WUA Members

The number of WUA members in each scheme is summarized below.

Number of WUA members

WUA	Number of Members	Year of Establishment
Sadi Sadi	240	1997
Lafa	140	1997
Total	380	

Source: WUA baseline survey, JICA Study Team, August 2003

(2) Sadi Sadi Scheme

The WUA has one executive committee, which consists of five (5) Board members and 12 block leaders. Their management and financial capacity seems weak. They have no any permanent contribution for the O&M activities of the scheme. However they have good and strictly respected water distribution program of for the members. Block leaders have played a great role on the distribution program of water.

(3) Lafa Scheme

The WUA has one executive committee, which consists of four board members and about 11 block leaders under them and three members of inspection committee. The committee is incomplete and weak. They have no any permanent financial contribution for O&M activities and even have no permanent meeting period.

4.4.4 Major Findings, Problems and Recommendations

It was observed that the both schemes face almost same problems. The major findings, problems, and recommendations for both schemes are summarized below.

Major Findings, Problems, and Recommendations

Issues	Findings / Problems	Recommendations
1) Market outlet problem	Bad road conditions are the most crucial problem of both schemes. The farmers are forced to produce maize for home consumption only and less amount of sugarcane for market because of transportation problem.	It is essential to mobilize the community to participate in road construction works and assist them to construct all weather gravel road for 19 km in total up to Meti rural town from both schemes. It will be really bringing great change in solving major problem of the area.
2) Improper settlement in the command area	About 30% of the command area is occupied by farmers as their residential area. Though some of	More awareness creation and mobilization to move out them from command area, and to use

Issues	Findings / Problems	Recommendations
	them believe that the necessity to move out their residential from the command area, they have financial constrains to resettle to outside the command area.	the irrigable land effectively for crop production only should be continued.
3) Absence of permanent contribution for O&M activities and bank account for WUA	No well understanding about the necessity of permanent contribution among the community. The WUA members had never discussed necessity to open and maintain a bank account for their financial management. No regular meeting and discussion on the managerial issues of the scheme are held.	Intensive training should be given to all WUA members, on all round irrigation farming and managerial activities.
4) Difficulties in acquiring farm inputs	Most of WUA members had difficulties in procurement of farm inputs. All WUA members have no access to credit service offered through cooperative promotion office for their financial constraints. They are also reluctant to be organized under cooperatives for a time being.	Systematic and proper input supplies and credit facilities for irrigation farming activities should be designed and practiced.

4.4.5 Required Rehabilitation Activities

The components of Sadi Sadi and Lafa schemes are listed below: -

Existing Facilities of Sadi Sadi Scheme

No.	Irrigation Facilities	Related Facilties
1.	Head work	Weir body, Wing walls, Flood protection apron, Intake gate, and Sluice gate
2.	Conveyance and Distribution canals	Main and Secondary canals
3.	Field structures	Culverts, Division Boxes, Drops, Off - takes (Turnouts)
4.	Farm roads	Inspection road

Existing Facilities of Lafa Scheme

No.	Irrigation Facilities	Related Facilities
1.	Head work	Weir body, Wing walls, Flood protection apron, Intake gate, and Sluice gate
2.	Conveyance and Distribution canals	Main, Secondary and tertiary canals
3.	Field structures	Culverts, Division Boxes, Drops, Off - takes (Turnouts), and Energy dissipaters
4.	Farm roads	Inspection road

Major irrigation components, which requires due attention in the project operation and maintenance has been discussed in the Table 4.4.1.

CHAPTER 5 FORMULATION OF REHABILITATION PLAN AND DETAIL DESIGN

5.1 Principles for Selection of Rehabilitation Activities

The JICA study team preliminary analyzed the problems in the existing irrigation schemes in the reference of the results of inventory survey and PCM training workshop (refer to ANNEX I). The problem tree is shown in Figure 5.1.1. The tree shows three major approaches for the rehabilitation works.

The rehabilitation works of the Ketar irrigation scheme as Category A will be carried out to verify immediate effects of the physical repair works of the major facilities. The main canal of the Ketar irrigation scheme is the life-line of three sub-schemes. In view of its extreme importance, the priority will be given to preventive rehabilitation work especially for the first five (5) km of the main canal. The organization set-up and managerial capacity of WUA are notified although the technical guidance and O&M training will be required in parallel.

The rehabilitation work required in Gedamso irrigation scheme as Category B should be initiated by community mobilization. The JICA Study Team strongly recommended OIDA to select this scheme for Program III since OIDA district officers and DAs need the standardized guideline and training to rectify such social problems apart from physical repair works of deteriorated facilities. It is highly important to verify problems and share information by systematic methodology. The physical rehabilitation will become effective when the community mobilization will be ensured.

Improvement of rural environment is also mandate of OIDA. The rehabilitation work for Sadi Sadi & Lafa irrigation schemes as Category C will cover both irrigation facilities and rural roads, of which integrated rehabilitation will bring enormous benefits to the area not only for irrigation benefits but also improvement of living standard and regional security. In both schemes, serious marketing problems due to poor accessibility have discouraged the WUA members to continue modern irrigation farming. To exploit the expected irrigation potentials at maximum level, the road repairing will be integrated with irrigation rehabilitation. Positive impacts of road repairing to irrigation projects will be carefully observed under Program III. The farmers are rather well organized and ready to contribute their manpower to the rehabilitation work. In addition to Sadi Sadi & Lafa schemes, the rehabilitation benefits will be shared also by other farmers in neighboring three schemes, namely Meti, Meti Samburo and Degaga Samburo.

5.2 Selection Criteria

The rehabilitation works proposed by OIDA consist of a diversity of repair and procurement from main facilities to on-farm structures. Prior to implementation of rehabilitation works, the demarcation of responsibility for each facility will be discussed and agreed between OIDA and WUA. It will ensure the appropriate O&M after completion of rehabilitation works. No rehabilitation works should be undertaken unless future O&M is guaranteed. Responsibilities of WUA will be confirmed.

In this regard, the rehabilitation of Category B, Gedamso-02 scheme, will be carefully discussed. Organization set-up and strengthening of WUA will be firstly undertaken as an initial part of rehabilitation works rather than immediate physical works.

Program III will carry out the rehabilitation selectively according to the following selection criteria. Rehabilitation works to be selected should be:

1) Significantly useful not only for capacity building of OIDA and but also for awareness creation, strengthen ownership and skill training of WUA.
2) Urgent and commonly required. Design and construction plan will be applicable to other many schemes. In this regard, improvement of canal leakage, which is the most prevailing problem in OIDA schemes, will be prioritized under Program III.
3) Ascertained with high cost performance. In view of limited budgetary status for rehabilitation program of OIDA, over-investment should be avoided. Selected works should be ensured by minimum investment but large benefits.
4) Completed by June 2004 but major works will be completed by March 2004 in order to enable to monitor benefits of rehabilitation. The first monitoring will be carried out by the JICA Study Team in the period from May to June 2004.

5.3 Rehabilitation Plan

Based on the selection criteria mentioned above, the following rehabilitation works are selected.

Selected Rehabilitation Works

Scheme	Existing Facilities	Rehabilitation works
I. Ketar scheme	1. Main canal	
	1.1 Aqueduct (sheet metal flume)	- Welding - Provision of anti rust
	1.2 Lined canal	- Re-plastering of lining
		- Provision of retaining wall : 10m
		- Provision of gabion : 80m
	1.3 Earth canal	- Excavation and cleaning : 5,500m

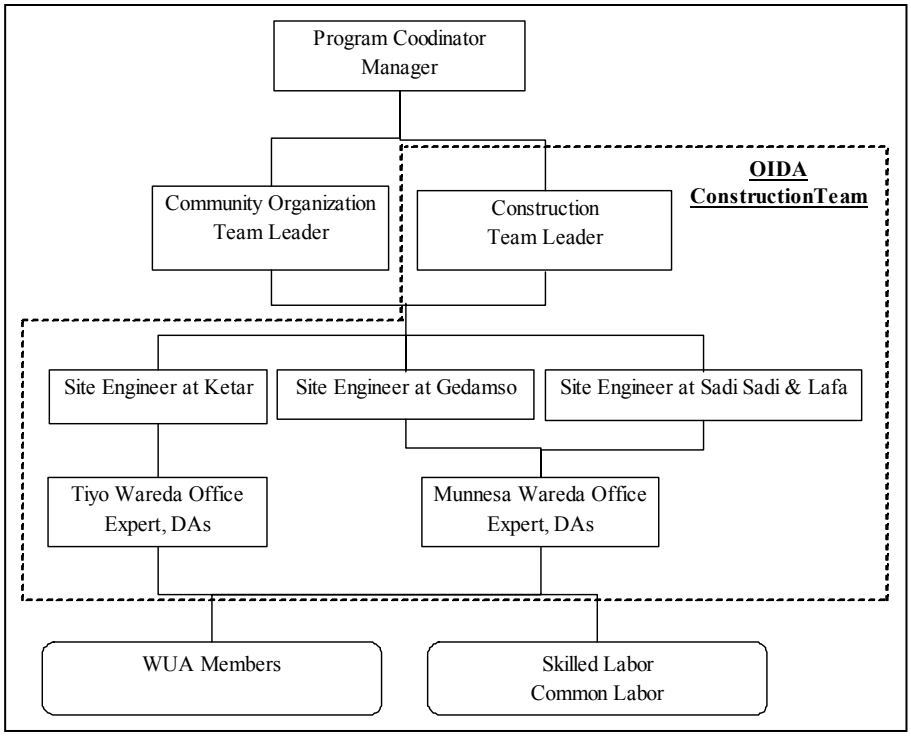
Scheme	Existing Facilities	Rehabilitation works
	1.4 Spillway	- Replacement of gates : 2 nos.
	1.5 Division box	- Provision of gates : 2 nos.
	2. Field structures	
	2.1 Culvert	- Provision of culverts : 3 nos.
II. Gedamso scheme	1. Headworks	
	1.1 Scoring sluice gate	- Replacement of sluice gate : 1 no
	2. Main canal	- Reconstruction of division box No.1 & No.2 - Excavation of earth canal : 1,000 m - Provision of canal base indicators at 50m interval - Construction of lining : 40m
	3. Secondary canal	- Excavation and cleaning - Provision of canal base indicators
	4. Tertiary and quaternary canals	- Construction of lining at TC4-4 : 85m - Excavation and filling - Provision of canal base indicators
	5. Field structures	
	5.1 Division boxes	- Modification of gates : 2 nos.
	5.2 Off-takes	- Construction of additional off-takes : 4 nos. - Provision of gates :95 nos.
	5.3 Drop	- Repairing of structures
	5.4 Culverts	- Provision of culverts : 3 nos.
	6. Night storage	- Replacement of outlet gate : 1 no
	7. Canal slope protection works	- Provision of gabion : 2 places
III. Sadi Sadi & Lafa schemes	1. Access road	- Provision of culverts - Provision of side ditch - Filling
III-1 Sadi Sadi scheme	1. Headworks	
	1.1 Wing wall, apron	- Extension of wing wall, apron and cut off
	1.2 Intake and sluice gate	- Provision of intake and sluice gates
	2. Main canal	- Construction of lining : 350m
	3. Secondary canals	- Plastering : 300m
	4. Tertiary canals	- Construction of lining : 445m
	5. Field structures	
	5.1 Off-takes	- Provision of gates
	5.2 Culverts	- Provision of culverts : 3 nos.
II-2 Lafa scheme	1. Headworks	
	1.1 Right side wing wall	- Extension of wing wall
	1.2 Sluice gate	- Improvement of gate
	2. Main canal	- Plastering of lining canal
	3. Secondary canals	- Plastering of lining canals - Increasing of wall height
	4. Tertiary canals	- Construction of canal at TC2-1
	5. Field structures	
	5.1 Division box	- Provision of gates :50 nos.
	5.2 Off-takes	- Provision of gates :23 nos. - Construction of off-takes : 4 nos.
	5.3 Drop	- Repairing of structure
	5.4 Culvert	- Provision of culvert : 1no.

CHAPTER 6 REHABILITATION WORKS

6.1 General

6.1.1 Organization of Construction Team for Rehabilitation Works

OIDA Central Branch Office organized the construction team for rehabilitation works as follows.



Organization Chart for Rehabilitation Works

JICA study team and OIDA Central Branch Office had progress meeting in biweekly and confirmed progress of rehabilitation works and problems to be solved.

6.1.2 Cost Implication of Rehabilitation Works

Estimated costs and actual expenditures for the rehabilitation works for three (3) schemes are summarized below:

Summary of Estimate Costs and Expenditures

No.	Scheme	Estimated cost (Birr)	Actual Expenditures	
			Total (Birr)	Unit (Birr/ha)
1.	Ketar	295,400	350,400	876
2.	Gedamso	106,000	160,700	945
3.	Sadi Sadi & Lafa	421,000	473,833	3,385
	Total	822,400	984,933	1,387

Source: The JICA Study Team, May 2004

6.2 Rehabilitation Works for Ketar Irrigation Scheme

6.2.1 Activities

The progress of rehabilitation programs for Ketar scheme is summarized below.

11 June 2003	: Preliminary site inspection
26 June 2003	: Site selection meeting with OIDA
2 to 16 August 2003	: Inventory survey of existing irrigation facilities
9 August 2003	: Baseline survey of WUA
17 August to 15 September	: Planning of rehabilitation plan, detailed design, and cost estimate
16 September 2003	: Meeting on rehabilitation works
26, 27 September 2003	: Preparation of rehabilitation schedule
4 October 2003	: Commencement of rehabilitation works
8 November 2003	: Preparation of plot map and plot list
10 December 2003	: Completion of rehabilitation works
11 December 2003	: Final inspection and handing-over

6.2.2 Rehabilitation Works

The items of the original and modified rehabilitation works are summarized below:

Rehabilitation Works in Ketar Scheme

Irrigation Facilities	Original	Modified
1. Main canal		
1.1 Aqueduct (sheet metal)	- Welding - Provision of anti rust : 200m	- - Provision of anti rust : 220m
1.2 Lined canal	- Re-plastering of lining : 4,350m	- Re-plastering of lining : 4,600m
	- Construction of retaining wall : 10m	- Construction of retaining wall : 20m
	- Provision of gabion : 82m^3	- Provision of gabion : 124m^3
1.3 Earth canal	- Excavation and cleaning : 5,500m	- Excavation and cleaning : 5,500m
2. Canal structures		
2.1 Cross drainage	- Construction of cross drainage: 1 no.	Not constructed
2.2 Culvert	- Construction of culverts : 3 nos.	- Construction of culverts : 3 nos.
2.3 Spillway	- Replacement of gates : 2 nos.	- Replacement of gates : 2 nos.
2.4 Division box	- Provision of gates : 2 nos.	- Provision of gates : 4 nos.
2.5 Chute	-	- Re-plastering of lining : 100 m

The schematic rehabilitation works are shown in the Figure 6.2.1.

6.2.3 Problems and Action taken during Rehabilitation Works

Problems and action taken during rehabilitation works are summarized below.

Problems occurred	Action taken
During rehabilitation works of main canal the irrigation water had been stopped. But some farmers have already started cultivation of crop and requested to get water.	OIDA site engineer and WUA members had a meeting to discuss the rotation of irrigation water. Finally they agreed that one day per week construction works was stopped and farmers could use irrigation water.
Due to shortage of dump truck in OIDA transportation works of sand and stone was delayed.	Construction schedule was reviewed.

6.2.4 Cost Implication

The comparison between preliminary cost estimate and actual expenditures is summarized below.

Estimated Direct Cost

Work Items	Estimated Cost (Birr)
Repairing of aqueduct	2,200
Re-plastering and pointing of lining canal	174,800
Provision of gabion	104,700
Construction of cross drainage	2,200
Construction of culvert	2,400
Replacement of gates at spillway	1,400
Provision of gates at division box	7,700
Total	295,400

Actual Expenditure

Expense Items	Actual Expenditure (Birr)
1. Material cost	146,300
2. Mason/Labor cost	116,100
3. Construction tool cost	10,000
4. Light and heavy equipment cost	78,000
Total	350,400

6.2.5 Participants

The number of participants for rehabilitation works of Ketar scheme is summarize below.

The Number of Participants

Staff	Man-day
OIDA staff	500
WUA members	2,800
Mason / Labor	6,850

6.3 Rehabilitation Works for Gedamso Irrigation Schemes

6.3.1 Activities

The progress of rehabilitation programs for Gedamso scheme is summarized below.

11 June 2003	: Preliminary site inspection
26 June 2003	: Site selection meeting with OIDA
2 to 16 Aug 2003	: Inventory survey of existing irrigation facilities
6 Aug 2003	: OIDA and WUA joint meeting, awareness creation
6 Aug 2003	: Baseline survey of WUA
17 Aug to 15 Sep	: Planning of rehabilitation plan, detailed design, and cost estimate
16 Sep 2003	: Meeting on plan of rehabilitation works
26, 27 Sep 2003	: Preparation of rehabilitation schedule
1 Oct 2003	: OIDA and WUA joint meeting, plan of rehabilitation works
4 Oct 2003	: Commencement of rehabilitation works
8 Nov 2003	: Preparation of plot map and plot list
23 Nov 2003	: Re-election of WUA executive committee
14 Nov 2003	: Commencement of land exchange
11 Jan 2004	: Completion of rehabilitation works
6 July 2004	: Official handing over

6.3.2 Rehabilitation Works

The work items of the original and modified rehabilitation works are summarized below:

Rehabilitation Works in Gedamso Scheme

Irrigation Facilities	Original Plan	Modified Plan
1. Headworks	- Replacement of sluice gate : 1 no	- Replacement of sluice gate : 1 no
2. Canals		
2.1 Main canal	- Excavation of earth canal : 3,700m	- Excavation of earth canal : 3,700m
	- Provision of canal base indicators	- Provision of canal base indicators
	- Construction of lining : 40m	- Construction of lining : 20m
2.2 Secondary canals	- Excavation of earth canal : 2,800m	- Excavation of earth canal : 2,800m
	- Provision of canal base indicators	- Provision of canal base indicators
2.3 Tertiary and quaternary canals	- Excavation of earth canal : 12.2 m	- Excavation of earth canal : 12.2 m
	- Construction of lining at TC4-4: 40 m	- Construction of lining at TC4-4: 40 m
	- Provision of canal base indicators	- Provision of canal base indicators
3. Canal structures		
3.1 Division boxes	- Re-construction of division box No.1 & No.2	Not constructed
	- Modification of gates : 2 pcs.	- Modification of gates : 2 pcs

Irrigation Facilities	Original Plan	Modified Plan
	- Provision of new gates : 2 pcs.	- Provision of new gates : 2 pcs.
3.2 Off-takes	- Construction of additional off-takes : : 4 pcs..	- Construction of additional off-takes : : 4 pcs..
	- Provision of gates : 168 pcs	- Provision of gates : 168 pcs
3.3 Drop	- Re-plastering of structures	- Re-plastering of structures
3.4 Culvert	- Construction of culverts : 2 nos.	- Construction of culverts : 2 nos.
4. Night storage	- Replacement of outlet gate : 1 pcs.	- Replacement of outlet gate : 1 pcs.
5. Canal slope protection works	- Provision of gabion : 44.0 m^3	- Provision of gabion : 44.0 m^3

The schematic rehabilitation works are shown in the Figure 6.3.1.

6.3.3 Problems and Action taken during Rehabilitation Works

Problems and action taken during rehabilitation works are summarized as below.

Problems occurred	Action taken
Cleaning works of main canal were carried out by WUA members. At the beginning more than 50 members were participated from both Gedamso-01 and 02. But the number of participants was gradually decreased day by day because of several reasons as follows. 1) harvest season for rain-fed crop started during rehabilitation works 2) Due to small number of WUA members comparing with scale of irrigation facilities it is so hard for members to participate continuously in clearing works	Firstly OIDA hold mobilization meeting with WUA members to increase the participants. Secondly OIDA mobilized WUA members and communities to commence land exchange and re-allocation in order to increase members.
WUA members requested OIDA extension of 2 km of canal lining works because WUA presumed seepage in the portion of earth canal is the main cause of shortage water.	OIDA engineer hold a meeting to explain that main cause of shortage water is small canal capacity due to siltation and the soils of earth canal don't cause high seepage. At this meeting they concluded that after water running test the decision would be made. On October 22 water running test was carried out between the headworks and the night storage pond. They observed sufficient water flowed to downstream. Finally WUA agreed rehabilitation works.

6.3.4 Cost Implication

The comparison between preliminary cost estimate and actual expenditures is summarized below.

Estimate of Direct Cost

Work Items	Estimated Cost (Birr)
Replacement of sluice gate	3,300
Excavation of earth canal	Carried our by WUA members
Construction of lining at main canal	7,500
Construction of lining canal at TC-4-4	24,900
Compacted fill at quaternary canals	14,000
Provision of bench mark indicators	24,200
Re-construction of division box	2,600
Provision of gates at off-takes	7,700
Re-plastering of drop	3,000
Construction of culverts	5,900
Provision of gabion	12,900
Total	106,000

Actual Expenditure

Expense Items	Actual Expenditure (Birr)
1. Material cost	58,300
2. Mason/Labor cost	40,400
3. Construction tool cost	700
4. Light and heavy equipment cost	61,300
Total	160,700

6.3.5 Participants

The number of participants for rehabilitation works of Ketar scheme is summarize below.

The Number of Participants

Staff	Man-day
OIDA staff	800
WUA members	1,050
Mason / Labor	1,700
Other agency	100

6.4 Rehabilitation Works for Sadi Sadi & Lafa Irrigation Schemes

6.4.1 Activities

The progress of rehabilitation programs in Sadi Sadi and Lafa scheme is summarized below.

21 June 2003 : Preliminary site inspection
26 June 2003 : Site selection meeting with OIDA
2 to 16 Aug 2003 : Inventory survey of existing irrigation facilities
7 Aug 2003 : Baseline survey of Sadi Sadi WUA
8 Aug 2003 : Baseline survey of Lafa WUA
26 Aug to 7 : Leveling survey of access road

17 Aug to 15 Sep : Planning of rehabilitation plan, detailed design, and cost estimate

16 Sep 2003 : Meeting on plan of rehabilitation works

26, 27 Sep 2003 : Preparation of rehabilitation schedule

14, 15 Oct 2003 : Meeting on the issues of access road maintenance with WUAs, communities along the road, PAs, and wareda administration staff

22 Oct 2003 : Commencement of road maintenance works by communities

11 Dec 2003 : Commencement of rehabilitation works in Lafa and access road by OIDA

1 Feb 2004 : Completion of rehabilitation works in Lafa

9 Feb 2004 : Commencement of rehabilitation works in Sadi Sadi

3 May 2004 : Completion of rehabilitation works in Sadi Sadi

6 July 2004 : Official handing over

6.4.2 Rehabilitation Works

The items of the original and the revised rehabilitation works are summarized below:

Rehabilitation Works in Sadi Sadi and Lafa Schemes

Irrigation Facilities	Original	Revised
1. Sadi Sadi Scheme		
1.1 Headworks	- Improvement of weir body : 1 no	- Improvement of weir body : 1 no
	- Installation of intake and sluice gates	- Installation of intake and sluice gates
1.2 Canals	- Lining of main canal : 350 m	- Lining of main canal : 600 m
	- Plastering of secondary canals : 170 m	- Plastering of secondary canals : 200 m
	- Lining of tertiary canals : 445 m	- Lining of tertiary canals : 500 m
1.3 Canal structures	- Improvement of division box : 1 no	- Improvement of division box : 1 no
	- Installation of gates at offtakes : 24 pcs.	- Installation of gates at offtakes : 24 pcs.
	- Construction of cross drainage : 1 no	- Construction of cross drainage : 1 no
2. Lafa Scheme		
2.1 Headworks	- Extension of right side wall : 1no	- Extension of right side wall : 1no
	- Maintenance of sluice gate : 1no	- Maintenance of sluice gate : 1no
2.2 Canal	- Plastering of main canal : 130 m	- Plastering of main canal : 130 m
	- Plastering of secondary canal : 2,500 m	- Plastering of secondary canal : 2,500 m
2.3 Canal structures	- Improvement of division box : 2 no	- Improvement of division box : 2 no
	- Installation of gates at offtakes : 23 pcs.	- Installation of gates at offtakes : 23 pcs.
	- Construction of culvert : 1 no	- Construction of culvert : 1 no
	- Construction of cross drainage : 1 no	- Construction of cross drainage : 1 no
3. Access Road between Goljota and Sadi Sadi / Lafa		
3.1 Road	- Road clearing work : 25.2 km	- Road clearing work : 15.0 km - Filling gully erosion : 10.2 km
3.2 Road structures	- Construction of ford/causeway : 40 nos.	-
	- Construction of causeway : 14 nos.	-
	- Excavation of road drainage	-

The schematic layout of rehabilitation works are shown in the Figure 6.4.1 to Figure 6.4.3.

6.4.3 Problems and Action taken during Rehabilitation Works

Problems and action taken during rehabilitation works are summarized as below.

Problems occurred	Action taken
In Sadi Sadi scheme WUA members requested OIDA to implement additional rehabilitation works during the rehabilitation works.	OIDA engineer held a meeting with WUA board members to discuss contents of rehabilitation works. OIDA engineer explained the limitation of budget and requested WUA to prioritize the rehabilitation works. Finally they concluded that extension of lining canal instead of construction of ford and causeway along access road.

6.4.4 Cost Implication

The comparison between preliminary cost estimate and actual expenditures is as summarized below.

Estimate of Direct Cost

Work Items	Estimated Cost (Birr)
1. Sadi Sadi	
- Improvement of weir body	15,500
- Installation of intake and sluice gates	5,500
- Lining of main canal	89,500
- Plastering of secondary canals	5,700
- Lining of tertiary canals	41,000
- Improvement of division box	3,200
- Installation of gates at offtakes	1,000
- Construction of cross drainage	2,600
1. Sub-total	164,000
2. Lafa	
- Extension of right side wall	9,000
- Maintenance of sluice gate	200
- Plastering of main canal	2,300
- Plastering of secondary canal	26,400
- Improvement of division box	200
- Installation of gates at off-takes	2,300
- Construction of culvert	1,000
- Construction of cross drainage	3,600
2. Sub-total	45,000
3. Access Road	
- Road clearing work	53,600
- Construction of ford/causeway	92,400
- Construction of causeway	66,000
- Excavation of road drainage	Constructed by communities
3. Sub-total	212,000
Total	421,000

Actual Expenditure

Expense Items	Actual Expenditure (Birr)
1. Sadi Sadi scheme	190,175
2. Lafa scheme	112,967
3. Access Road scheme	170,691
Total	473,833

6.4.5 Participants

The number of participants for rehabilitation works of Sadi Sadi and Lafa schemes is summarized below.

The Number of Participants

Staff	Man-day
OIDA staff	700
WUA members Community	6,150
Mason / Labor	4,000
Other agency	100

CHAPTER 7 WUA TRAINING

7.1 Objectives

After handing over the irrigation scheme, the responsibilities of operation and maintenance works of the facilities are transferred to WUA in principle. For sustainable scheme management capacity building of WUA is important issue. Through Program III the following capacity building programs for WUA were carried out;

1) Awareness creation for scheme management
2) Participatory rehabilitation planning using problem analysis and joint inventory survey
3) Transfer of technical skills for maintenance works of irrigation facilities
4) Water management
5) Preparation of WUA member list and plot layout map and list
6) Land distribution and exchange issue

7.2 Study Tour to Ketar Scheme

On 12 June 2004, Study Tour to Ketar irrigation scheme was carried out with the attendance of 30 WUA board members from three (3) rehabilitation scheme. After the site visiting the following issues are introduced by the board member of Ketar Genet WUA and they shared experience.

1) WUA by-law, internal regulation
2) Operation and maintenance of irrigation facilities
3) Regular water charge collection and financial management
4) Preparation and following water distribution program
5) Land distribution
6) Irrigation farming practice & marketing

CHAPTER 8 PBME OF REHABILITATION SCHEMES

8.1 Methodology

The Study prepared Project Design Matrix (PDM) as presented in Table 8.1.1. The PBME was carried out to collect and analyze necessary information in terms of the verifiable indicators stipulated in the PDM. The interviews were held to WUA board members by OIDA DAs. The monitoring aspects to WUA board members are summarized below.

Monitoring Aspects to WUA Board Members

No	Index	Monitoring Aspects
1	Irrigation performance	Cultivated area
2	No. of WUA members	No. of WUA members and actual cultivated farmers
3	Basic information of WUA	Starting year, official hand-over
4	WUA organization	Profile of WUA board member, roles of board members
5	WUA meeting	Type of meeting and frequency, attendance of meeting, agenda, record keeping and minutes of meeting
6	Financial management	Collection of water charge, collection ratio, bank and cash account, revenue and expenditure
7	Water management	Water distribution rule, water dispute, solution of dispute
8	Land distribution	Land distribution, problems, countermeasure taken
9	O&M activities of WUA	Details of O&M, frequency of O&M activities, process of O&M work
10	Bylaw of WUA	Formulation of bylaw and its contents
11	Irrigation farming	Type of crop, process to select crop, production constraints
12	WUA management	Problems on WUA management
13	Relation with the surrounding community	Some issues between WUA and surrounding community

The questionnaire survey was also made to WUA board members and some 5% of the total WUA members to ask the impacts of rehabilitation works. The PBME was carried out according to the following work flow.

1) Interview to DAs and WUAs at three schemes : 24 May to 2 June 2004
2) Questionnaire survey to WUA members : 24 May to 2 June 2004
3) Supplemental survey : 4 to 5 June 2004
4) Analyses and report preparation : 6 to 10 June 2004

8.2 Respondents

The number of respondents for interview and questionnaire is summarized below.

The Number of Respondents

Scheme	WUA	Interview to WUA board members	Questionnaire survey to WUA members
Ketar scheme	Ketar Genet	7	10
	Golja	7	12
	Hamsa Gasha	7	18
Gedamso	Gedamso	7	5
Sadi Sadi & Lafa	Sadi Sadi	7	8
	Lafa	7	8

8.3 Major Findings through PBME

The results of PBME are presented in Table 8.3.1 to 8.3.2. The followings are major findings through the PBME.

(1) Expansion of Irrigated Area by Improved Facilities

The Ketar scheme was handed over to WUA in December 2003, while both Gedamso and Sadi Sadi & Lafa schemes were in June 2004. According to the interview to the WUA boards and members, water discharge was definitely increased in all three schemes enabling them to supply irrigation water to more irrigation area. As a result, water disputes among the WUA members are significantly mitigated. The WUA board members recognize that illicit water tapping was reduced.

The irrigation area and WUA members were increased in most of the WUAs after rehabilitation as presented below.

Summary of Rehabilitation Schemes

Scheme	WUA	Plan		Before Rehabilitation (A)		After Rehabilitation (B)		Improvement Ratio (B/A)	
		Irrigation area (ha)	Member (HH)	Planted area (ha)	Member (HH)	Planted area (ha)	Member (HH)	Planted area	Member
Ketar	Ketar Genet	110	276	107	277	115	282	107%	102%
	Golja	200	180	170	190	198	202	116%	106%
	Hamsa Gasha	90	114	90	175	125	205	139%	117%
Gedamso	Gedamso	170	134	100	156	150	309	150%	198%
Sadi Sadi & Lafa	Sadi Sadi	60	210	35	240	50	240	143%	100%
	Lafa	80	50	53	140	70	145	132%	104%
Total		710	964	555	1,178	708	1,383	128%	117%

Remark: Planted Area after rehabilitation of both Gedamso and Sadi Sadi & Lafa schemes were estimated by current water volume. Because, Irrigation water was not available through main canals during the rehabilitation period, some beneficiary farmers were faced to give up dry season crop started in and after October 2003.

Source: PBME results, June 2004

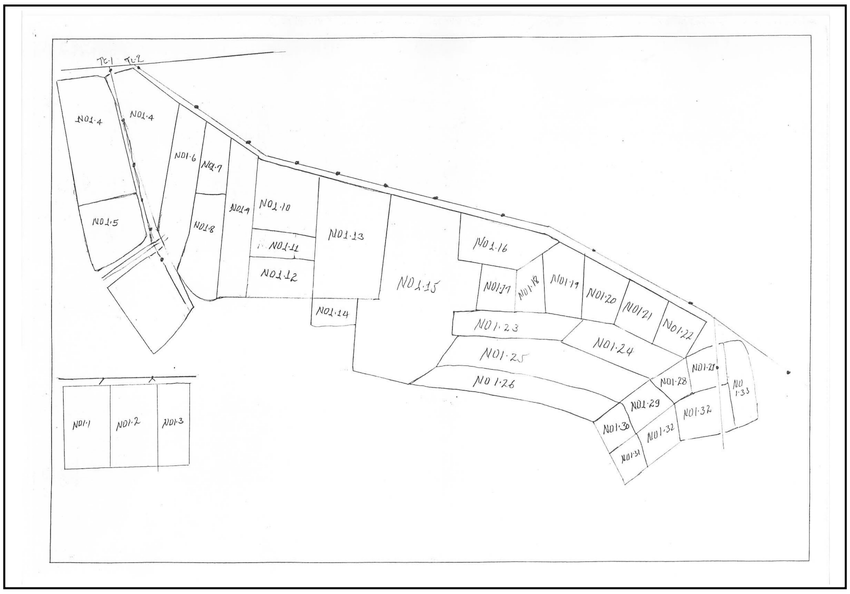
(2) Improvement of Water Management

In both Gedamso and Sadi Sadi & Lafa schemes, steel gates were installed to most of division boxes and off-takes so as to control canal water discharge to meet the water distribution schedules. The WUA boards embarked on proper water management under their responsibilities. They prepared water distribution schedules. But the responsibilities of the WUA members are still vague and not understood by all the members. Therefore, sometimes farmers are not actually punished according to the by-laws even though their behaviors are against benefits of other WUA members.

(3) Improvement of WUA Management

No plot layout maps have been prepared in almost all of the OIDA schemes. Therefore, the WUA can not properly identify member farmers and irrigable plots. Under Program III, plot layout maps were prepared for the rehabilitated schemes by DAs in association of the WUAs. The WUAs recognized that the plot layout maps are useful especially for collection of water charge and other fees from member farmers. They also understood necessity of periodical updating of the map information. Plot layout maps and lists prepared by DAs and WUAs is shown in next page.

The rehabilitation works encouraged the WUA management. All three WUAs started holding regular meetings. In addition, the WUA committees hold the monthly meetings once or twice. The WUA board of Gedamso holds the weekly meetings. The Gedamso and Lafa WUAs had election for board members after the rehabilitation. Each of three WUAs of the Ketar scheme successfully opened their bank account, in which Birr 3,000 is currently deposited.



Plot Layout Map of Ketar Irrigation Scheme

The Study for Capacity Building Programs for Community-based Irrigation Development in Central Oromia Region of Ethiopia

Plot List

Name of Scheme: Ketar Genet. Turnout / Division Box No.

Plot No.	Plot Area (ha)	Land Owner			Actual Cultivator				Planted Crop					
									EC 1993		EC1994		EC1995	
		Name	Sex	Age	Name	Sex	Age	Status[1)]	Dry	Rainy	Dry	Rainy	Dry	Rainy
1.1	0.25	Lema Balcha	M	60	Lemma Bacha	M	60	1	Potato Shallot	maize wheat	potato maize	Maize wheat	maize potato Bean	Teff wheat
1.2	0.25	Wakjira Ejersa	M	72	Wakjira Ejersa	M		1	paper	potato	Tomato	wheat	Potato Kale	wheat
1.3	0.25	Tadeshaw Wakjira	M	38	Tadeshew wakjira	M		1	Potato Shallot	wheat	potato Shallot	Teff	maize potato	Potato
1.4	2.00	Beyene Dehine	M	56	Beyene Dehine	M	56	1	Potato Shallot	wheat	potato Shallot	Teff, wh. Barely	Teff Potato Cabbage	Bean Wheat Barely
1.5	0.125	Tamiru Lakew	M	59	Tamiru Lakew	M	59	1	Potato	wheat	potato	wheat	Shallot	wheat
1.6	0.5	Assefa Haile	M	62	Assefa Haile	M	62	1	Potato	wheat	Shallot potato	Barely	Shallot potato	wheat
1.7	0.125	Sabsibe Yadate	M	~~80~~ 73	Sabsibe Yadate	M	80	1	–	–	Potato	wheat	Potato	Potato
1.8	0.125	Degarge Tesera	M	67	Daniel Yirgu	M	36	5	Potato	wheat	Potato	wheat	Potato ~~Bean~~	Bean
1.9	1.00	Taye Amare	M	38	Taye Amare	M	38	1	Potato	wheat	Shallot potato	Bean wheat	Potato Beetroot Tomato	maize wheat
1.10	1.00	Tadessa Mekonnen	M	50	Tadesse mekonnen	M	50	1	Potato	Bean Wheat	Shallot Potato	wheat Barely	Potato Teff	Sorghum Bean, wheat
1.11	0.125	Assefa Mekonnem	M	48	Assefa mekonnen	M	48	1	Potato	wheat	Potato	wheat	potato	wheat
1.12	0.125	Tadessa Mekonnen	M	50	Tadesse mekonnen	M	50	1	Potato	wheat	Potat	Sorghum	Beetroot Teff	wheat
1.13	0.75	Mulatu Nigusse	M	70	Teshome mulatu	M	60	2	–	wheat	Tomato Shallot	wheat	Tomato	Potato Shallot
1.14	0.125	Sisay Teshome	M	35	Sisay Teshome	M	35	1	Potato	wheat	Beetroot	wheat	Shallot	wheat
1.15	0.125	Nigusse Asfaw	M	50	Niguse Asfew	M	50	1	Potato	wheat	maize potat	wheat	potato	wheat
1.16	0.125	Midakso Ujina	M	65	midakso Ujina	M	65	1	Potato	wheat	Teff	wheat	Shallot	wheat
1.17	0.125	Aserat Haile	M	68	Shelelew Bahiru	M	30	2	Potato	wheat	Teff	wheat	potato	wheat
1.18	0.25	Teshome Darib	M	65	Teshome Darib	M	65	1	Potato	wheat	Shallot	wheat	potato	wheat
1.19	0.125	Teshome Abdo	M	45	Teshome Abdo	M	45	1	Potato	wheat	potato	Teff	potato	wheat
1.20	0.25	Getacho Darib	M	66	Getacho Darib	M		1	Potato	wheat	potato	Sorghum	Potato	wheat

Note 1): Status 1. Land owner himself, 2. Family of land owner, 3. Relative of land owner, 4. Hired labour, 5. Other farmer under contract with land owner

Members List of Ketar Irrigation Scheme

(4) Operation and Maintenance by WUA Members

The majority of the WUA members accept their individual responsibilities for canal maintenance and minor repairs of facilities although the members of the Sadi Sadi scheme do not fully accept their responsibility. The sense of project ownership was surely grown through participation in the rehabilitation works under Program III. Since the members generally agree to join the maintenance works such as canal desilting. The members' participation is significantly increased after the rehabilitation works.

(5) Irrigation Water Charge Collection

The water charges are already collected in Ketar scheme. Three WUAs in Ketar scheme regularly collect water charges in 100 birr/ha/year for operation and maintenance. The average collection rate is around 50% of the total expected amount in the last year. In this year water charge is still under collection. The WUAs of Gedamso and Lafa start to collect water charges in 40 birr/ha/year and 52 birr/ha/year respectively. In Sadi Sadi scheme water charge are not regularly collected but contributions are occasionally collected when needed for maintenance. The members of Sadi Sadi accept its necessity although the action has not been taken for water charge collection.

(6) Regular Monitoring

The WUA members understand the importance of regular monitoring for project performance and identification of constraints within the scheme.

(7) Improvement of Accessibility to Market

Rural accessibilities were focused on in Sadi Sadi and Lafa schemes. The road conditions were improved by participation of not only the WUA members but local communities through the rehabilitation works. Due to limited inputs for road repairing under Program III, however, the project impacts are still below expectation of stakeholders.

8.4 Lesson Learnt

8.4.1 Importance of Community Mobilization for Rehabilitation Works

OIDA places great emphases on the rehabilitation of the existing schemes. By obtaining the development fund from international agencies and donors, OIDA has implemented rehabilitation works by their staff and equipments with minimum inputs of local contractors. The most of rehabilitation works aims to rectify physical constraints, i.e. replacement and repair of deteriorated facilities. Therefore, engineers play a major role in the rehabilitation and an inventory survey of existing facilities is always a first step of the rehabilitation works.

Program III was keen to WUA management apart from the engineering aspects and prioritized the farmers' capacity building; otherwise the facilities will be deteriorated again even though full rehabilitation works are provided by OIDA. In other words, it is important to empower farmers as project owners so as to ensure the project sustainability. Instead of inventory survey of existing facilities, Program III started with problem analysis among a WUA community, who would directly confront the problems identified by all the farmers.

Program III made an attempt to verify extreme importance of awareness creation and community mobilization prior to physical rehabilitation. Especially in Gedamso scheme (Category B), farmers were encouraged and made a decision to participate in rehabilitation works. They were convinced themselves hardship and benefits from the rehabilitation work.

At same time, Program III confirmed that social workers of OIDA are important stakeholders when OIDA shares the information with farmers and to lead them to right direction. Under Program I linked with Programs II and III, the skill trainings for several techniques such as PCM, PRA and PBME were provided to OIDA staff. The JICA Study Team recommends continuing the capacity building program of social workers so that OIDA will apply the development methodology established under Program III.

8.4.2 Values of Plot Layout Maps

The utmost important issue in the WUA management is how to sustain fairness among members through day-to-day operation. A WUA board has to treat each of their members equally in any cases; otherwise WUA will lose members' confidence resulting in corruption of society. Even or fair distribution of natural resources is one of the basic concepts of the government project. However, land information is not available in most of OIDA schemes. Consequently, the WUA can not identify project beneficiaries and collect water charge from all the beneficiaries.

The Oromia state government issued a proclamation concerning land holding size to be 0.5 ha/HH within an irrigation area of government project. This means that land exchange is occasionally required among farmers when irrigation schemes are developed. Without the information of land ownership, however, it is nearly impossible to follow this government proclamation.

According to the suggestion of the JICA Study Team, OIDA DAs prepared the plot layout maps at the opportunity of the rehabilitation works under Program III. It was recognized by DAs and WUAs that the plot layout maps are essential tools for fair management of the irrigation project although its preparation and updating are costly and time-consuming.

8.4.3 Demarcation of Responsibilities for O&M between OIDA and WUA

Vague demarcation of responsibility for O&M of irrigation facilities between OIDA and WUA is one of the causes of low irrigation performance. Out of three (3) schemes Gedamso and Sadi Sadi & Lafa schemes were not officially handed over to WUA from the government. Therefore, in those schemes it was observed that WUA

members had no awareness of responsibilities for O&M and much dependency on government assistance. The rehabilitation works started from the awareness creation of WUA's responsibilities for O&M and defined the demarcation of responsibilities through PRA. Finally Program III of the Study set up clear demarcation of responsibilities at the handing over after rehabilitation.

It is recommended to set up a basic principle which will clearly define that main facilities such as headworks and main canals are under the governmental responsibilities, while on-farm facilities below off-takes of a main canal such as division boxes and field ditches are under the WUA's responsibilities. In line with such a basic principle, further detailed demarcation will be made. The following table shows the prevailing problems for headworks and proposed demarcation of their O&M.

Responsibility for Problems of Headworks

Problems	Responsibility	
	OIDA	WUA
Damaged / missing gates	○	○
Damaged intake body	●	
Sedimentation	○	○
Lack of side protection	●	
Weed infestation		●

Remark: ● main responsibility, ○ shared responsibility
Source: JICA Study Team, 2001

OIDA's engineering support will be essential for replacement of gates although cost implication will be borne by WUA. Since this problem is quite prevailing, the agreement between OIDA and WUAs has to be made at the earliest stage. Deterioration of structures such as intake body and side protection will be under full responsibility of OIDA, while regular maintenance such as desilting and weed control will be under WUA. Awareness creation among WUA will be required so as to ensure these maintenance works. The prevailing problems of main canals and proposed demarcation of responsibilities are summarized below.

Responsibility for Constraints of Main Canals

Problems	Responsibility	
	Government	WUA
Leakage	○	○
Sedimentation	○	○
Cracks	●	
Damages by livestock		●
Weed infestation		●
Lack of canal shape	○	○
Cropping on canal bank		●

Problems	Responsibility	
	Government	WUA
Breached	○	○
Damaged gates	●	
Illicit water use		●
Overtopping	○	○

Remark: ● main responsibility, ○ shared responsibility

Leakage and sedimentation are major problems, for which both OIDA and WUA have to take their own responsibilities. Lack of awareness among farmers results in damages by livestock, weed infestation, cropping on canal embankment, illicit water use, etc. According to the OIDA database only seven schemes out of 68 schemes have their own O&M manuals. According to the standard O&M rules, the O&M manuals will be prepared by OIDA and agreed with WUAs through PRA.

8.4.4 Necessity of DA Training

As frontline workers, OIDA DAs are crucial especially for community-based irrigation development under the decentralization policy. A wide range of technical knowledge and experience is required for DAs, who often provide WUAs practical advices about engineering, agronomic and financial management. Under Program III, DAs were trained through full involvement in the process of rehabilitation works from community awareness creation to construction. The capacities of DAs for three (3) schemes were remarkably improved. The Study recommends OIDA to consider the staff training program focusing on DAs.

In the area of O&M training for DAs including WUAs the JICA Study Team recommends Training of Trainers (TOT) through the following 3 steps with a close linkage each other.

Step 1 : O&M training for OIDA wareda staff and DAs
Step 2 : O&M training for WUA leaders
Step 3 : Awareness creation and O&M training for WUA members

Central Branch Office will take full responsibilities for Step 1. Step 2 will be promoted by DAs under the initiatives of the OIDA wareda offices. For this purpose, PCM and PRA specialists will be trained up at the wareda level under Step 1. Step 2 is envisaged to promote the leadership training. The WUA leaders trained under Program 2 will play important roles in Step 3 being supported by DAs. Each step will consist of the following curriculums.

Step 1 : O&M training for OIDA wareda staff and DAs

1-1 Seminars and workshops for standard O&M rules

1-2 Training courses for PCM and PRA

1-3 Skill training of O&M of irrigation facilities and irrigation farming techniques

1-4 Training for WUA management including logistics and financial issues

1-5 Training for PBME

1-6 Legal registration and application to cooperatives

Step 2 : O&M training for WUA leaders

2-1 On-site workshops

2-2 Skill training for O&M irrigation facilities and irrigation farming techniques

2-3 Leadership training in WUA

2-4 Logistics and accounting

2-5 Legal registration and application to cooperatives

Step 3 : Awareness creation and O&M training for WUA members

3-1 Problem analysis to aware problems and share information

3-2 Participatory planning of rehabilitation and O&M through PRA

3-3 Preparation of individual O&M manuals

3-4 Farm management and marketing

3-5 Legal registration and application to cooperatives

CHAPTER 9 PRELIMINARY STUDY ON MASTER PLAN OF EXSISTING IRRIGATION SCHEMES REHABILITATION PROGRAM IN OROMIA REGION

9.1 Objectives

The Study obtained a wide range of experiences and lesson learnt through the rehabilitation works under Program III. On the basis of the experiences and the lesson learnt, the master plan was preliminarily studied to indicate possible directions to OIDA for extension of rehabilitation program in Oromia Region.

9.2 Proposal for a Rehabilitation Program

In view of food security and poverty reduction, irrigation development has to be more encouraged in Oromia Region. In last decade, the government has attached top priority to irrigation development and expanded to nearly 10,000 ha by investing US$ 7.9 million during the period from 1991 to 2000. However, substantial extent of existing irrigation land, i.e. 4,000 ha, is not fully utilized for irrigation farming at present.

The rehabilitation program aims at facilitating rehabilitation works of 96 schemes in Oromia Region. The master plan consisted of four components, namely (i) project benefit monitoring and evaluation (PBME), (ii) establishment of standard O&M rules, (iii) O&M training for DAs and WUAs and (iv) implementation of rehabilitation works. Four components will be implemented in parallel. They are summarized below.

9.2.1 Component 1 : Project Benefit Monitoring and Evaluation (PBME)

Low performance of irrigation activities is caused by several incidents derived from deteriorated facilities, lack of irrigation farming techniques and poor management of WUA. PBME is important to identify such constraints prevailing in a scheme. Although PBME is a main task of DAs, farmers will be involved more in a participatory monitoring system in order to identify problems timely and at detail. The procedures for PBME have to be standardized by applying the PCM method as an effective tool. It is also important to monitor the performance after the rehabilitation to know the effects of rehabilitation and quantify the project benefits.

9.2.2 Component 2 : Establishment of Standard O&M Rules

Standard O&M rules are essential. It is recommended to set up a basic principle which will clearly define that main facilities such as headworks and main canals are

under the governmental responsibilities, while on-farm facilities below off-takes of a main canal such as division boxes and field ditches are under the WUA's responsibilities. In line with such a basic principle, further detailed demarcation will be made.

9.2.3 Component 3 : O&M Training for DAs and WUAs

The great emphasis will be placed on the capacity building of DAs and WUAs to ensure daily O&M of irrigation schemes. The master plan will encourage Training of Trainers (TOT) through the following 3 steps with a close linkage each other.

Step 1 : O&M training for OIDA wareda staff and DAs
Step 2 : O&M training for WUA leaders
Step 3 : Awareness creation and O&M training for WUA members

Central Branch Office will take full responsibilities for Step 1. Step 2 will be promoted by DAs under the initiatives of the OIDA wareda offices. For this purpose, PCM and PRA specialists will be trained up at the wareda level under Step 1. Step 2 is envisaged to promote the leadership training. The WUA leaders trained under Program 2 will play important roles in Step 3 being supported by DAs. Each step will consist of the following curriculums.

9.2.4 Component 4 : Implementation of Rehabilitation Works

The Study recognizes an importance to standardize the rehabilitation works. For this purpose, the irrigation schemes are categorized on the basis of prevailing problems. The preliminary assessment for 96 schemes investigated in the Meki study was made as presented in Table 9.2.1. The rehabilitation work will be continued on the basis of the experiences obtained under Program III.

Out of 96 schemes, 28 schemes are either rehabilitated or planed to be rehabilitated. The time schedule of the rehabilitation works of OIDA is illustrated in Figure 9.2.1. The remaining 68 schemes will be subject to further rehabilitation plan.

9.3 Action Plan for Rehabilitation Program

Program III of the Study implemented the rehabilitation of Katar, Gedamso and Sadi Sadi & Lafa schemes out of 37 schemes. Through Program III, the approach and methodology for the farmers' participatory rehabilitation work were preliminarily optimized. The proposed program will carry out the rehabilitation work as continuation manner of Program III in the command area under Central Branch Office. The implementation schedule for Components 1 to 4 will be prepared on

the basis of budgetary status under the OIDA strategic plan 2004-2006. The technical and financial assistance including provision of heavy equipment will be required for execution of the Program.

Tables

Table 1.1.1 List of Irrigation Schemes in Oromia Region (2003) (1/4)

No.	Name of the scheme	Branch Office	Location		River Basin	Source of Water	Irrgation System	Planned Area(ha)	Devel.	Benef. (HH)	Funding Source	Construction Year(EC)		Investment ('000)
			Zone	District								Started	Completed	
1	Lami	Central Branch	North Shoa	Yaya Gulale	Abbay	Spring	Gravity	200	200	682	Gov.	1988	1988	341.10
2	Taltale	Central Branch	North Shoa	Yaya Gulale	Abbay	Spring	Gravity	90	90	418	Gov.	1989	1989	322.30
3	Abbayyi	Central Branch	North Shoa	Qimbibit	Abbay	River	Gravity	26	26	100	ESRDF	1992	1992	242.35
4	Lakku	Central Branch	West Shoa	Bako Tibe	Gibe	River	Gravity	71	50	280	EEC	1986	1987	336.50
5	Ijaji	Central Branch	West Shoa	Bako Tibe	Gibe	River	Gravity	48	48	160	EEC	1988	1988	508.10
6	Abbukkoo	Central Branch	West Shoa	Bako Tibe	Gibe	River	Gravity	80	80	160	Gov.	1994	1994	1,140.20
7	Chole	Central Branch	West Shoa	Ambo	Abbay	River	Gravity	100	100	304	Gov.	1989	1989	544.30
8	Indris	Central Branch	West Shoa	Ambo	Abbay	River	Gravity	150	70	300	Gov.	1984	1986	70.00
9	Alanga	Central Branch	West Shoa	Chelia	Gibe	River	Gravity	60		153	Gov.	1995	NC	
10	Robi	Central Branch	West Shoa	Walmera	Abbay	River	Gravity	120	120	349	Gov.	1990	1991	450.80
11	Walga	Central Branch	Southwest Shoa	Waliso	Abbay	River	Gravity	150	240	637	Gov.	1990	1990	590.44
12	Qullit	Central Branch	Southwest Shoa	Amaya	Gibe	River	Gravity	200	200	234	ESRDF	1992	1994	1,584.50
13	Daddeba Gudda	Central Branch	East Shoa	Arsi Nagelle	Rift Valley Lake	River	Gravity	46	50	200	EEC	1985	1987	205.60
14	Qoraro Arsi	Central Branch	East Shoa	Arsi Nagelle	Rift Valley Lake	River	Gravity	40	40	160	Gov	1983	1983	NA
15	Meki Ziway -01	Central Branch	East Shoa	Dugda Bora	Rift Valley Lake	Lake	Pump	200	200	250	Gov	1986	1987	476..6
16	Meki Ziway -02	Central Branch	East Shoa	Dugda Bora	Rift Valley Lake	Lake	Pump	100	100	100	Gov	1988	1988	176.00
17	Meki Ziway -03	Central Branch	East Shoa	Dugda Bora	Rift Valley Lake	Lake	Pump	100	100	105	Gov	1989	1989	222.70
18	Wayyu Seriti	Central Branch	East Shoa	Dugda Bora	Rift Valley Lake	Lake	Pump	17	17	34	ESRDF	1992	1992	786.25
19	Tepo	Central Branch	East Shoa	Dugda Bora	Rift Valley Lake	Lake	Pump	10	10	43	ESRDF	1990	1990	NA
20	Sogido Bandira-01	Central Branch	East Shoa	Fantale	Awash	River	Gravity	45	55	150	EEC	1988	1988	566.20
21	Sogido Bandira-02	Central Branch	East Shoa	Fantale	Awash	River	Gravity	70	85	73	EEC	1990	1991	929.70
22	Lugo	Central Branch	East Shoa	Fantale	Awash	River	Gravity	70	57	100	EEC	1990	1990	623.50
23	Godino-01	Central Branch	East Shoa	Ada Chukala	Awash	Dam	Gravity	83	102	300	EEC	1988	1988	308.90
24	Godino-02	Central Branch	East Shoa	Ada Chukala	Awash	Dam	Gravity	95	117	346	EEC	1989	1989	400.00
25	Fultino	Central Branch	East Shoa	Ada Chukala	Awash	Dam	Gravity	85	85	177	EEC	1989	1990	366.10
26	Laftu	Central Branch	East Shoa	Shashamane	Rift Valley Lake	River	Gravity	30	30	120	EEC	1989	1989	352.60
27	Goha workie	Central Branch	East Shoa	Ada'aa Liban	Awash	Dam	Gravity	150	150	308	ESRDF	1992	1994	955.01
28	Sheled -01*	Central Branch	Arsi	Zeway Dugda	Rift Valley Lake	River	Gravity	50	50	200	IFAD	1982	1984	NA
29	Sheled -02	Central Branch	Arsi	Zeway Dugda	Rift Valley Lake	River	Gravity	30	25	100	IFAD	1988	1988	389.00
30	Arata Chufa	Central Branch	Arsi	Zeway Dugda	Rift Valley Lake	River	Gravity	100	100	317	IFAD	1985	1986	156.00
31	Dodicha	Central Branch	Arsi	Zeway Dugda	Rift Valley Lake	Lake	Pump	69	69	160	ESRDF	1992	1993	955.01
32	Bosha-Dera 01	Central Branch	Arsi	Tiyo	Rift Valley Lake	Spring	Gravity	100	100	233	IFAD	1986	1986	106.00
33	Chikilfata (Bosha-02)	Central Branch	Arsi	Tiyo	Rift Valley Lake	Spring	Gravity	60	60	220	IFAD	1987	1987	585.00
34	Katar-01	Central Branch	Arsi	Tiyo	Rift Valley Lake	River	Gravity	100	100	200	ADB	1980	1982	187.10
35	Katar-02	Central Branch	Arsi	Tiyo	Rift Valley Lake	River	Gravity	200	130	354	ADB	1982	1986	817.70
36	Katar-03	Central Branch	Arsi	Tiyo	Rift Valley Lake	River	Gravity	90	90	260	ADB	1987	1988	156.10
37	Hasen Usman	Central Branch	Arsi	Ticho	Rift Valley Lake	River	Gravity	230	230	367	IFAD	1985	1987	660.88
38	Sole bekeksa	Central Branch	Arsi	Ticho	Rift Valley Lake	River	Gravity	100	100	300	Gov	1987	1991	1,743.90
39	Kaawa*	Central Branch	Arsi	Gudabe				200		500	Gov	1978		NA

Table 1.1.1 List of Irrigation Schemes in Oromia Region (2003) (2/4)

No.	Name of the scheme	Branch Office	Location		River Basin	Source of Water	Irrgation System	Planned Area(ha)	Devel.	Benef. (HH)	Funding Source	Construction Year(EC)		Investment ('000)
			Zone	District								Started	Completed	
40	Meti metana	Central Branch	Arsi	Munessa	Rift Valley Lake	River	Gravity	40	40	180	IFAD	1986	1986	83.00
41	Dalele Simbro	Central Branch	Arsi	Munessa	Rift Valley Lake	River	Gravity	60	60	162	IFAD	1986	1986	256.00
42	Dagaga Simbiro	Central Branch	Arsi	Munessa	Rift Valley Lake	River	Gravity	40	40	270	IFAD	1987	1987	163.13
43	Shobe Gennet	Central Branch	Arsi	Munessa	Rift Valley Lake	Spring	Gravity	100	100	440	IFAD	1986	1986	95.00
44	Sadi Sadi	Central Branch	Arsi	Munessa	Rift Valley Lake	River	Gravity	60	60	221	IFAD	1988	1988	413.00
45	Lafa	Central Branch	Arsi	Munessa	Rift Valley Lake	River	Gravity	60	80	260	IFAD	1988	1990	559.85
46	Gedemso-01	Central Branch	Arsi	Munessa	Rift Valley Lake	River	Gravity	80	77	250	Gov	1989	1990	1,051.56
47	Gedemso-02	Central Branch	Arsi	Munessa	Rift Valley Lake	River	Gravity	97	93	320	Gov	1989	1990	972.24
48	Argedda	Central Branch	Arsi	Munessa	Rift Valley Lake	River	Gravity	80	80	100	Gov	1994	1994	567.60
49	Chafe Gurati	Eastern Branch	West Hararghe	Tullo	Wabe Shabele	River	Gravity	100	60	220	IFAD	1987	1988	883.37
50	Aminur Datcho	Eastern Branch	West Hararghe	Tullo	Wabe Shabele	Spring	Gravity	40	40	80	IFAD	1987	1987	425.02
51	Hirna	Eastern Branch	West Hararghe	Tullo	Wabe Shabele	River	Gravity	63	63	240	IFAD	1986	1987	745.60
52	Hirna Midegdu	Eastern Branch	West Hararghe	Tullo	Wabe Shabele	River	Gravity	20	20	90	Gov.	1994	1994	277.20
53	Midhagdu	Eastern Branch	West Hararghe	Baddessa	Wabe Shabele	River	Gravity	200	200	250	Gov.	1988	1990	902.30
54	Kase heja	Eastern Branch	West Hararghe	Chiro	Wabe Shabele	River	Gravity	187	187	750	Gov.	1982	1984	391.92
55	Homicho	Eastern Branch	West Hararghe	Chiro	Wabe Shabele	River	Gravity	150	375	600	Gov.	1982	1984	460.40
56	Mi'esso Eba	Eastern Branch	West Hararghe	Mi'esso	Wabe Shabele	River	Gravity	100		163	Gov.	1995	NC	
57	Jarjartu	Eastern Branch	East Hararghe	Melka Belo	Wabe Shabele	River	Gravity	60	60	240	IFAD	1988	1989	661.40
58	Chulul-03	Eastern Branch	East Hararghe	Girawa	Wabe Shabele	Spring	Gravity	75	75	276	Gov.	1989	1989	532.60
59	Burka Birbirsa	Eastern Branch	East Hararghe	Girawa	Wabe Shabele	River	Gravity	40	40	100	IFAD	1987	1988	206.10
60	Burka Danaba	Eastern Branch	East Hararghe	Girawa	Wabe Shabele	River	Gravity	76	76	215	Gov.	1990	1990	420.26
61	Mudena Sailo	Eastern Branch	East Hararghe	Girawa	Wabe Shabele	River	Gravity	51	51	120	Gov.			197.70
62	Melba	Eastern Branch	East Hararghe	Girawa	Wabe Shabele	River	Gravity	40	51	170	Gov.	1991	1991	154.00
63	Harew (Babi ali-02)	Eastern Branch	East Hararghe	Chelenko	Wabe Shabele	River	Gravity	40	40	130	IFAD	1988	1988	206.38
64	Ramis	Eastern Branch	East Hararghe	Chelenko	Wabe Shabele	River	Gravity	60	60	273	Gov.	1989	1989	514.32
65	Saydi Ali	Eastern Branch	East Hararghe	Dader	Wabe Shabele	Spring	Gravity	45	46	160	IFAD	1987	1987	690.00
66	Babi Ali	Eastern Branch	East Hararghe	Dader	Wabe Shabele	River	Gravity	40	46	130	IFAD	1987	1987	707.30
67	Galan sadi	Eastern Branch	East Hararghe	Dader	Wabe Shabele	River	Gravity	100	40	360	IFAD	1987	1988	879.90
68	Nadhi Gelan sadi	Eastern Branch	East Hararghe	Dader	Wabe Shabele	River	Gravity	75	75	375	IFAD	1993	1994	717.30
69	Erer Medda Talila	Eastern Branch	East Hararghe	Goro-Gutu	Awash	River	Gravity	100	100	600	IFAD	1987	1988	1,252.80
70	Erer Goda	Eastern Branch	East Hararghe	Goro-Gutu	Wabe Shabele	River	Gravity	103		466	Gov.	1995	NC	
71	Water-01	Eastern Branch	East Hararghe	Kersa	Wabe Shabele	Spring	Gravity	30	30	130	IFAD	1986	1986	585.80
72	Water-02	Eastern Branch	East Hararghe	Kersa	Wabe Shabele	River	Gravity	40	71	150	IFAD	1987	1987	233.60
73	Water-03	Eastern Branch	East Hararghe	Kersa	Wabe Shabele	River	Gravity	40	40	260	IFAD	1988	1988	517.00
74	Arara-01	Eastern Branch	East Hararghe	Kersa	Wabe Shabele	River	Gravity	56	40	276	IFAD	1986	1987	411.34
75	Arara-02	Eastern Branch	East Hararghe	Kersa	Wabe Shabele	River	Gravity	16	25	100	IFAD	1986	1987	150.00
76	Burka Weldiya	Eastern Branch	East Hararghe	Jaarsoo	Awash	River	Gravity	30	30	127	IFAD	1993	1994	147.60
77	Hara Deneba	Eastern Branch	East Hararghe	Bedeno	Wabe Shabele	River	Gravity	102	102	376	Gov.	1994	1994	716.60

Table 1.1.1 List of Irrigation Schemes in Oromia Region (2003) (3/4)

No.	Name of the scheme	Branch Office	Location		River Basin	Source of Water	Irrgation System	Planned Area(ha)	Devel.	Benef. (HH)	Funding Source	Construction Year(EC)		Investment ('000)
			Zone	District								Started	Completed	
78	Waro	Western Branch	Jimma	Dado	Gibe	River	Gravity	150	150	370	Gov.	1982	1987	243.30
79	Kawwa	Western Branch	Jimma	Dado	Gibe	River	Gravity	120	120	270	Gov.	1988	1990	1,078.40
80	Abono	Western Branch	Jimma	Saka Chokorsa	Gibe	River	Gravity	160	160	480	Gov.	1986	1987	274.40
81	Nadda Gudda	Western Branch	Jimma	Omo-Naada	Gibe	River	Gravity	120	120	240	Gov.	1987	1989	2,002.51
82	Birbirsa	Western Branch	Jimma	Karsa	Gibe	River	Gravity	70	70	332	Gov.	1988	1989	657.51
83	Kersa	Western Branch	Jimma	Karsa	Gibe	River	Gravity	70	70	150	ESRDF	1992	1994	854.80
84	Chilalo	Western Branch	Jimma	Sokoru	Gibe	River	Gravity	73	73	150	ESRDF	1992	1993	906.80
85	Gulufa	Western Branch	Jimma	Saka Chokorsa	Gibe	River	Gravity	25		60	Gov.	1995	NC	
86	Koba Gudda	Western Branch	Ilubabor	Gachi	Abay	River	Gravity	56		210	Gov.	1987	1989	1,628.20
87	Loko	Western Branch	Ilubabor	Bedele	Abay	River	Gravity	72	70	240	Gov.	1991	1992	922.23
88	Bondo	Western Branch	West Wallagga	Sayo	Abay	River	Gravity	50	50	150	Gov.	1987	1988	521.30
89	Borta	Western Branch	West Wallagga	Sayo	Abay	River	Gravity	30	30	120	Gov.	1988	1988	384.70
90	Gi'ii	Western Branch	West Wallagga	Gimbi	Abay	River	Gravity	65	60	450	Gov.	1989	1989	140.10
91	Sokoru	Western Branch	West Wallagga	Manasibu	Abay	River	Gravity	30	30	265	Gov.	1990	1990	330.09
92	Melka Allati	Western Branch	West Wallagga	Manasibu	Abay	River	Gravity	38	38	83	ESRDF	1992	1994	563.10
93	Kujur	Western Branch	West Wallagga	Nejo	Abay	River	Gravity	57	57	110	Gov.	1991	1991	699.30
94	Deggero	Western Branch	West Wallagga	Nejo	Abay	River	Gravity	120	120	296	Gov.	1989	1990	1,294.20
95	Kalla	Western Branch	West Wallagga	Nejo	Abay	River	Gravity	47	47	90	ESRDF	1993	1994	766.40
96	Muchuchatu	Western Branch	West Wallagga	Jarso	Abay	River	Gravity	30		138	Gov.	1995	NC	
97	Gibe lemu-01	Western Branch	East Wallagga	Bila Sayo	Gibe	River	Gravity	54	54	250	Gov.	1986	1989	489.78
98	Gibe lemu-02	Western Branch	East Wallagga	Bila Sayo	Gibe	River	Gravity	60	60	120	Gov.	1989	1989	326.52
99	Gambella Tare	Western Branch	East Wallagga	Bila Sayo	Gibe	River	Gravity	80	80	235	Gov.	1984	1987	711.30
100	Jare	Western Branch	East Wallagga	Bila Sayo	Abay	River	Gravity	40	40	112	Gov.	1991	1991	404.70
101	Jaato-01	Western Branch	East Wallagga	Guto Wayu	Abay	River	Gravity	54	25	250	Gov.	1986	1987	629.90
102	Jaato-02	Western Branch	East Wallagga	Guto Wayu	Abay	River	Gravity	60	29	157	Gov.	1990	1990	474.23
103	Tate	Western Branch	East Wallagga	Guto Wayu	Abay	River	Gravity	18	18	40	Gov.	1986	1987	278.20
104	Basaqa	Western Branch	East Wallagga	Guto Wayu	Abay	River	Gravity	60	60	281	Gov.	1991	1992	541.00
105	Abono-02	Western Branch	East Wallagga	Dega Leka	Abay	River	Gravity	80	80	248	Gov.	1987	1988	855.55
106	Nagesso	Western Branch	East Wallagga	Jima Arjo	Abay	River	Gravity	50	30	120	Gov.	1989	1990	247.20
107	Wajja	Western Branch	East Wallagga	Gida Kiramu	Abay	River	Gravity	60	25	130	Gov.	1989	1989	329.44
108	Dangago-01	Western Branch	East Wallagga	Jima Rare	Abay	River	Gravity	60	18	160	Gov.	1988	1988	307.60
109	Dangago-02	Western Branch	East Wallagga	Jima Rare	Abay	River	Gravity	20	12	162	Gov.	1990	1990	111.30
110	Indiris	Western Branch	East Wallagga	Sibusire	Gibe	River	Gravity	40	40	93	Gov.	1994	1994	797.80
111	Chirecha	Western Branch	East Wallagga	Leka Dullecha	Gibe	River	Gravity	50	50	100	Gov.	1994	1994	596.80
112	Gabar	Western Branch	East Wallagga	Jimma Horro	Abay	River	Gravity	40	40	63	ESRDF	1992	1993	663.20
113	Blbala	Western Branch	East Wallagga	Jimma Ganneti	Gibe	River	Gravity	63		110	Gov.	1995	NC	
114	Hababa Chambe	Southern Branch	Guji	Hagera Mariam	Wabeshabale	River	Gravity	60	60	200	Gov.	1987	1989	1,056.10

Table 1.1.1 List of Irrigation Schemes in Oromia Region (2003) (4/4)

No.	Name of the scheme	Branch Office	Location		River Basin	Source of Water	Irrgation System	Planned Area(ha)	Devel.	Benef. (HH)	Funding Source	Construction Year(EC)		Investment ('000)
			Zone	District								Started	Completed	
115	Aflata	Southern Branch	Guji	Hagera Mariam	Wabeshabale	River	Gravity	102		166	AFD	1995	NC	
116	Melka Hidda	Southern Branch	Guji	Gelan Abeyya	Rift Valley Lake	River	Gravity	70	70	136	Gov.	1991	1991	601.20
117	Hila	Southern Branch	Guji	Adola	Ganale dawo	River	Gravity	40		100	IFAD	1994	NC	
118	Haya Oda	Southern Branch	Bale	Menna Angetu	Ganale dawo	River	Gravity	100	100	370	IFAD	1987	1988	1,254.80
119	Chirri	Southern Branch	Bale	Menna Angetu	Ganale dawo	River	Gravity	50	50	140	IFAD	1986	1987	364.07
120	Gomgoma	Southern Branch	Bale	Menna Angetu	Ganale dawo	River	Gravity	70	71	213	Gov.	1986	1987	733.49
121	Dayu	Southern Branch	Bale	Menna Angetu	Ganale dawo	River	Gravity	124		210	IFAD	1992	NC	
122	Arada Tare	Southern Branch	Bale	Ginnir	Ganale dawo	River	Gravity	120	120	368	IFAD	1987	1988	881.60
123	Dinik	Southern Branch	Bale	Ginnir	Ganale dawo	River	Gravity	200	200	137	Gov.	1988	1990	2,265.00
124	Oda Roba	Southern Branch	Bale	Ginnir	Ganale dawo	River	Gravity	70	70	150	Gov.	1989	1990	759.50
125	Okuma	Southern Branch	Bale	Dodola	Wabeshabale	River	Gravity	80	100	420	Gov.	1989	1990	970.00
126	Shayya *	Southern Branch	Bale	Sinana Disho	NA	NA	NA	230		271	NA	NA	NA	NA
127	Hora Boka *	Southern Branch	Bale	Sinana Disho	NA	NA	NA	32		183	NA	NA	NA	NA
128	Malka Butta *	Southern Branch	Bale	Goro	NA	NA	NA	85		340	NA	NA	NA	NA
129	Ambentu	Southern Branch	Bale	Agarfa	Wabeshabale	River	Gravity	200	200	523	Gov.	1991	1992	884.10
130	Gabe	Southern Branch	Bale	Berebere	Ganale dawo	River	Gravity	200		400	IFAD	1992	NC	
131	Dugda Adu	Southern Branch	Bale	Berebere	Ganale dawo	River	Gravity	400		642	AFD	1995	NC	
132	Hambella	Southern Branch	Bale	Berebere	Ganale dawo	River	Gravity	200		400	IFAD	1994	NC	
	Total							11,166	9,115	31,288				

Notes

***:Schemes developed before the establishment of regional state So, we are unable to get full informations**

NA Data is Not Available

NC- Schemes not completed

FL-Flooding, Gr-Gravity, PG-Pump and Gravity

Table 2.5.1 List of Existing Irrigation Schemes under OIDA Central Branch Office

Name of Scheme	Location		Area Development			Number of Beneficiaries			Comp-leted	Facility Status/1	WUA Status/2	Water Sources	Intake Structure	Site Location/3	Category/4
	Zone	District	Plan	Actual	%	Plan	Actual	%							
1 Kawa	Arsi	Gedeb	200	20	10	500	80	16	1985	D	C	River	Pump	Out	C
2 Meti Metana	Arsi	Munesa	40	30	76	160	140	88	1993	B	C	River	Headworks	In	B
3 Sadi Sadi	Arsi	Munesa	60	30	50	221	221	100	1995	C	C	Spring	Headworks	In	C
4 Arata Chufa	Arsi	Ziway Dugda	100	80	80	317	250	79	1993	B	A	River	Headworks	In	D
5 Shalad-01	Arsi	Tiyo	50	47	94	196	184	94	1995	A	A	Spring	Headworks	In	D
6 Shalad-02	Arsi	Tiyo	25	0	0	100	0	0	1995	D	D	Spring	Headworks	In	C
7 Bosha-01	Arsi	Tiyo	100	60	60	233	320	137	1993	C	C	Spring	Headworks	In	C
8 Bosha-02	Arsi	Tiyo	60	35	58	220	140	64	1994	C	C	Spring	Headworks	In	C
9 Shoba	Arsi	Munesa	100	60	60	279	270	97	1993	C	B	Spring	Headworks	In	A
10 Gedamso-01	Arsi	Munesa	80	58	72	250	73	29	1996	A	C	River	Headworks	In	B
11 Gedamso-02	Arsi	Munesa	90	10	11	320	20	6	1997	B	C	River	Headworks	In	B
12 Lafa	Arsi	Munesa	80	40	50	150	140	93	1997	C	C	River	Headworks	In	C
13 Sole Bakekisa	Arsi	Tena	100	40	40	300	150	50	1998	D	C	River	Headworks	In	C
14 Meti Samburo	Arsi	Munesa	60	40	67	160	164	103	1993	B	B	River	Headworks	In	D
15 Dagaga Samburo	Arsi	Munesa	40	20	50	60	40	67	1996	C	B	River	Headworks	In	A
16 Ketar-01	Arsi	Tiyo	110	55	50	400	120	30	1987	C	A	River	Headworks	In	A
17 Ketar-02	Arsi	Tiyo	200	100	50	200	200	100	1993	C	A	River	Headworks	In	A
18 Ketar-03	Arsi	Tiyo	90	45	50	360	0	0	1992	C	A	River	Headworks	In	A
19 Hasen Usman	Arsi	Tena	230	280	122	527	1,000	190	1994	A	B	River	Headworks	Out	D
20 Homba	Arsi	Merti	100	10	10	400	40	10	-	D	C	River	Headworks	Out	C
21 Teltele	N. Shoa	Detre Libanes	90	145	161	418	220	53	1996	A	C	Spring	Headworks	Out	B
22 Lami	N. Shoa	Yaya Gulale	30	56	187	200	225	113	1996	A	B	Spring	Headworks	Out	D
23 Indris	W. Shoa	Ambo	175	380	217	875	1,087	124	1993	A	B	River	Headworks	Out	D
24 Laku	W. Shoa	Bako-Tibe	50	6	12	40	9	23	1994	D	D	River	Headworks	Out	C
25 Walga	W. Shoa	Wanchi & Waliso	150	518	345	637	1,070	168	1998	A	B	River	Headworks	Out	D
26 Walshamo	W. Shoa	Chaliya	50	0	0	160	0	0	1995	D	D	River	Headworks	Out	C
27 Robi	W. Shoa	Meta Robi	120	123	103	410	410	100	1998	A	C	River	Headworks	Out	B
28 Chole	W. Shoa	Ambo	100	200	200	464	500	108	1996	A	B	River	Headworks	Out	D
29 Lugo	E. Shoa	Fentale	57	53	93	70	64	91	1996	A	B	River	Headworks	Out	D
30 Sogido Bandira-01,02	E. Shoa	Fentale	140	110	79	117	65	56	1998	B	C	River	Headworks	Out	B
31 Godino	E. Shoa	Adama	219	183	84	270	182	67	1996	A	C	River	Dam	In	B
32 Balbala	E. Shoa	Adama	100	42	42	400	182	46	1996	C	C	River	Dam	In	C
33 Fultino	E. Shoa	Adama	85	33	39	182	165	91	1998	D	C	River	Dam	In	C
34 Laftu	E. Shoa	Shashamene	30	3	8	60	14	23	1996	D	D	River	Headworks	Out	C
35 Kararo Arsi	E. Shoa	Arsi Negele	42	38	90	253	85	34	1990	A	B	River	Headworks	Out	D
36 Tiliku Debeda	E. Shoa	Arsi Negele	50	25	51	200	101	51	1995	C	D	River	Headworks	Out	C
37 Meki-Zway	E. Shoa	Meki & Duguda-Bora	1,500	33	2	3,375	132	4	1984	D	D	Lake	Pump	In	C
Total			4,903	3,008	61	13,484	8,063	60							

Note: /1 Evaluation of facility status, A~D (fully functioning~ deteriorated)

/2 Evaluation of WUA activities, A~D (very active ~ poor)

/3 Site location, In or Out(within or out of 100km from Addis Ababa)

/4 Category, A~D (A:deterioration of facilities, B:weak WUA management, C:A+B or other constraints, D:functioning at reasonable level)

Table 3.2.1 Results of IEE of Rehabilitation of Existing Schemes based on Check Lists in FSRDF's Small Scale Irrigation Project Technical Handbook

Potential Impact Area	Ketar Scheme	Gedamso Scheme	Sadi Sadi & Lafa Scheme
1. Socio-Economic Effect			
1.1 Social Issues			
(1) Voluntary resettlement	x	x	x
(2) Involuntary resettlement	x	x	x
(3) Social Acceptability	+	+	+
(4) Change in population density	x	x	x
(5) Religious and cultural assets	x	x	x
(6) Women	x	x	x
(7) Conflict among communities and people	++	+++	++
1.2 Economic Activities			
(1) Employment opportunity	++	++	+
(2) Agriculture land	++	++	+
(3) Modification of economic activities	+	+	++
1.3 Effect on Public and Private Services			
(1) Drinking water supply	x	x	x
(2) Hospitals / health care facilities	x	x	x
(3) Education / schools	x	x	x
(4) Transportation	x	x	+
(5) Housing facilities	x	x	x
1.4 Health and Sanitary Issues			
(1) Outbreak of endemic diseases	x	x	x
(2) Outbreak of epidemic diseases	x	x	x
(3) Increased use of agro-chemicals	-	-	-
2. Biological and Ecological Changes			
2.1 Changes in Vegetation	x	x	x
2.2 Grazing Land	x	-	x
2.3 Impacts on Important Aquatic Flora and Fauna	x	x	x
2.4 Degradation of Ecosystem with Biological Diversity	x	x	x
2.5 Encroachment into Natural Forest and Wildlands	x	x	x
2.6 Wildlife Reserve	x	x	x
2.7 Valuable Fish Species	x	x	x
2.8 Accelerated Soil Erosion and Sediment Production	x	x	x
2.9 Soil Salinization	-	-	-
3. Water Resources			
3.1 Changes in Surface Water Hydrology	x	x	x
3.2 Water Quality Changes	-	-	-
4. Air Quality	x	x	x

Notes:
+ : Beneficial effects, + ~ +++ (low ~ high)
- : Negative effects, - ~ --- (low ~ high)
x : No effects

Table 3.2.2 Results of IEE of Rehabilitation of Existing Schemes based on Check List in the Study Guideline on Environmental Impact Assessment prepared by MOWR

Type of Impact	Ketar Scheme			Gedamso Scheme			Sadi Sadi & Lafa Scheme		
	Severity of impact	Duration of impact	Extent of impact	Severity of impact	Duration of impact	Extent of impact	Severity of impact	Duration of impact	Extent of impact
Loss of vegetation	x	x	x	x	x	x	x	x	x
Impact on human health	x	x	x	x	x	x	x	x	x
Soil erosion	x	x	x	x	x	x	x	x	x
Sediment transport	x	x	x	x	x	x	x	x	x
Land loss	x	x	x	x	x	x	x	x	x
Water quality pollution	low	medium	local	low	medium	local	low	medium	local
Soil salinity	low	medium	local	low	medium	local	low	medium	local
Reservoir siltation	x	x	x	x	x	x	x	x	x
Impact on wild life	x	x	x	x	x	x	x	x	x
Displacement of people	x	x	x	x	x	x	x	x	x
Impact on wetland	x	x	x	x	x	x	x	x	x
Impact on downstream ecology	low	short	local	low	short	local	low	short	local
Impact on groundwater	x	x	x	x	x	x	x	x	x
Water use conflict	low	short	local	low	short	local	low	short	local
Water logging	x	x	x	x	x	x	x	x	x

Notes:
x : No effects

Table 4.2.1 Findings in Existing Facilities and Required Rehabilitation Works in Ketar Scheme (1/2)

Existing Facilities		Findings	Required Rehabilitation Works
Conveyance Canal	Sheet metal flume	The section at the inlet and outlet from the flume have leakage and has inspected it is due to long age of the construction between the metal sheet and concrete.	Well finishing at the joints and the transitions is proposed and also the outlet pool has to be plastered for better future life of the system
		Leakage in flume section at pillar no 11 is observed. Moreover the sheet metal is exposed to wearing because of the existing anti rust is out of use. In addition to that some broken bracing are observed.	Welding the flume section and bracing are main important activities in this rehabilitation program. And provision of anti rust to the whole section of the flume is proposed.
	Lined canal	Generally the canal is long age thus, it is deteriorated and creates leakage along the main canal.	Provide chiseling and apply plaster at internal and external side of the canal.
		The external side of the canal is neither pointed nor plastered, thus this also exaggerates the leakage. In addition to that the shape and depth of the external sidewall is not extending to the foundation depth.	As far as the topography allows apply pointing to the external face of the canal.
		Gully is developed at chainage 0+477 at the right side of the canal	Retaining wall is proposed.
		After chainage 1+500 most of the left side canal is earthen and it is shapeless, and broken. This resulted to long travel time to reach the command area and also most of the water is pooled in the canal and exposed to leakage and other losses.	Provision of regular shape by providing lined canal is proposed, even if the excavation is difficult.
		From chainage 1+740 to 2+180 the canal passes through very loose fine ash soil material and this material makes caves. And the canal is maintained frequently, but still there are serious cracks along 3.5-meter depth canal foundation.	This issue is the major risk of this project and solving the problem to the grass roots is important. For this effect the following options are discussed in the field and also with experts participated in the construction of the project 20 years back and other experts involved in the foundation material. • Change the route of the canal to the left side; this will need the mobilization of heavy machineries to the site. • Building lightweight flumes, this has problem in getting reasonable depth of footing. • Provision of Gabion masonry cut off at the right side of the canal and substitute the existing earth between the canal and the Gabion by selected material. Option one is adapted to the sustainability of the system as well as construction and operation easiness
		The gate provided for the Spillway at chainage 4+700 is out of order, thus regulation is by the use of local materials	Replacement of the existing gate has to be made.

Table 4.2.1 Findings in Existing Facilities and Required Rehabilitation Works in Ketar Scheme (2/2)

Existing Facilities		Findings	Required Rehabilitation Works
Conveyance Canal	Lined canal	The Division box at chainage 6+981 to wards Golja is not provided with gate, thus it needs provision and the gate towards the pond is provided with gate, but it needs spindle to operate easily.	Provide gate for the canal towards Golja and maintain the gate to the pond
Field Structures	Culverts	At the more densely cattle paths to the river, culverts were not provided across the main canal. As a result, the non-beneficiaries place stones in the canal and will allow their cattle to pass the river. Therefore according to the observation three culverts are required at the following two locations.	Provisions of culverts at chainage 2+588, 4+618 and 6+900 are recommended.
	Division Boxes	-	Nil
	Flume	-	Nil
	River Crossing	-	Nil
Water Pond/Nigh t Storage	Pond body	At chainage 7+200 water storage pond exists and the purpose is to supply drinking water as well as for cattle's for the Goljota town. And this pond inlet is provided with energy dissipater but at the discharging point is worn out, thus it is proposed for maintenance.	The importance of pond is for drinking and this topic is out of the scope of irrigation project, but for keeping the existing system with out any interruption at the down stream the maintenance has to be provided.
	Inlet Structure	The embankment fill at the top of the pond is eroded and the existing pond capacity is below the spillway level. And this also creates scarcity of water at the down stream users and creates water stress.	Level survey is conducted along the bank top level and it shows level variation of 4m between the eroded part and the constructed bank top level. To this effect compacted fill work is recommended up to the existing pool bank top level.
	Outlet Gate and Spillway		Nil

Table 4.3.1 Findings in Existing Facilities and Required Rehabilitation Works in Gedamso Scheme (1/3)

Existing Facilities		Findings	Required Rehabilitation Works
Headwork	Left side wing wall extension	In the left bank of the headwork the flood is passing behind the wing wall structure therefore, it scour the weir .In addition to that it will be difficult to get water in the direction of the intake (i.e. right side of the head work) in the dry period of the year.	Extension of the left bank wing wall to the end of abutment is proposed so as to avoid the escape of water in the dry season behind the wing wall as well as to avoid scouring of the structure in this free end embankment. Therefore to this effect the cross section of the existing retaining wall section is extended as a measure
	Sluice gate	The sluice gate, which uses to remove accumulated sediments behind the weir, is not functioning properly, because wood logs carried by flood damaged it. Therefore in irrigation period filling sacks of sands behind the sluice gate bottom is applied to use the system with minimum leakage. And this creates sediments intrusion in the canal, hence it created a lot of problems in the system, even if there is Silt trap Basin. According to the beneficiaries the sluice gate has not functioned effectively in its life. This is due to the fact that the community has no concept to the function and operation of the gate.	To mitigate this replace the existing sluice gate and provide it with trash racks to avoid any bounce on the gate. Training regarding operation skill has to be given for the community.
Conveyance Canal	Intake to Division Box 1 (0+000 - 1+037)	The main canal, which runs from the Intake to Division Box No 1, has impounding behavior, and so the flow is not flowing in the required rate to reach Division Box .No 1 At chainage between 0+800 - 0+900 the canal bed has a slope of 1/4760m/m, which is almost, nil, hence pooling in canal is created between chainage 0+750 - 0+800 and over flowing at the canal top is observed at around chainage 0+725. In addition to that the Box Culvert inlet crown level is placed at a higher level this also have an impact to impoundment of water in the canal as well as over topping the canal.	The canal slope should be made to join the bed slope of chainage 0+500 and 1+025(i.e. Box Culvert inlet) this rises the canal bed slope to 1/746m/m. The adjustment of the canal bed slope will raise the canal bank top level and this is shown in the proposed working drawing profile. The earth canal section between Division Box 1 and Intake is located at chainage 0+975-1+025has to be lined so as to avoid canal damage and to increase the canal efficiency.
	Division Box 1 to Division Box 2 (1+037 - 1+625)	During the daily routine maintenance of earth canal the design bed slope will not be achieved with out level survey instrument, therefore the flow detention period is long as well as reduce the efficiency of irrigation.	To facilitate the daily routine maintenance of the canal bed trapezoidal section lined canal mark is proposed at interval of 50m..
	Division Box 2 to Night Storage (1+625 - 3+699)	1+625-1+810 : Canal is pooled, and flow rate and speed are very small 2+100-2+286 : Seepage to the adjacent command area 3+069-3+080 : Canal is broken 3+557-3+688 : Cavity hall formed	Lined Canal

Table 4.3.1 Findings in Existing Facilities and Required Rehabilitation Works in Gedamso Scheme (2/3)

Existing Facilities		Findings	Required Rehabilitation Works
Distributio n Canal	Secondary Canals	As it is shown in the schematic lay out the project (Gedamso 01 and Gedamso 02) have four secondary canals, which are SC1, SC2, SC3, and SC4.As per the community problem indicates water is pooled in the SC4 canal between chainage 0+000-0+250。	Level survey is conducted to check the flow as well as the canal bed level in the above chainage, and it is found as a problem of daily routine maintenance management. But to facilitate the maintenance benchmark is proposed in the canal bed. In addition to that due attention has to be given in the activity of operation and maintenance of the system.
	Tertiary and Quaternar y Canals	TC2-2：0+105-0+382 Water is pooled in the canal. Canal is in fill but it is collapsed at the bed, therefore the slope and the section are changed from the designed.	Lined Canal
		TC4-4：0+253-0+337 Canal is broken. Drainage canal is filled by sediments and it overflows to this canal.	Lined Canal
		TC4-4：0+907-1+741 Canal is broken and filled by sediments. All tertiary canals, except TC4 are drained in this system. Because the secondary drain fills frequently.	Lined Canal
		QC4-4-1- 4-4-12： Canals are not available in cut and /or fill. It is not used for the anticipated target since the project implementation	Provide canal excavation and compacted fill.
Field Structure s	Division Boxes	Division Boxes terminology is used to structures which divide water from the main canal to the secondary canal. And the masonry box structure and gates provides water control in the main canal. Division Box 1 and 2 (At chainage 1+037,and 1+625): At this structure only the secondary canal inlet is provided with gate and more water is released towards this secondary canal .The gate is operated well, for full and/or zero flow rates only, but in the controlling of the gate for flow rate in between, it is impossible. Due to the gate is out of order for this purpose.	At the secondary canal inlet gate ring has to be welded so that the use of keys is possible and controlling the flow rate at any level will be possible. Provision of gate to the main continuing canal is also recommended to make the management easy and to be safe in case of failure of one gate
	Off-takes (Turnouts)	The name Turnouts and Off takes are used for the same purpose in this project, but for identification it is assumed Off takes are those placed on secondary and tertiary canals and supply to field ditch is not allowed directly from these canals. The major problem of the Off takes is lack of gate, and this creates a problem in water management. In addition to that cracks at the pipe out lets are observed	Steel gates are proposed in each of the structures so as to increase efficiency of the project and to avoid the observed water scarcity. And as preventive measure to cracking it is recommended to chisel the cracked area and provide plastering. Additional Offtakes are proposed at the following locations so as to improve the water management of the system.
	Drops	In general most of the drops have cracks at the joints between the canal protection wing wall and vertical face of the drop. And drops in Quaternary canal 4-4-3 to 4-4-12 are filled by soils, because the system is not used for irrigation since the project implementation.	Chiseling widely around the cracked area and apply three coats of plaster is proposed, And also if it is serious remove the part and provide new masonry.

Table 4.3.1 Findings in Existing Facilities and Required Rehabilitation Works in Gedamso Scheme (3/3)

Existing Facilities	Findings	Required Rehabilitation Activities
Culverts	Culverts are provided systematically in the project, but now the community changes their settlement from the previous places and this makes the requirement of additional culvert at two locations..	Provision of culverts at chainage 1+857 and 3+410 and serious maintenance at TC 4-4 at chainage 0+151 are recommended.
Night Storage Pond and Fence	Along the joints of the Night Storage Pond inlet, cracks are observed. And the out let gate is out of order, thus the community uses sacks of sands for closing and opening the out flow from the Night Storage Pond.	It is proposed to plaster the Inlet canal and to replace the outlet gate.
	Night storage pond fence was constructed using wooden poles and barbed wire, but now termites attack the pole and it is failed. Thus the pond is exposed to different activities and these interventions affect the water availability in the pond and its life to Gedamso 02 project.	Fencing with angle iron poles and barbed wire is proposed.
River Crossings and Protections	The river crossing which is located on the main canal at chainage 0+106 is eroded at the down stream part of the river crossing structure where the flood is discharged. Therefore before exposing the structure to risk attention has to be given	Gabion protection is proposed and the sketch is attached in annex. In addition to that to decrease the load on this stream some of drain is lead to enter before the headwork and a catch drain of 45 meter is proposed.
	In the main canal at chainage 0+175 big gully is developed and it expands towards the canal from the river, This will creates serious problem in the future sustainability of the system	It is proposed to cease the expansion of the gully and to stabilize the developed gullies from further expansion by providing Gabions across the gully.

Table 4.4.1 Findings in Existing Facilities and Required Rehabilitation Worksin SadiSadi & Lafa Schemes (1/3)

1. Sadi Sadi Scheme

Existing Facilities		Findings	Required Rehabilitation Works
Headwork	Sediments	Sediments filled the headwork; and only to the intake canal and sluice gate direction is free from sediments accumulation. The problem is in the design that is due to river flow direction; placing and type of sluice gate. And also discussion is made on the importance of clearing the sediments from the reservoir and provision of another sluice gate direct to the flow direction.	The sediments are already consolidated for seven years operation therefore it is stabilized. Thus on the efficiency of the weir body there is no impact as well as on the availability of water in the irrigation period. In addition to that for the safety of the intake gate and hammering impact of the work the weir will be in risk if opening of another gate direct to the river flow direction is attempted. And also if the sluice gate is not operated as required the problem will be developed again. Thus it is decided to leave as it is.
	Left side wing wall extension, apron and cut off extension	The left side wing wall, apron and cut off were not constructed for the full length of the river cross section, thus the flow is passing through this week line.	Extending the wing wall, apron and cut off to the full length is proposed and sketch is attached in annex.
	Intake and sluice gate	The Intake and sluice are not provided with gate, therefore at the gate position farmers use sacks of sands for the regulating of the system.	Provision of steel gate is essential so as to provide good service in water management. (Sketch is attached in annex.)
Conveyance canal	0+065 - 1+080	The main canal, which passes through vertical cliff and big boulders canal route for the length of 0.35km, has no regular canal shape and slope. And also at most of the canal part it passes over suspend earth canal over the verge of the cliff, thus the farmers are looking carefully towards this problem.	Excavating the boulder rocks is hardly possible, by using different construction techniques and machineries and provision of lined canal is proposed
Distribution Canal	Secondary canals	At division Box No 1 the water is divided in to two directions, and the main is called secondary canal 1 and the second is used as a tertiary canal and/or field canal. Field structures were provided for secondary canal 1 only and most of the distribution is from this canal. In addition to that there are canals constructed from off takes of this canal, but they are not provided systematically to better water management. And also this major canal passes through the fences of the farmers, hence it is difficult to manage the water for efficient use.	Inspection is made towards secondary canal 1 and some of the so-called tertiary canals and according to the soil type, which is sandy; much of the water is lost through the distribution. Therefore lined canal is proposed for those canals, which diverted from Off-take No 1 and Off-take No 2 towards the right and left direction respectively.
		SC1 : 0+221-0+235 Canal is deteriorated.	Plastering
		SC1 : 0+287-0+424 Canal is deteriorated.	Plastering
		SC1 : 0+532-0+552 Canal is deteriorated.	Plastering
		SC1 : 3+557-3+688 Canal is deteriorated.	Plastering

Table 4.4.1 Findings in Existing Facilities and Required Rehabilitation Worksin Sadi Sadi & Lafa Schemes (2/3)

Existing Facilities		Findings	Required Rehabilitation Works
Distribution Canal	Tertiary canals	TC1: 115m of length High percolation due to sandy soil and caving	Lined canal
		TC2: 330m of length High percolation due to sandy soil and caving	Lined canal
Field Structures	Off-takes (Turnouts)	The major problem of the Off-takes is lack of gate, and this creates a problem in water management. And also the supply of water to the field is directly from the secondary canal Off-take and the supply is rotational between the Off-takes. In addition to that cracks at the pipe out lets are observed.	Steel gates are proposed in each of the structures so as to provide fair water distribution between the users and to increase efficiency of the project. And as preventive measure to cracking it is recommended to chisel the cracked area and provide plastering.
	Culverts	The canals from the off-take crosses foot - path (field roads) and water loss is observed along these canals. Following to these roads and canals the land is eroded seriously, thus due attention is required for this case.	Provision of culverts at chainage 0+333, 0+432, and 0+768 at SC1
Access Road		The project is located at 10 km distance from Meti town and 21 km from Goljota town through very difficult dry weather road using four wheel drives In spite of this fact to reach the project the farmers are in problem to the supply of irrigation inputs and to access their product for market.	To change the life standard of the beneficiaries in this project and other four projects along this road (i.e. Goljota – Meti - Sadi Sadi) the accessibility of the road has to be improved. Construction of access road from Goljota to Sadi Sadi is proposed and this road can serve about four irrigation projects to have the supply of irrigation inputs and to provide their products to market.

2. Lafa Scheme

Existing Facilities		Findings	Required Rehabilitation Works
Headworks	Right side wing wall extension	The down stream right bank of the headwork wing wall was closed to the abutment using earthen embankment, but now it is eroded therefore, currently it is not closed to the abutment. This resulted to flow over the weir and erodes the main canal.	Extension of the wing wall to the abutment using masonry is proposed so as to avoid the risk of biting the lined canal as well as the headwork structure.
	Sluice gate	The sluice gate, which uses to remove accumulated sediments behind the weir, is not functioning properly, because it hasn't be used since the project implementation till now. Therefore, sediments are filled behind the weir and sluice gate becomes out of order (deteriorated).	To provide the targeted uses of the component the sediments behind the weir body and sluice gate has to be removed and provision of grease and small maintenance has to be given for the gate.
Conveyance canal	Main canal	Even though the main canal, which runs for 126 m length, has not provided maintenance, there is no serious crack, except just at the intake out let. But the structure like the drop and energy dissipaters shows cracks at their floors.	Provide chiseling and apply plastering at the internal face of the structures. In addition to that provision of plastering to the whole main canal at the internal face is recommended.
Distribution Canal	Secondary canals	Parallel to the secondary canal there exists a footpath and flood passes through it and this resulted to erosion and exposing the lined canal to risk.	Filling the foot path to the required depth is recommended in addition to that pointing the external face of the canal makes the system more sustainable.
		Due to tearing of the existing lined canal there exists cracks at six to ten meter distance along the secondary canals.	Provide chiseling and apply plastering at the internal face of the Main and, Secondary canal.

Table 4.4.1 Findings in Existing Facilities and Required Rehabilitation Works in Sadi Sadi & Lafa Schemes (3/3)

Existing Facilities		Findings	Required Rehabilitation Works
Distribution Canal	Secondary canals	At the sharp end of the canal water is splashed above the canal top because of the radius curvature of the canal was not attain to the required height in the construction.	At the sharp bend locations increase the height of the lined canal.
	Tertiary canals	All canals passed through sandy clay soil, and aligned in steep slope topographic landforms. Therefore, the main and secondary canals are fully lined and the Tertiary canal, which is branched from the secondary canal 2/1, is earth. This canal is under risk due to the above cases and floods coming from the catchments.	To avoid the risk this tertiary canal is proposed to be lined, and to pass the catchments floods safely the existing culvert is modified to use as a cross drainage. And excavation of catch drains parallel to the tertiary canal is must.
Field Structures	Division box 1 at 0+127 and 2 at 0+230	The system is designed for proportional control; hence provision of gate was not considered. But the existing lay out is not as per the intended approach. In addition to that the floors of the division boxes are out of use, thus maintenance is must.	Gates are proposed and also, maintenance of the existing foundation and plastering of the internal face are considered.
	Off-takes (Turnouts)	The major problem of the Off takes is lack of gate, and this creates a problem in water management. In addition to that cracks at the pipe out lets are observed.	Steel gates are proposed in each of the structures so as to increase efficiency of the project and to avoid the observed water scarcity. And as preventive measure to cracking it is recommended to chisel the cracked area and provide plastering.
Field Structures	Off-takes (Turnouts)	The supply of water to the field is directly from the secondary canal off-take and the supply is rotational between the off-takes. Therefore the amount of water released for one irrigation interval is not as per the recommended rate for the specific topography and intended irrigation system (continuous flow). This created problem and can be seen from the amount of land eroded by the discharge from the out let.	Provisions of additional four off-takes are recommended at chainage of 0+491, 0+968 at SC 1 and 0+002, 0+336 at SC2.
	Drops	Since all canals are lined drops are few, and are in a good condition. But the joints between the upstream protection and vertical wall of the drop needs minor maintenance.	Chiseling widely around the cracked area and apply three coats of plaster is proposed.
	Culverts	Culverts are provided systematically in the project, but now the community changes their settlement from the previous places and this makes the requirement of additional culvert.	Provision of culverts at SC 2/2 and chainage 1+064.is recommended.
Drainage system		To this project every essential components of irrigation project were not incorporated as well as the system is not provided with any drainage system. In addition to that the topography allows to release the excess water through the natural drains.	Therefore the project is not sensitive to the provision of maintenance and/or construction of drainage system.
Access Road		The project is located at five km distance from Meti town and 21 km from Goljota town through very difficult dry weather road using four wheel drives In spite of this fact to reach the project the farmers are in problem to the supply of irrigation inputs and to access their product for market even if their food security is moderately reserved.	To change the life standard of the beneficiaries in this project and other four projects along this road (i.e.Goljota – Meti - Lafa) the accessibility of the road has to be improved. Construction of access road from Goljota to Lafa is proposed and this road can serve about four irrigation projects to have the supply of irrigation inputs and to provide their products to market

Table 8.1.1 Project Design Matrix : Rehabilitation of Existing Schemes (Program III)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal:			
Family income in irrigation schemes is improved	Annual gross income of farmers household is increased.	Farmers' income survey	Marketing system of agricultural products is not changed drastically.
Project Purpose:			
Low irrigation performance of existing schemes is improved and schemes are managed in sustainable.	1. Irrigation efficiency (actually irrigated area / planed scheme area) is increased. 2. Water charge for O&M is properly collected.	1. Interview to WUA members using plot layout map. 2. Bank account and cash account	Marketing system of agricultural products is not changed drastically. Agriculture extension support is given to farmers by other agency.
Outputs:			
1. Functioning of irrigation facilities is improved	1-1 Rehabilitation work is completed. 1-2 Water discharge is increased.	1-1 Completion report of rehabilitation and handing over document 1-2 Measurement of water discharge	Abnormal weather is not happened in project site.
2. Organization operational capability of WUA is improved.	2-1 WUA member's list is prepared and updated. 2-2 WUA meeting is held periodically. 2-3 WUA chairman and board members are elected and, their responsibilities are properly carried out. 2-4 WUA accounting is managed fairly	2-1 WUA member's list 2-2 Record or minutes of WUA activity 2-3 Interview to WUA member 2-4 Accounting Record	Price of crop is not declined drastically.
3. Water management is carried out properly.	3-1 Water distribution schedule is prepared and, scheduled water distribution is realized 3-2 Water conflicts among members is not reduced	3-1 Water distribution schedule 3-2 Interview to WUA member	
4. Operation and maintenance of irrigation facilities are carried out sufficiently by WUA	4-1 Water use fee for O&M is collected and saved properly. 4-2 Maintenance of facilities is regularly carried out by WUA	4-1 Accounting record, Bank account 4-2 Observation of water volume	
5. Monitoring system of OIDA and WUA are established	5. Monitoring of WUA activities is done periodically and, result of monitoring is submitted to OIDA central office	5. Monitoring report prepared by OIDA and WUA	
6. Accessibility to market is improved	6. No. of visiting of middle-mans is increased.	6. Interview to WUA member	
Activity 1-1 Inventory survey of irrigation facilities 1-2 Participatory rehabilitation planning by PRA 1-3 Survey, design and preparation of construction plan 1-4 Procurement of material and equipment and, rehabilitation work Problem analysis with WUA member 2-1 Preparation of member's list and cadastre map 2-2 Training of WUA management and accounting 2-3 Preparation or review of by-law 2-4 Land exchange and consolidation 2-5 Study Tour (Site Visit) 2-6 Review of regulation for water distribution 3-1 Training for water distribution 3-2 Establishment of O&M structure and regulation 4-1 Training for O&M 4-2 Establishment of monitoring system in OIDA 5-1 Implementation of monitoring 5-2 Organize workshop 5-3 Rehabilitation work of access road 6-1	**Input** OIDA 1. Assignment of staff 2. Provide land, office and other necessary facilities 3. Provide some equipment WUA 1. Participation in planning of implementation plan 2. Participation in construction work and monitoring activity 3. Partial burden of necessary equipment for construction JICA Study Team 1. Assignment of Expert 2. Provide equipment for construction and monitoring(Heavy Equipment and Vehicle) 3. Provide necessary equipment and materials for construction 4. Per diem for OIDA staff 5. Cost burden for training and workshop		Personnel of OIDA branch office and wareda office is not changed drastically. Preconditions 1 Basic Policy of Oromia Province on Irrigation Development (Decentralization and Participatory Development) is sustained and financial, personnel and institutional support is provided by OIDA 2. Sustainable water source was captioned (at least two years continuously)

Table 8.3.1 Summary of Status of WUA after Rehabilitation (As of June 2000) (1/5)

No.	Basic Information	Ketar Scheme			Gedamso Scheme	Sadi Sadi & Lafa Scheme	
		Ketar Genet WUA	Golja WUA	Hamsa Gasha WUA	Gedamso WUA	Sadi Sadi WUA	Lafa WUA
1.	Irrigation Area						
1.1	Planed command area(ha)	110	200	90	170	60	80
1.2	Irrigated area after	115	198	125	94	44	36
1.3	Ratio (1.2 / 1.1)	105%	99%	139%	55%	73%	45%
2.	No. of WUA members						
2.1	Planned (HH)	276	180	114	134	210	140
2.2	Current WUA members (HH)	285	202	205	309	240	145
2.3	Actual beneficiaries (HH)	282	166	204	238	174	145
2.4	Ratio (2.3/2.2)	99%	82%	100%	77%	73%	100%
2.5	Average plot size of actual beneficiaries(ha/HH)	0.41	1.19	0.61	0.39	0.25	0.25
3.	History of scheme						
3.1	Completion of construction(G.C)	1986	1993	1993	1997	1997	1997
3.2	Official handing over(G.C)	2001	2001	2001	2004	2004	2004
4.	WUA Organization						
4.1	WUA board member / No.	- Chairman / 1 - Vice Chairman /1 - Secretary /1 - Tresurer /1 - Casher /1 - Auditor /3 - Block leader /9	- Chairman / 1 - Vice Chairman /1 - Secretary /1 - Tresurer /1 - Casher /1 - Auditor /1 - Block leader /5 - Others / 10	- Chairman / 1 - Vice Chairman /1 - Secretary /1 - Tresurer /1 - Casher /1 - Auditor /1 - Block leader /7	- Chairman / 1 - Vice Chairman /1 - Secretary /1 - Tresurer /1 - Casher /1 - Auditor /3 - Block leader /5 - Credit committee/ 3 - Others / 2	- Chairman / 1 - Vice Chairman /1 - Secretary /1 - Tresurer /1 - Casher /1 - Inspector / 1 - Others / 14	- Chairman / 1 - Vice Chairman /1 - Secretary /1 - Casher /1 - Auditor /2 - Others / 11
4.2	Roles of WUA board member						
	(1)Secretary	-Preparation of meeting minutes - Keeping WUA documents	-Preparation of meeting minutes -Receiving letters and present to board members - Keeping WUA documents	-Receiving letters and present to board members - Keeping WUA documents	-Preparation of meeting minutes -Receiving letters and present to board members - Keeping WUA documents	-Preparation of meeting adgenda and minutes	-Preparation of meeting minutes -Controlling attendance -Labor work
	(2)Tresurer	-Controlling financial movement of WUA -Resister all financial movement -Keeping acount book	-Registering income and expenditure of WUA -Resister all financial movement -Keeping acount book	-Registering income and expenditure of WUA -Resister all financial movement -Keeping acount book	N.A.	-Controlling financial movement of WUA -Checking financial expense and contribution	No treasurer
	(3)Cashier	-Handling WUA's cash -Collection irrigation fee -Pay expenditures	-Handling WUA's cash -Collection irrigation fee -Pay expenditures	-Handling WUA's cash -Collection irrigation fee -Pay expenditures	N.A.	-Handling the finance contributed by WUA	-Handling the finance contributed by WUA
	(4)Auditor/Inspector	-Controlling all activities of executive committee and financial movement -Reporting at general assembly meeting	No auditor	-Controlling all activities of executive committee and financial movement -Reporting at general assembly meeting	-Controlling all activities of executive committee	No inspection committee and auditor	-Inspection of movement of money

Table 8.3.1 Summary of Status of WUA after Rehabilitation (As of June 2000) (2/5)

No.	Basic Information	Ketar Scheme			Gedamso Scheme	Sadi Sadi & Lafa Scheme	
		Ketar Genet WUA	Golja WUA	Hamsa Gasha WUA	Gedamso WUA	Sadi Sadi WUA	Lafa WUA
5.	Regular Meeting of WUA						
5.1	WUA board meeting						
	(1) Frequency	1 time/ month	1 time/ month	2 times/ month	every week	1 time/ month	1 time/ month
	(2) Average atendance rate	86%	71%	71%	67%	71%	75%
5.2	General assembly meeting						
	(1) Frequency	2 times/ year	2 times/ year	4 times/ year	4 times/ year	1 time/ month	1 time/ month
	(2) Average atendance rate	70%	50%	88%	26%	50%	57%
5.3	Main agenda of meeting	-Canal cleaning and silt removal -Water distribution program and schedule -Protection livestock from damage on structure -Maintenance and guard fee collection	-Canal cleaning and maintenance -Water distribution program and schedule -Maintenance fee collection -The way to strengthen WUA	-Canal cleaning and silt removal -Water distribution program and schedule -Protection livestock from damage on structure -Maintenance and guard fee collection -Teaching WUA by-law	-Canal clearing program -Water distribution program -Avoiding not to damage facilities by cattles -Discussion on WUA internal bylaw -Decision on fee collection from members -Cultivating plot in command area	-Canal maintenance and cleaning -To avoid water stealing -To organize cooperatives -To discuss on irrigation technology -To solve the problems arisen by users -Water distribution -Increasing cultivated area	-Water distribution -WUA contribution -To discuss on irrigation extention -To discuss market and market outlet -Irrigation farmmanagement and protection of cattle
5.4	Documentation and filing						
	(1) Handing over document	Yes	Yes	Yes	Yes	Yes	Yes
	(2) Bylaw	Yes	Yes	Yes	Yes	Yes	Yes
	(3) Minutes of Meeting	Yes	Yes	Yes	Yes	Yes	Yes
	(4) Out-going letter	Yes	Yes	Yes	Yea	Yes	Yes
	(5) In-coming letter	Yes	Yes	Yes	Yes	Yes	Yes
6.	Financial Management						
6.1	Water charge						
	(1) Collection of water charge	Yes	Yes	Yes	Yes	No	Yes
	(2) Purpose	O&M Guard salary	O&M Guard salary	O&M Office work	O&M	-	O&M
	(3) Price of water charge	Birr 100/ha	Birr 100/ha	Birr 100/ha	Birr 40/ha	-	Birr 52/ha
	for Guard salary	Birr 12/head	Birr 3/head	Birr 5/head	-	-	-
	(4) Frequency of collection	1 time/ year	1 time/ year	1 time/ year	Not yet fixed	-	1 time /year
	(5)Collection ratio						
	2002 G.C.	30%	5%	N.A.	N.A.	N.A.	17%
	2003 G.C.	54%	24%	63%	N.A.	N.A.	0%
	2004 G.C.	8% (under collection)	6% (under collection)	8%(under collection)	N.A.	N.A.	0%
6.2	Cooperatives						
	(1) Registration of cooperatives	No	No	Yes	Yes	No	Yes
	(2) Share	-	-	Birr 25/head	Birr 50/head		Birr 60/head
	(3) Registration fee	-	-		Birr 36/head		

Table 8.3.1 Summary of Status of WUA after Rehabilitation (As of June 2000) (3/5)

No.	Basic Information	Ketar Scheme			Gedamso Scheme	Sadi Sadi & Lafa Scheme	
		Ketar Genet WUA	Golja WUA	Hamsa Gasha WUA	Gedamso WUA	Sadi Sadi WUA	Lafa WUA
6.3	Bank and cash account						
	(1) Year of open bank account	1999	1999	N.A.	No bank acount	No bank account	No bank account
	(2) Bank Name	Assela commercial bank	Assela commercial bank				
	(2) Bank account balance (birr)	1,453	250.7	3,000	-	-	-
	(3) Cash kept by WUA (birr)	300	150	300	1,000	-	200
	(4) Total amount (birr)	1,753	400.7	3,300	1,000	-	200
6.4	Main items of revenues	Maintenance fee	Maintenance fee	Water charge	Share & Resistration fee	Punishment	Maintenance fee from members
		Guard fee	Guard fee	Guard fee	Sales tax	Membership fee	Punishment fee
		Punishment fee	Punishment fee	Punishment fee	Sales tax from middle-man		
6.5	Main items of expenditure	Canal maintenace	Canal maintenace	Canal maintenace	Perdium for board member	-Office maintenance	Expense for accused members(to court)
		Salary for canal and gate keepers	Salary for canal and gate keepers	Salary for canal and gate keepers	Statineries	-Statineries	Perdiem for board members
		Stationeries	Stationeries	Stationeries			
		Perdiem for WUA board members	Perdiem for WUA board members	Perdiem for WUA board members			
6.6	Accounting documents and filling						
	(1) Account book	Yes	No	No	No	No	No
	(2) Receipt	Yes	Yes	Yes	Yes	No	No
7.	Water management						
7.1	Method of water distribution	On Monday and Tuesday it can be irrigated according to rotation schedule	From Wednesday to Friday it can be irrigated according to rotation schedule	On Saturday and Sunday and durind night time it can be irrigated according to rotation schedule	During day time for Gedamso-1, during night time for night storage of Gedamso-2	Low stream first policy is practiced	Lower stream first policy is practiced
7.2	Dispute of water distribution	No	Non WUA members sometimes violate water distribution schedule	Some members use water without following schedule.	The main cause of dispute was water stealing without following schdule. Currently these problems have been decreased.	No even water distribution Drainage problem	Stealing of water sometimes
7.3	Solution of dispute	Solved by board member according to by-law	Solved by board member according to by-law	Solved by board member according to by-law	Solved by board member or report to local court if beyond WUA.	After investigation, punishment is given	After investigation, punishment is given

Table 8.3.1 Summary of Status of WUA after Rehabilitation (As of June 2000) (4/5)

No.	Basic Information	Ketar Scheme			Gedamso Scheme	Sadi Sadi & Lafa Scheme	
		Ketar Genet WUA	Golja WUA	Hamsa Gasha WUA	Gedamso WUA	Sadi Sadi WUA	Lafa WUA
8.	Land distribution and allocation						
8.1	Method of land distribution	Maximum land holding size is 0.5ha/HH. Land transfer to land owner's children above 18 years old	Based on the Oromia proclamation land exchange is practiced.	Members distribute 0.25ha for all members through exchange rainfed land before Oromia proclamation	For land owner:0.5ha/HH, For married family member:0.5ha, For children above 18 years old:0.25ha, the rest exchange for non-relative outside command area	No land distribution because most plots size is about 0.1 ha	Land owners get a maximum 0.5ha. Other members get less than 0.5ha.
8.2	Dispute of land distribution	Lack of commitment by land owner in some case	Land distribution is not easily implemented	Some members disagree to reallocate land	Violation of agreement of land distribution. Lnad transfer to children below 18 years	No	There is difficulty to implement the land distribution policy
9.	O&M Activities						
9.1	Regular works						
	(1) Daily works	Canal and gate guarding	Canal and gate guarding	Pond, canal and gate guarding	-	-	Controlling water distribution
	(2) Bimonthly works	Canal maintenance	-	Canal maintenance and filling	Canal clearing	-	Canal clearing
	(3) Quarterly works	-	-	-	-	-	-
	(4) Half-yearly works	Canal clearing	Canal clearing	Canal cleaning	-	-	-
	(5) Yearly works	-	-	-	-	-	-
9.2	Needs based works	N.A.	Maintenance works	N.A.	N.A.	Canal clearing, road maintenance	N.A.
10.	By law						
10.1	Formulation of by-law	Yes	Yes	Yes	Yes	Yes	Yes
10.2	Main contents	-Rules and regulations of water distribution program	-Rules and regulations of water distribution program	N.A.	-Penaltites for missuse of the scheme and irrigation water	-Penaltites for absence from participatory works	-Penaltites for missuse of the scheme and irrigation water
		-Financial contribution	-Punishments		-Penaltites for absence of canal cleaning and meeting	-Schedule of canal clearing, financial contribution and water contribution	-Penaltites for absence of canal cleaning and meeting
		-Punishments			-Farm land protection from cattle		-Farm land protection from cattle
11.	Irrigation farming						
11.1	Type of crops in dry season 2004						
	(1) 1st crop	Potato	Potato	Potato	Onion	Maize	Sugarcane
	(2) 2nd crop	Shallot	Onion	Shallot	Haricot bean	Chili	Maize
	(3) 3rd crop	Teff	Teff	Haricot bean	Tomato	Sugar cane	Haricot Bean

Table 8.3.1 Summary of Status of WUA after Rehabilitation (As of June 2000) (5/5)

No.	Basic Information	Ketar Scheme			Gedamso Scheme	Sadi Sadi & Lafa Scheme	
		Ketar Genet WUA	Golja WUA	Hamsa Gasha WUA	Gedamso WUA	Sadi Sadi WUA	Lafa WUA
11.2	Production constraints	-Marketing	-Marketing	-Marketing	No improvement seed & fertilizer	-Transporation to market	-Affection by desease
		-Disease affection	-Affection by blight rust	-Affection by blight rust	Marketing constrain	-Disease on crops	-Lack of market and accessability
		-No improvement seeds, chemicals, fertilizer	-Soil problems	-Soil problems	Lack of capital	-Lack of improved seed materials	-Lack of seed materials
					Crop desease		-Storage and transport facilities for vegitable
11.3	Marketing						
	(1) Market place	Farm side	Farm side	Farm side	Farm side	Kanchare	Meti/Goljota
		Golja town	Golja town, Aselle	Golja town	Goljota town	Kersa	Kersa
	(2) Trainsportation	Donkey's back	Donkey's back,	Donkey's back	Donkey's back,	Donkey's back	Donkey's back
	(3) Problems related marketing	Low price	Low price	Low price	Fluctuation on prices	Price control by middlemen	No access road
		Price fluctuation	Price fluctuation	Price fluctuation	Lack of market information		Price control by middlemen
12	Difficulty to manage WUA	Conflict with PA leaders		Lack of market information	Conflict between cooperative & non-cooperative members	Lack of road infrustructure	Crops and irrigation facilities are damaged by livestock
		Irrigation facirities are damaged by cattle from neighboring Digulu Xijo district		Lack of financial skill	Lack of improved seed & fertilizar	Lack of improved seed materials & chemicals	Bloodship relationship problems to manage to make decisions
				Lack of skill of WUA management	Low attentance on WUA meeting		Difficulty to implement land distribution
					High registration fee to join cooperative		Reluctancy to pay O&M fee due to lack of by-laws
13	Inpacts from Rehabilitation						
13.1	Positive Impact	Water management was improved	Water shortage problem was solved	Production increased	Water discharge was increased	Water discharge is increased	Accessability for vehicles was improved due to road maintenance
		Irrigation area is increased	Frequency of repair and maintenance works of canals was decreased	Maintenance work decreased	Efficient water distribution using gates	Water stealing was decreased because of gate installation	Sufficient water
				Sufficient water	Becoming easy clearing work based on bench mark	Efficient water management is exercised	Efficient use of water due to gate installation
					Increased number of beneficiaries		Canal leakage was decreased
13.2	Negative Impact	Water fee collection rate become low			Confricts were created because of land reallocation	Drainage problems	Conflicts due to land arrangement

Table 8.3.2 Results of Questionnaire Survey on Impacts of Rehabilitation to WUA Board Member (1/2)

Question		Ketar Scheme			Gedamso	Sadi Sadi & Lafa	
		Ketar Genet WUA	Golja WUA	Hamsa Gasha WUA	Gedamso WUA	Sadi Sadi WUA	Lafa WUA
1. Rehabilitation Works							
Q1-1	Did WUA fully cooperate with OIDA in the rehabilitation works?	Yes	Yes	Yes	Yes	Yes	Yes
Q1-1a	How many man-day did farmers participate in the rehabilitation works?	405 man-day	403 man-day	1,488 man-day	862 man-day	115 man-day	180 man-day
Q1-1b	What kinds of works did farmers participate?	Canal cleaning Supplying water Supplying local material	Canal cleaning Supplying water Supplying local material	Quering Supply stone Supplying water	Canal clearing Road maintenance	Canal clearing Supplying water Road maintenance	Cleaning of canal Road maintenance Quering
Q1-2	Does WUA understand the importance of participatory works?	Yes	Yes	Yes	Yes	Yes	Yes
Q1-3	Do you feel that OIDA's rehabilitation works meet WUA's needs?	Yes	No Answer	Yes	Yes	No	Yes
Q1-3a	If "No" at Q1-3, please describe the reason.	-	Chute structure was not repaired completely	-	-	Maintenance works were not followed to our need	-
Q1-4	Did WUA meet any problems during rehabilitation works	No	No	Yes	Yes	Yes	Yes
Q1-4a	If "Yes" at Q1-4, what kinds of problem? (please describe)	-	-	Interruption of cropping calendar due to rehabilitation works	1. Land reallocation and rehabilitation works caused interruption of cropping calendar 2. Some plots could not be cultivated due to land exchange	Interruption of cropping calendar due to rehabilitation works	Interruption of cropping calendar due to rehabilitation works
2. Irrigation Performance							
Q2-1	Was the total irrigated area increased after rehabilitation?	Yes	Yes	Yes	Yes	Yes	Yes
Q2-2	Is water discharge increased after rehabilitation works?	Yes	Yes	Yes	Yes	Yes	Yes
Q2-3	Is there any water shortage after rehabilitation?	No	No	No	No Answer (Not all plots were cultivated)	Yes	Yes
Q2-4	Can you utilize the plot map for scheme management?	Yes	Yes	Yes	Yes,but some members are missed in the list	No Answer	No
3. WUA Performance							
Q3-1	Was the performance of WUA board member improved after rehabilitation works?	Yes	Yes	Yes	Yes	No Answer	Yes
Q3-2	Do WUA members become cooperative for WUA's activities?	Yes	Yes	Yes	No	Yes	Yes
Q3-3	Is the number of conflicts among WUA members decreased after rehabilitation?	Yes	Yes	Yes	Yes	Yes	Yes
Q3-4	Can WUA and WUA board member solve conflicts among WUA members	Yes	Yes	Yes	Yes	No	No
Q3-5	What are the major conflicts among member?	1.Some members don't follow water distribution schedule 2.Misuse of irrigation facilities 3.Using other farmer's plot to access water	1.Misuse of irrigation facilities 2.Damage of irrigation facilities by cattles	No	1.Conflict between cooperatives and non-cooperative memberes 2.Land distribution issues 3.Some members don't follow	1.Some members don't follow water distribution schedule 2.Crops are damaged by cattles	1.Crops are damaged by cattles 2.Uneven land distribution
Q3-6	Do you have meetings regularly?	Yes	Yes	Yes	Yes	Yes	Yes

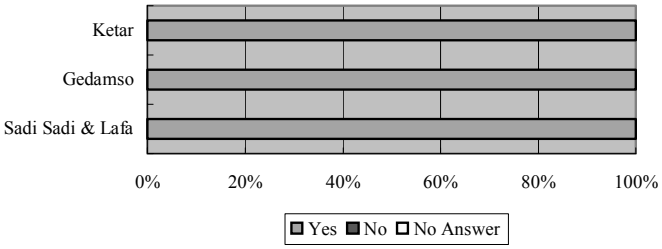
Table 8.3.2 Results of Questionnaire Survey on Impacts of Rehabilitation to WUA Board Member (2/2)

Question		Ketar Scheme			Gedamso	Sadi Sadi & Lafa	
		Ketar Genet WUA	Golja WUA	Hamsa Gasha WUA	Gedamso WUA	Sadi Sadi WUA	Lafa WUA
4. Water Management							
Q4-1	Does WUA have irrigation water distribution schedule?	Yes	Yes	Yes	Yes	Yes	Yes
Q4-2	Do the farmers follow the water distribution schedule?	Yes	Yes	Yes	Yes	Yes	Yes
Q4-3	Does WUA have any punishment to the farmers who don't follow the schedule?	No	Yes	Yes	Yes	Yes	Yes
Q4-4	Does WUA properly implement punishment to the farmers who don't follow the schedule?	No	Yes	Yes	No	No	No
Q4-5	Do you meet any difficulties about water management?	No	No	No	No	Yes	No
Q4-5a	If "Yes" at Q4-5, what kinds of difficulties?	-	-	-	-	Not using irrigation facilities properly Protection of water from other members	-
5. Maintenance of Irrigation Facilities							
Q5-1	Is the volume of WUA's works for maintenance of irrigation facilities decreased after	Yes	Yes	Yes	Yes	Yes	Yes
Q5-2	Is the number of farmers participating in regular canal cleaning works increased after	Yes	Yes	Yes	Yes	Yes	Yes
Q5-3	Who should take responsible for regular maintenance of irrigation facilities (i.e. canal cleaning, canal repairing)?	WUA	No Answer	WUA	WUA	WUA	WUA
Q5-4	Does WUA collect irrigation water fee for maintenance of irrigation facilities?	Yes	Yes	Yes	No Answer	No	Yes
Q5-5	How much is suitable price for irrigation water fee? (Birr / ha / year)	100 - 300 birr	100 - 300 birr	100 - 300 birr	Less than 100 birr	Less than 100 birr	100 - 300 birr
Q5-6	Can you utilize plot map for water fee collection?	Yes	Yes	Yes	Yes	Yes	Yes
6. Farming Activities and Marketing							
Q6-1	What crop was increased to be planted after rehabilitation?	Potato	Potato, Onion	Potato	Shallot, Haricot bean	Maize, Haricot bean	Maize
Q6-2	Do you feel that the accessibility to market or middle-merchants for sale of crop was improved after rehabilitation works?	No	No	No	Yes	No	No
Q6-3	Was the total crop production increased after rehabilitation?	Yes	Yes	Yes	Yes	No Answer	Yes
Q6-4	Do you feel that farmer's gross income from irrigation plot was increased after	Yes	No	Yes	Yes	No Answer	No Answer
7. Required Support from Government							
	(1)Strengthening of WUA management	○	○	○	○		○
	(2)Other maintenance works of irrigation facilities			○		○	
	(3)Training of water management	○					
	(4)Agriculture extension				○	○	○
	(5)Land arrangement						
	(6)Marketing promotion	○	○	○		○	○
	(7)Rural credit		○		○		
	(8)Others ( )						

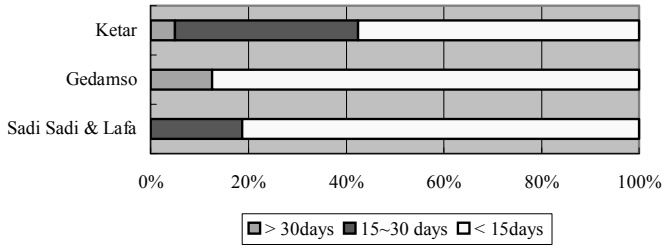
Table 8.3.3 Results of Questionnaire on Impacts of Rehabilitation to WUA Members (1/3)

1. Rehabilitation Works

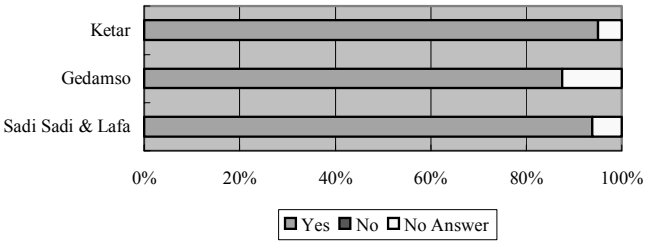
Q1-1 Did you participate in the rehabilitation works?



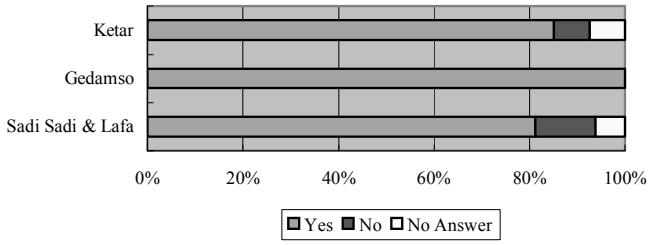
Q1-2 How many days did you participate?



Q1-3 Do you understand the importance of participatory works?

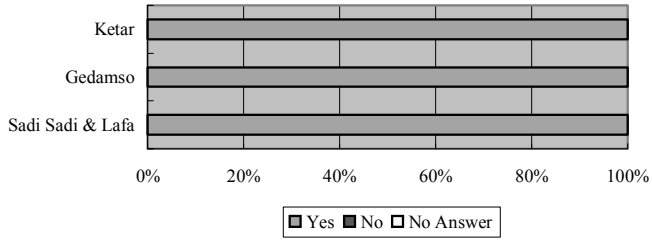


Q1-4 Do you feel that OIDA's rehabilitation works meet WUA's needs?

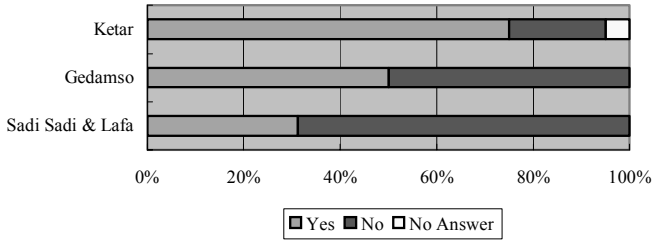


2. Irrigation Performance

Q2-1 Can you get more irrigation water than before rehabilitation?

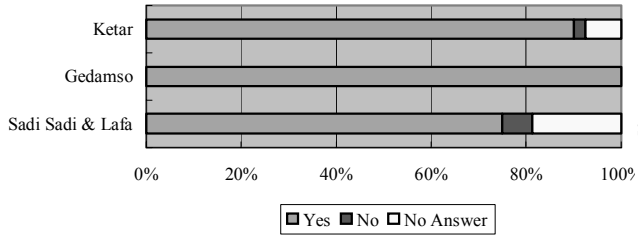


Q2-2 Can you increase irrigation area after rehabilitation?



3. WUA Performance

Q3-1 Do you feel the performance of WUA board member was improved after rehabilitation works?



Q3-2 Do you feel that WUA members became cooperative for WUA's activities?

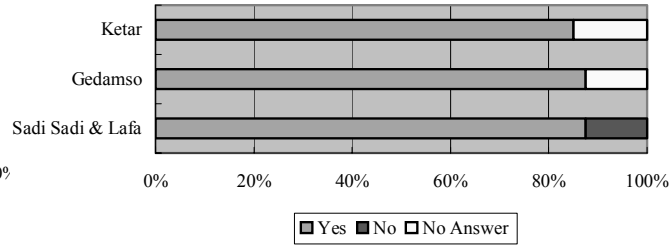
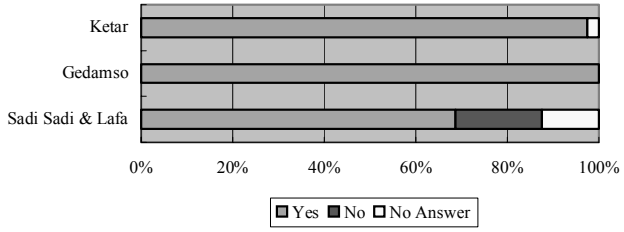


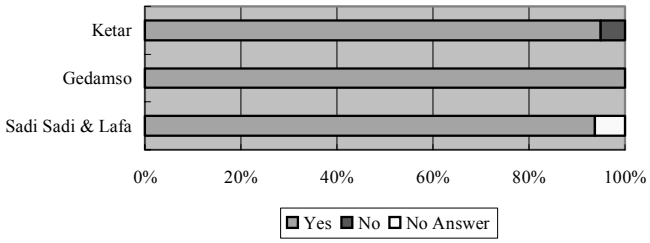
Table 8.3.3 Results of Questionnaire on Impacts of Rehabilitation to WUA Members (2/3)

Q3-3 Do you think that WUA and WUA board member can solve conflicts among WUA members?

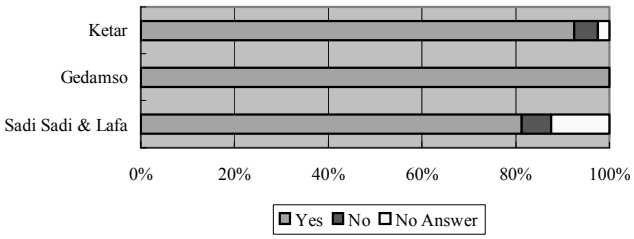


4. Water Management

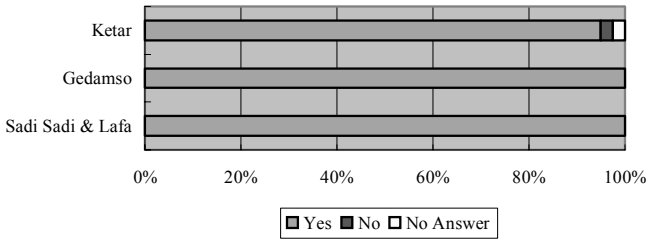
Q4-1 Does WUA have irrigation water distribution schedule?



Q4-2 Do you follow the water distribution?

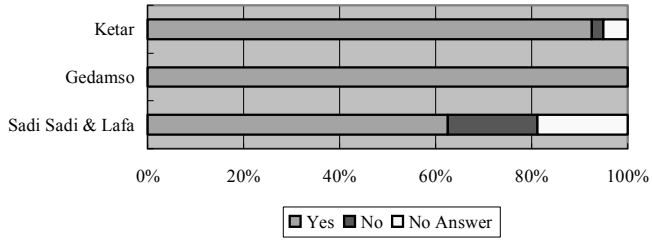


Q4-3 Do you feel that the conflicts regarding water distribution were decreased after rehabilitation?



5. Maintenance of Irrigation Facilities

Q5-1 Are WUA's and your works for maintenance of facilities decreased?



Q5-2 Do you feel that the number of farmers participating in regular canal cleaning increased?

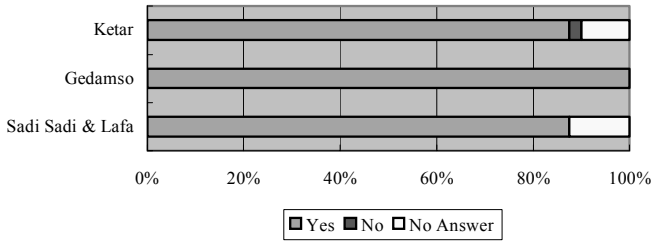
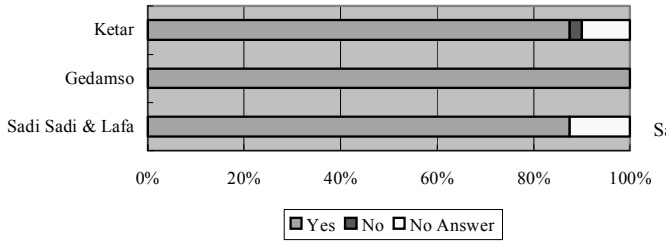
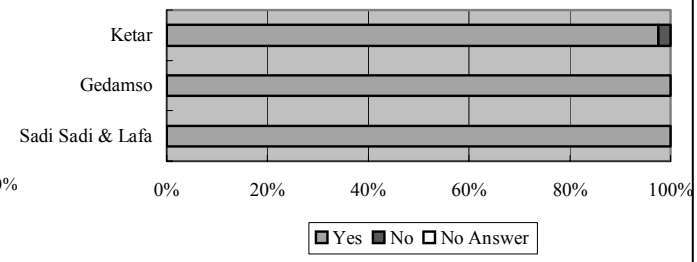


Table 8.3.3 Results of Questionnaire on Impacts of Rehabilitation to WUA Members (3/3)

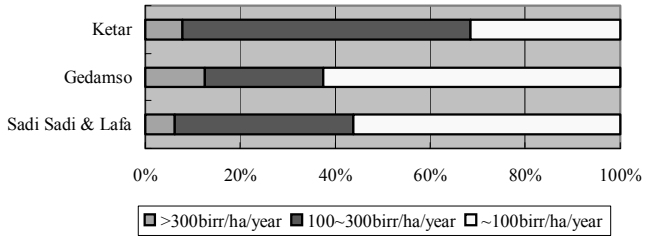
Q5-3 Who should take responsible for regular maintenance (e.g. canal cleaning, canal repairing)?



Q5-4 Do you agree to pay irrigation water fee for maintenance of irrigation facilities?

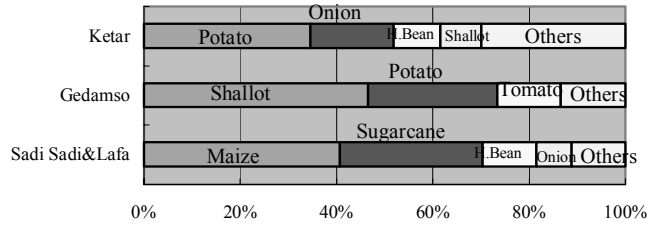


Q5-5 If you pay, how much is suitable price for irrigation water fee?

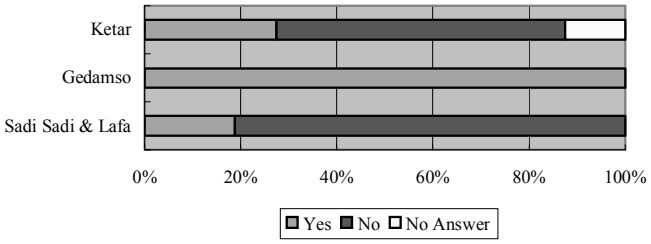


6. Farming Activities and Marketing

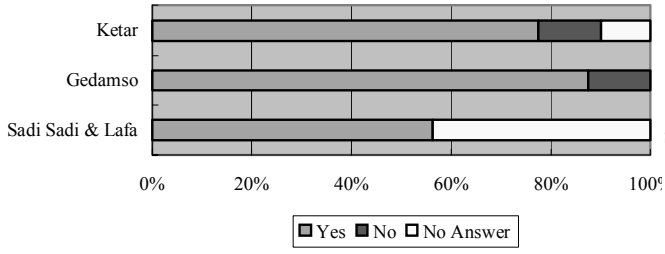
Q6-1 What crop did you plant after rehabilitation?



Q6-2 Do you feel that the accessibility to market or middle-merchants for sale of crop was improved after rehabilitation?



Q6-3 Was your total crop production increased after rehabilitation?



Q6-4 Your gross income from irrigation plot was increased after rehabilitation

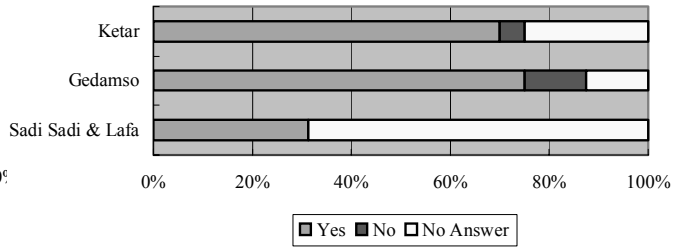


Table 9.2.1 List of Existing Irrigation Schemes in Oromia Region (1/5)

No.	Name of Scheme	Branch Office	Location		Water Sources	Intake Structure	Const. Year	Command Area Development			Number of Beneficiaries			Facility Status/1	WUA Status/2	Approximate Rehabilitation Cost (Birr)	Rehabilitation Works (as of June 2004)			Category/3
			Zone	District			(Completed)	Plan	Actual	%	Plan	Actual	%				Study	Construction	Fund	
1	Kawa	Central Branch	Arsi	Gedeb	River	Pump & Headworks	1985	200	20	10.0	500	80	16.0	D	C	377,700	Completed	Completed	Ethio-Italy	C
2	Meti Metana	Central Branch	Arsi	Munesa	River	Headworks	1993	40	30	76.0	160	140	87.5	B	C	31,300				B
3	Sadi Sadi	Central Branch	Arsi	Munesa	Spring	Headworks	1995	60	44	73.3	210	240	114.3	B	C	383,833	Completed	Completed	JICA	B
4	Arata Chufa	Central Branch	Arsi	Zuway Dugda	River	Headworks	1993	100	80	80.0	317	317	100.0	B	A	170,300				D
5	Shalad-01	Central Branch	Arsi	Tiyo	Spring	Headworks	1995	50	47	94.0	196	184	93.9	A	A	196,400				D
6	Shalad-02	Central Branch	Arsi	Tiyo	Spring	Headworks	1995	25	0	0.0	100	0	0.0	D	Not Active	119,626	Completed	Not start	IFAD	C
7	Bosha-01	Central Branch	Arsi	Tiyo	Spring	Headworks	1993	100	60	60.0	233	320	137.3	C	C	77,590	Completed	Under construction	NGO	C
8	Bosha-02	Central Branch	Arsi	Tiyo	Spring	Headworks	1994	60	35	58.3	220	140	63.6	C	C	41,968	Completed	Not start	IFAD	C
9	Shoba	Central Branch	Arsi	Munesa	Spring	Headworks	1993	100	60	60.0	279	270	96.8	C	C	126,907	Completed	Under construction	NGO	C
10	Gedamso-01	Central Branch	Arsi	Munesa	River	Headworks	1996	80	60	75.0	64	159	248.4	B	C		Completed	Completed	JICA	B
11	Gedamso-02	Central Branch	Arsi	Munesa	River	Headworks	1997	90	34	37.8	70	150	214.3	D	C	160,700	Completed	Completed	JICA	C
12	Lafa	Central Branch	Arsi	Munesa	River	Headworks	1997	80	36	45.0	50	145	290.0	C	C	90,000	Completed	Completed	JICA	C
13	Sole Bakekisa	Central Branch	Arsi	Tena	River	Headworks	1998	100	40	40.0	300	150	50.0	D	C	200,400				C
14	Delali Sambaru	Central Branch	Arsi	Munesa	River	Headworks	1993	60	40	66.7	160	164	102.5	B	B	101,980				D
15	Dagaga Sambaro	Central Branch	Arsi	Munesa	River	Headworks	1996	40	20	50.0	60	40	66.7	C	B	181,400				A
16	Katar-01	Central Branch	Arsi	Tiyo	River	Headworks	1987	100	115	115.0	276	285	103.3	A	A		Completed	Completed	JICA	D
17	Katar-02	Central Branch	Arsi	Tiyo	River	Headworks	1993	210	198	94.3	180	202	112.2	A	B	350,400	Completed	Completed	JICA	D
18	Katar-03	Central Branch	Arsi	Tiyo	River	Headworks	1992	90	125	138.9	114	205	179.8	A	A		Completed	Completed	JICA	D
19	Hasen Usman	Central Branch	Arsi	Tena	River	Headworks	1994	230	280	121.7	527	1,000	189.8	A	B	86,974	Completed	Not start	IFAD	D
20	Homba	Central Branch	Arsi	Merti	River	Headworks	-	100	10	10.0	400	40	10.0	D	C	193,400	Completed	Completed	Ethio-Italy	C
21	Teltele	Central Branch	North Shoa	Detre Libanes	Spring	Headworks	1996	90	145	161.0	418	220	52.6	A	C	103,000				B
22	Lami	Central Branch	North Shoa	Yaya Gulale	Spring	Headworks	1996	30	56	187.3	200	225	112.5	A	B	88,395				D
23	Indris	Central Branch	Weat Shoa	Ambo	River	Headworks	1993	175	380	217.1	875	1,087	124.2	A	B	301,000				D

Note : /1 Evaluation of facility status, A-D (Functioning - deteriorated)
/2 Evaluation of WUA, A-D (Very active - poor)
/3 Category A : Deterioration of facilities, B : Weak WUA, C : A+B, D : Relatively well Functioning

Table 9.2.1 List of Existing Irrigation Schemes in Oromia Region (2/5)

No.	Name of Scheme	Branch Office	Location		Water Sources	Intake Structure	Const. Year	Command Area Development			Number of Beneficiaries			Facility Status/1	WUA Status/2	Approximate Rehabilitation Cost (Birr)	Rehabilitation Works (as of June 2004)			Category/3
			Zone	District			(Completed)	Plan	Actual	%	Plan	Actual	%				Study	Construction	Fund	
24	Laku	Central Branch	Weat Shoa	Bako-Tibe	River	Headworks	1994	50	6	12.0	40	9	22.5	D	D	200,000				C
25	Walga	Central Branch	Weat Shoa	Wanchi & Waliso	River	Headworks	1998	150	518	345.0	637	1,070	168.0	A	B	201,600				D
26	Walshamo	Central Branch	Weat Shoa	Chaliya	River	Headworks	1995	50	0	0.0	160	0	0.0	D	D	110,900				C
27	Robi	Central Branch	Weat Shoa	Meta Robi	River	Headworks	1998	120	123	102.5	410	410	100.0	A	C	206,400				B
28	Chole	Central Branch	Weat Shoa	Ambo	River	Headworks	1996	100	200	200.0	464	500	107.8	A	B	28,300				D
29	Lugo	Central Branch	East Shoa	Fentale	River	Headworks	1996	57	53	93.0	70	64	91.4	A	B	87,700				D
30	Sogido Bandira-01,02	Central Branch	East Shoa	Fentale	River	Headworks	1998	140	110	78.6	117	65	55.6	B	C	240,800				B
31	Godino	Central Branch	East Shoa	Adama	River	Dam	1996	219	183	83.6	270	182	67.4	A	C	376,680				B
32	Balbala	Central Branch	East Shoa	Adama	River	Dam	1996	100	42	42.0	400	182	45.5	C	C	85,600				C
33	Fultino	Central Branch	East Shoa	Adama	River	Dam	1998	85	33	38.8	182	165	90.7	D	C	70,000				C
34	Laftu	Central Branch	East Shoa	Shashamene	River	Headworks	1996	30	3	8.3	60	14	23.3	D	D	3,100				C
35	Kararo Arsi	Central Branch	East Shoa	Arsi Negele	River	Headworks	1990	42	38	90.5	253	85	33.6	A	B	72,240				D
36	Tiliku Debeda	Central Branch	East Shoa	Arsi Negele	River	Headworks	1995	50	25	50.8	200	101	50.5	C	D	3,100				C
37	Meki-Zway	Central Branch	East Shoa	Duguda Bora	Lake	Pump	1984	1,500	216	14.4	3,375	332	9.8	D	D	197,600				C
38	Kujur	Western Branch	West Walaga	Najo	River	Headworks	1998	57	0	0.0	110	0	0.0	D	D	80,370	Completed	Under construction	UNDP	C
39	Borta	Western Branch	West Walaga	Sayo	River	Headworks	1996	40	7	17.5	120	31	25.8	D	D	68,800				C
40	Bondo	Western Branch	West Walaga	Sayo	River	Headworks	1995	50	8	16.0	150	25	16.7	D	D	86,000				C
41	Degaro	Western Branch	West Walaga	Nadijo	River	Headworks	1997	120	28	23.3	296	120	40.5	D	D	206,400				C
42	Gi'I	Western Branch	West Walaga	Gimbi	River	Headworks	1996	60	8	12.5	228	26	11.4	D	D	103,200				C
43	Sokoru	Western Branch	West Walaga	Rharasibu	River	Headworks	1997	30	25	83.3	267	37	13.9	A	C	51,600				B
44	Waja	Western Branch	East Walaga	Limu	River	Headworks	1996	25	25	99.0	200	198	99.0	A	D	61,199	Completed	Completed	UNDP	B
45	Dhangago-01	Western Branch	East Walaga	Jima-Rare	River	Headworks	1995	30	21	71.3	253	129	51.0	B	C	51,600				B
46	Jato-01	Western Branch	East Walaga	Jima-Rare	River	Headworks	1994	54	46	85.0	515	419	81.4	A	D	92,880				B

Note : /1 Evaluation of facility status, A-D (Functioning - deteriorated)
/2 Evaluation of WUA, A-D (Very active - poor)
/3 Category A : Deterioration of facilities, B : Weak WUA, C : A+B, D : Relatively well Functioning

Table 9.2.1 List of Existing Irrigation Schemes in Oromia Region (3/5)

No.	Name of Scheme	Branch Office	Location		Water Sources	Intake Structure	Const. Year	Command Area Development			Number of Beneficiaries			Facility Status/1	WUA Status/2	Approximate Rehabilitation Cost (Birr)	Rehabilitation Works (as of June 2004)			Category/3
			Zone	District			(Completed)	Plan	Actual	%	Plan	Actual	%				Study	Construction	Fund	
47	Gambela Tare	Western Branch	East Walaga	Guto-Wayu	River	Headworks	1994	150	59	39.2	235	86	36.6	D	D	258,000				C
48	Negeso	Western Branch	East Walaga	Bila-Sayo	River	Headworks	1997	30	30	100.0	128	160	125.0	A	B	5,352				D
49	Abono-02	Western Branch	East Walaga	Jima-Arjo	River	Headworks	1995	80	67	83.1	248	160	64.5	A	B	197,482	Completed	Completed	UNDP	D
50	Tate	Western Branch	East Walaga	Leka-Dulacha	River	Headworks	1993	20	0	0.0	75	0	0.0	D	In Active	34,400				C
51	Jato-02	Western Branch	East Walaga	Guto-Wayu	River	Headworks	1997	60	0	0.0	157	0	0.0	D	D	40,236				C
52	Dhangago-02	Western Branch	East Walaga	Guto-Wayu	River	Headworks	1997	20	0	0.0	162	0	0.0	D	D	34,400				C
53	Gibe Lamu-01	Western Branch	East Walaga	Jima-Rare	River	Headworks	1995	53	53	100.0	250	54	21.6	A	B	91,160				D
54	Gibe Lamu-02	Western Branch	East Walaga	Bila-Sayo	River	Headworks	1996	60	23	39.0	250	37	14.8	D	D	103,200				C
55	Jare	Western Branch	East Walaga	Bila-Sayo	River	Headworks	1998	40	0	0.0	112	0	0.0	D	In Active	68,800				C
56	Koba Guda	Western Branch	Ilu Aba Bora	Gachi-Boracho	River	Headworks	1996	56	0	0.0	57	0	0.0	D	In Active	90,005	No	No	UNDP	C
57	Nada Guda	Western Branch	Jima	Omo-Nada	River	Headworks	1997	120	31	25.8	340	48	14.1	D	D	206,400				C
58	Kawa	Western Branch	Jima	Dedo	River	Headworks	1997	120	54	45.0	270	54	20.0	C	D	206,400				C
59	Birbirsa	Western Branch	Jima	Qarsa	River	Headworks	1997	70	5	7.4	150	52	34.7	D	D	120,400				C
60	Abono	Western Branch	Jima	Sayo Chokorsa	River	Headworks	1994	160	0	0.0	300	0	0.0	D	In Active	275,200				C
61	Waro	Western Branch	Jima	Dedo	River	Headworks	1996	180	25	13.9	300	40	13.3	D	D	309,600				C
62	Arara-01	Eastern Branch	East Harar	Kersa	Spring	Headworks	1994	40	50	125.0	276	276	100.0	A	B	68,800				D
63	Arara-02	Eastern Branch	East Harar	Kersa	Spring	Headworks	1994	25	25	100.0	100	100	100.0	A	B	43,000				D
64	Babi Ali	Eastern Branch	East Harar	Deder	Spring	Headworks	1994	46	60	130.4	130	220	169.2	A	B	79,120				D
65	Burka Deneba	Eastern Branch	East Harar	Gurawa	Spring	Headworks	1997	76	76	100.0	215	216	100.5	A	B	39,412	Completed	Under construction	UNDP	D
66	Chulul	Eastern Branch	East Harar	Goro Gutu	Spring	Headworks	1996	75	64	85.6	275	256	93.1	A	C	129,000				B
67	Erer Meda Talila	Eastern Branch	East Harar	Deder	Spring	Headworks	1995	100	100	100.0	550	550	100.0	A	B	172,000				D
68	Galan Sadi	Eastern Branch	East Harar	Melka Balo	Spring	Headworks	1995	100	100	100.0	360	360	100.0	A	B	35,470	Completed	Not start	IFAD	D
69	Jarjartu	Eastern Branch	East Harar	Gurawa	River	Headworks	1996	60	36	60.0	240	240	100.0	C	B	79,981	Completed	Completed	FAO	A

Note : /1 Evaluation of facility status, A-D (Functioning - deteriorated)
/2 Evaluation of WUA, A-D (Very active - poor)
/3 Category A : Deterioration of facilities, B : Weak WUA, C : A+B, D : Relatively well Functioning

Table 9.2.1 List of Existing Irrigation Schemes in Oromia Region (4/5)

No.	Name of Scheme	Branch Office	Location		Water Sources	Intake Structure	Const. Year	Command Area Development			Number of Beneficiaries			Facility Status/1	WUA Status/2	Approximate Rehabilitation Cost (Birr)	Rehabilitation Works (as of June 2004)			Category/3
			Zone	District			(Completed)	Plan	Actual	%	Plan	Actual	%				Study	Construction	Fund	
70	Mudana Silo	Eastern Branch	East Harar	Gurawa	Spring	Headworks	1998	51	56	109.8	120	175	145.8	A	B	34,341	Completed	Not start	UNDP	D
71	Melba	Eastern Branch	East Harar	Meta	Spring	Headworks	1998	51	44	85.6	107	107	100.0	A	B	87,720				D
72	Ramis	Eastern Branch	East Harar	Gurawa	River	Headworks	1996	60	51	85.0	273	273	100.0	A	B	54,590	Completed	Not start	IFAD	D
73	Burka Burbursa	Eastern Branch	East Harar	Deder	Spring	Headworks	1995	40	0	0.0	100	0	0.0	D	In Active	68,800				C
74	Said Ali	Eastern Branch	East Harar	Kersa	Spring	Headworks	1994	46	71	154.3	160	270	168.8	A	B	79,120				D
75	Water-01	Eastern Branch	East Harar	Kersa	Spring	Headworks	1993	60	60	100.0	130	130	100.0	A	B	103,200				D
76	Water-02	Eastern Branch	East Harar	Kersa	Spring	Headworks	1994	71	60	84.5	150	150	100.0	A	B	122,120				D
77	Water-03	Eastern Branch	East Harar	Kersa	River	Headworks	1995	40	40	100.0	260	260	100.0	A	B	68,800				D
78	Harewo	Eastern Branch	East Harar	Meta	Spring	Headworks	1995	40	15	37.5	133	60	45.1	D	B	68,800				A
79	Amir Nur Decho	Eastern Branch	West Harar	Tulo	Spring	Headworks	1994	40	17	42.5	80	28	35.0	C	B	68,800				A
80	Chafe Gurati	Eastern Branch	West Harar	Tulo	River	Headworks	1995	60	35	57.9	86	139	161.6	C	B	62,779	Completed	Under construction	FAO	A
81	Hirna	Eastern Branch	West Harar	Tulo	River	Headworks	1994	70	40	57.1	80	63	78.8	C	C	120,400				C
82	Homicho	Eastern Branch	West Harar	Bedesa	River	Headworks	1991	375	212	56.5	600	200	33.3	C	D	645,000				C
83	Kaseheja	Eastern Branch	West Harar	Chiro	River	Headworks	1992	187	139	74.3	748	556	74.3	B	D	321,640				B
84	Midhagudu	Eastern Branch	West Harar	Tulo	River	Headworks	1997	235	105	44.8	250	53	21.2	C	D	18,444	Completed	Under construction	FAO	C
85	Haya Oda	Southern Branch	Bale	Mana Angetu	River	Headworks	1995	100	96	96.0	220	178	80.9	A	B	172,000				D
86	Hora Boka	Southern Branch	Bale	Sinana Dinsho	River	Free Intake	1983	32	0	0.0	183	0	0.0	D	In Active	55,040				C
87	Gomgoma	Southern Branch	Bale	Mana Angetu	River	Headworks	1994	71	51	71.8	156	182	116.7	B	C	216,090	Completed	Under construction	UNDP	B
88	Chiri	Southern Branch	Bale	Mana Angetu	River	Headworks	1994	50	50	100.0	140	152	108.6	A	B	86,000				D
89	Dinki	Southern Branch	Bale	Ginir	River	Headworks	1997	200	169	84.4	450	265	58.9	A	B	116,116	Completed	Not start	IFAD	D
90	Melko Buta	Southern Branch	Bale	Goro	River	Headworks	1984	85	0	0.0	340	0	0.0	D	In Active	146,200				C
91	Shaya	Southern Branch	Bale	Sinana Dinsho	River	Headworks	1987	230	0	0.0	271	0	0.0	D	In Active	395,600				C
92	Ukuma	Southern Branch	Bale	Dodola	River	Headworks	1997	100	0	0.0	400	0	0.0	D	In Active	172,000				C

Note : /1 Evaluation of facility status, A-D (Functioning - deteriorated)
/2 Evaluation of WUA, A-D (Very active - poor)
/3 Category A : Deterioration of facilities, B : Weak WUA, C : A+B, D : Relatively well Functioning

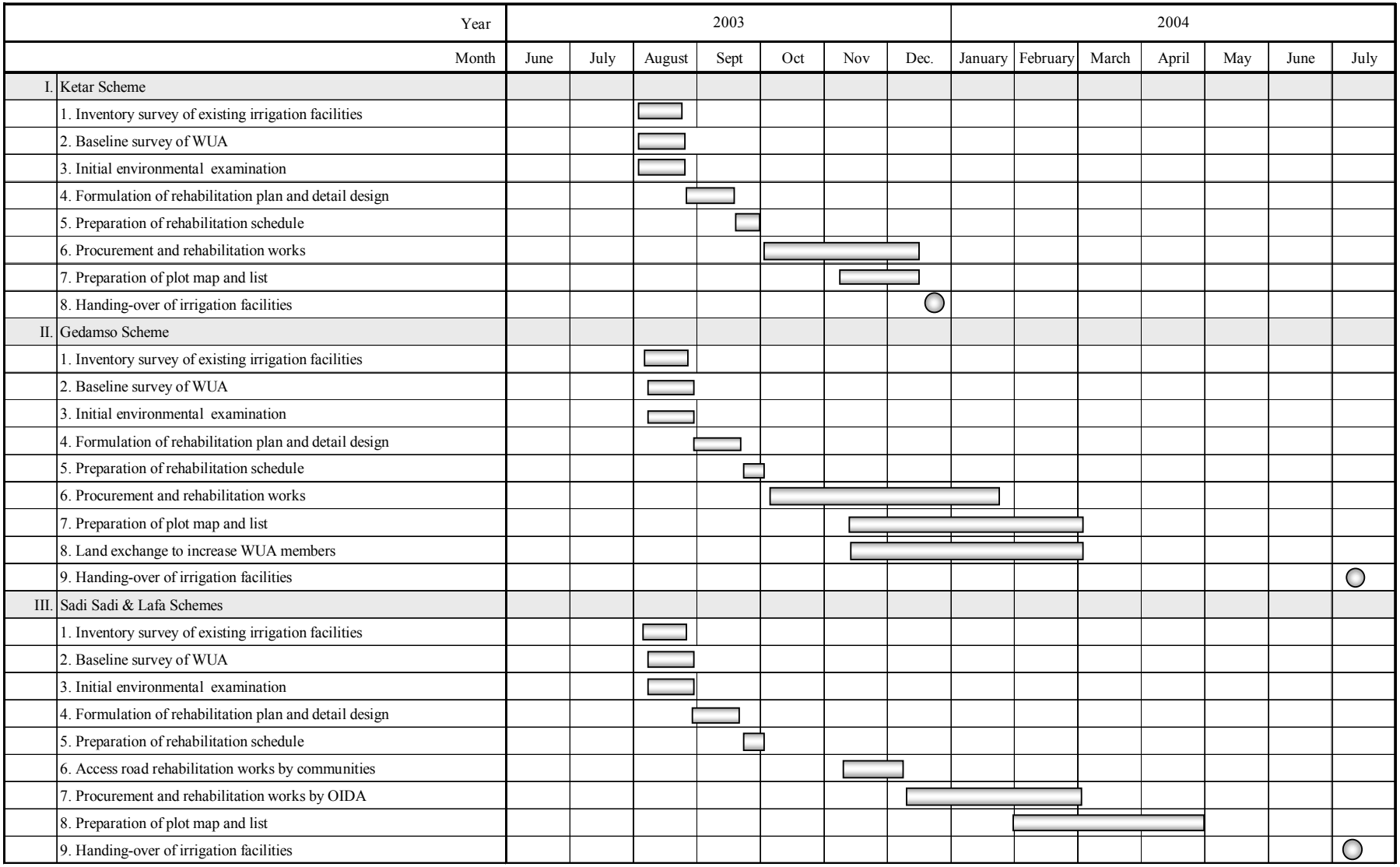
Table 9.2.1 List of Existing Irrigation Schemes in Oromia Region (5/5)

No.	Name of Scheme	Branch Office	Location		Water Sources	Intake Structure	Const. Year	Command Area Development			Number of Beneficiaries			Facility Status/1	WUA Status/2	Approximate Rehabilitation Cost (Birr)	Rehabilitation Works (as of June 2004)			Category/3
			Zone	District			(Completed)	Plan	Actual	%	Plan	Actual	%				Study	Construction	Fund	
93	Arada Tare	Southern Branch	Bale	Ginir	River	Headworks	1996	120	120	100.0	288	300	104.2	A	B	206,400				D
94	Oda-Roba	Southern Branch	Bale	Ginir	River	Headworks	1997	70	70	100.0	120	200	166.7	A	B	229,555	Completed	Not start	IFAD	D
95	Melka Hida	Southern Branch	Borana	Galana-Abaya	River	Headworks	1998	70	0	0.0	136	0	0.0	D	In Active	120,400				C
96	Abeda Chambe	Southern Branch	Borana	Adola	River	Headworks	1996	60	0	0.0	200	0	0.0	D	In Active	103,200				C
Total								9,724	5,991	61.6	26,047	16,577	63.6			12,700,315				A 5
Average								101	62	-	271	173	-							B 14
Maximum								1,500	518	-	3,375	1,087	-							C 43
Minimum								20	0	-	40	0	-							D 34

Note : /1 Evaluation of facility status, A-D (Functioning - deteriorated)
/2 Evaluation of WUA, A-D (Very active - poor)
/3 Category A : Deterioration of facilities, B : Weak WUA, C : A+B, D : Relatively well Functioning

Figures

Figure 2.3.1 Overall Work Progress of Program III



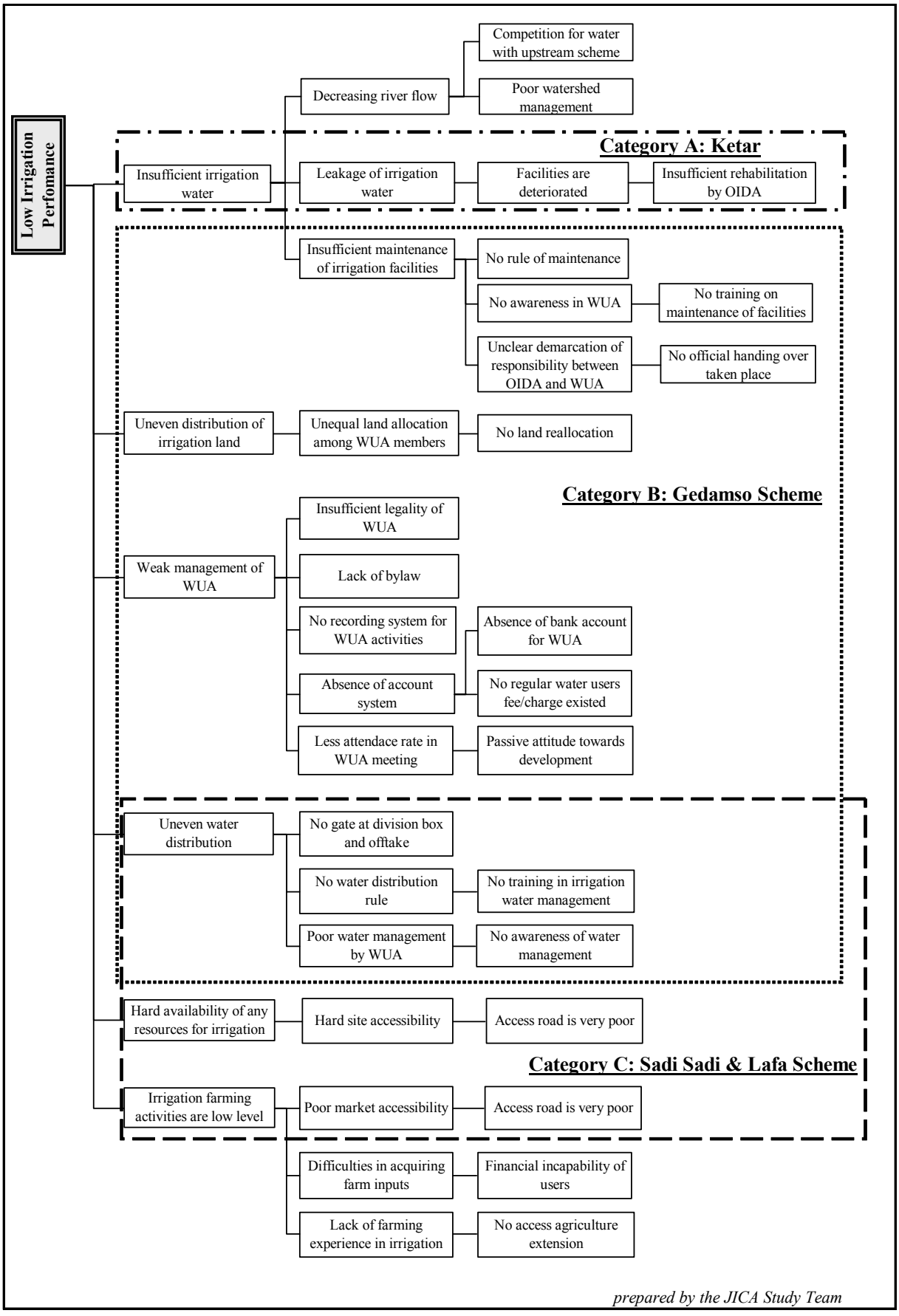
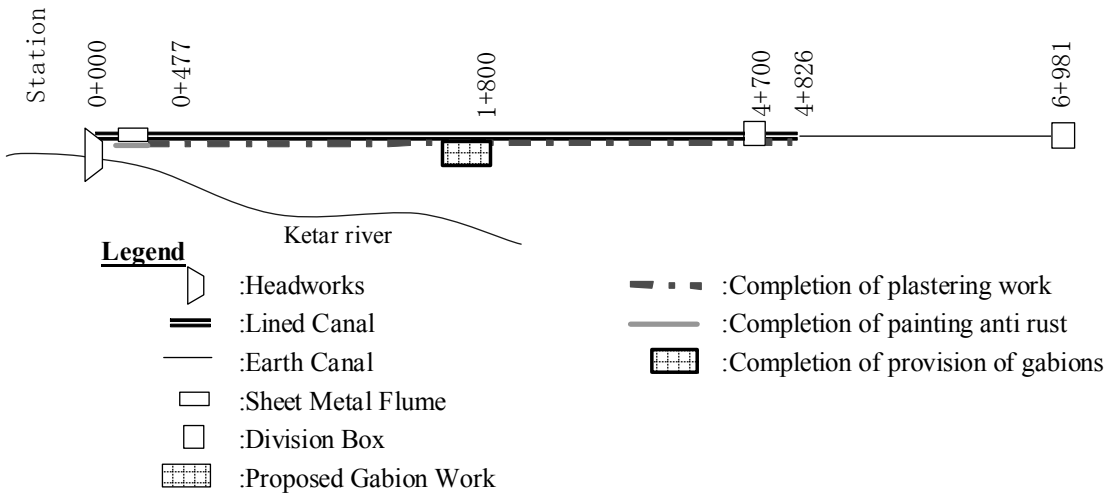


Figure 5.1.1 Problem Analysis of OIDA Existing Irrigation Schemes

Project Name : Ketar Scheme

1. Schematic Work Progess



2.Work Progress

Work Items	Total Work Volume		Completion Work		Progress
	Q'ty	Unit	Q'ty	Unit	
1. Plastering works for lined canal	4.8	km	4.8	km	100%
2. Painting anti rust for metal flume	220	m	220	m	100%
3. Gabion works	124	m3	124	m3	100%
4. Replacement of gates at division boxes	6	nos	6	nos	100%
5. Construction of canal structures	4	nos	4	nos	100%
Total					100%

3.Man-Power Supply

Staff/Labor	Man-days			
	Oct.	Nov.	Dec.	Total
OIDA Staff	150	200	150	500
Masonry	920	1,280	450	2,650
Labor	1,600	2,200	400	4,200
Farmers Participation	1,200	1,400	200	2,800

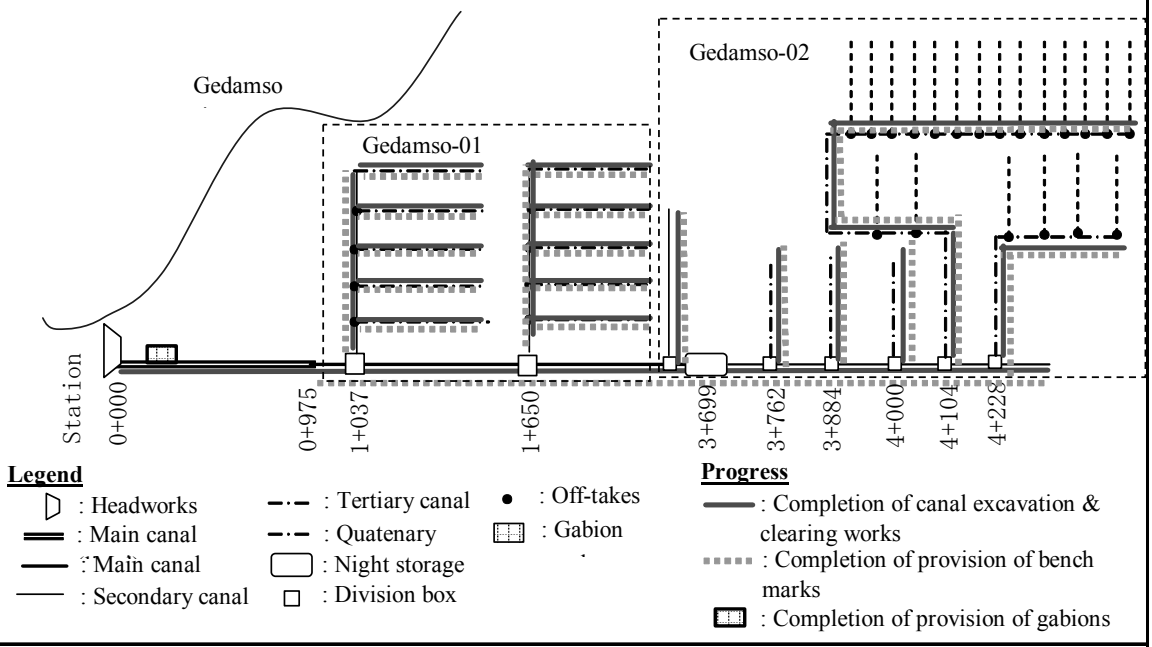
4.Material Supply

Material	Unit	Quantity			
		Oct.	Nov.	Dec.	Total
Cement(1quintar=100kg	quintar	927	383	0	1,310
Gabion Wire	pcs	62	0	0	62
Sand	m3	250	300	0	550
Stone	m3	119	120	0	239
Gate	pcs	0	0	6	6

Figure 6.2.1 Work Progress Record of Rehabilitation Works in Ketar Scheme (As of the End of December 2003)

Project Name : Gedamso Scheme

1. Schematic Work Progess



2.Work Progress

Work Items	Total Work Volume		Completion Work		Progress
	Q'ty	Unit	Q'ty	Unit	
1. Excavation & clearing of canals					
(1) Main canal	3.7	km	3.7	km	100%
(2) Secondary canals	2.8	km	2.8	km	100%
(3) Tertiary canals	8.6	km	8.6	km	100%
(4) Quaternary canals	3.6	km	WUA continues this work		
2. Improvement of division boxes & off-takes	170	nos.	170	nos.	100%
3. Provision of bench marks in the canals	15.1	km	15.1	km	100%
4. Replacement of gates(headworks/night storage)	2	nos.	2	nos.	100%
5. Repairing of canal structures(drop/culvert)	30	nos.	30	nos.	100%
6. Provision of gabion box	2	place	2	place	100%
Total					100%

3.Man-Power Supply

Staff/Labor	Unit	Man-days					
		Oct.	Nov.	Dec.	Jan	Feb	Total
OIDA Staff	MD	150	200	200	150	100	800
Masonry	MD	20	90	144	0	0	254
Labor	MD	50	650	550	0	0	1,250
Farmers Participation	MD	650	300	100	100	0	1,150

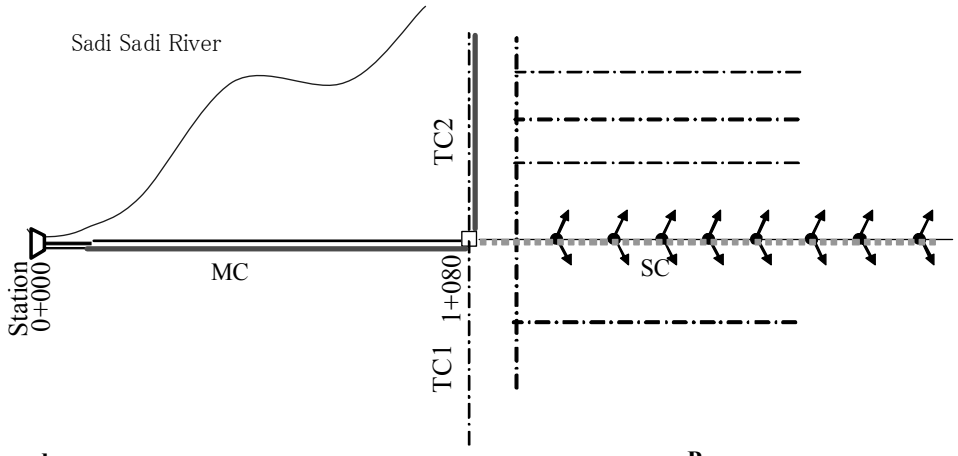
4.Material Supply

Material	Unit	Quantity			
		Oct.	Nov.	Dec.	Total
Cement(1quintar=100kg	quintar	150	150	0	300
Gabion Wire	pcs	22	0	0	22
Sand	m3	30	60	0	90
Stone	m3	90	60	69	219
Gate	nos	0	72	101	173

Figure 6.3.1 Work Progress Record of Rehabilitation Works in Gedamso Scheme (As of the End of December 2003)

Project Name : Sadi Sadi Scheme

1. Schematic Work Progess



Legend

: Headworks
: Main canal
: Main canal
: Secondary canal
: Tertiary canal
: Quatenary canal
: Division box
: Off-takes

Progress

: Completion of reparing of headworks
: Completion of lining canal
: Completion of provision of gate

2.Work Progress

Work Items	Total Work Volume		Completion Work		Progress
	Q'ty	Unit	Q'ty	Unit	
1. Headworks					
(1) Extension of left side wing wall	1	no.	1	no.	100%
(2) Installation of intake and sluice gates	2	nos.	2	nos.	100%
2. Canal					
(1) Lining of main canal	350	m	600	m	171%
(2) Plastering of secondary canal	170	m	170	m	100%
(3) Lining of tertiary canals	445	m	450	m	101%
3. Field structures					
(1) Improvement of division boxes	1	no.	1	no.	100%
(2) Installation of steel gates at offtakes	24	nos.	24	nos.	100%
(3) Construction of cross drainage	1	no.	1	no.	100%
Total					120%

3.Man-Power Supply

Staff/Labor	Unit	Man-days			
		Dec.	Jan.	Feb.	Total
OIDA Staff	MD			100	100
Masonry	MD			400	400
Labor	MD			510	510
Farmers Participation	MD			50	50

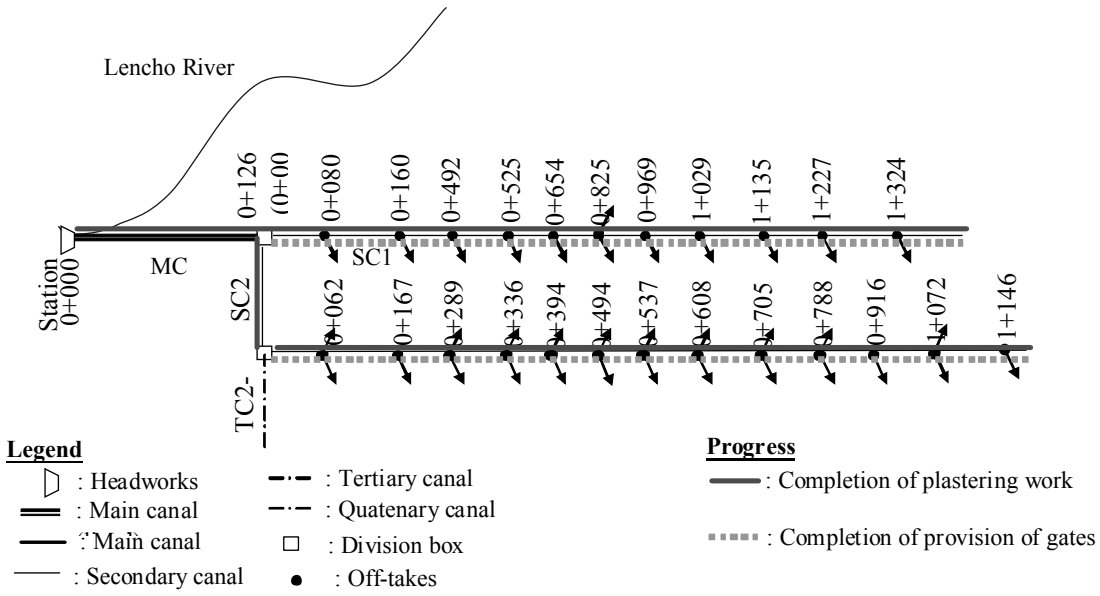
4.Material Supply

Material	Unit	Quantity			
		Dec.	Jan.	Feb.	Total
Cement(1quintar=100kg	quintar			500	500
Sand	m3			100	100
Stone	m3			50	50
Gate	nos			26	26

Figure 6.4.1 Work Progress Record of Rehabilitation Works in Sadi Sadi Scheme (As of the End of December 2003)

Project Name : Lafa Scheme

1. Schematic Work Progess



2.Work Progress

Work Items	Total Work Volume		Completion Work		Progress
	Q'ty	Unit	Q'ty	Unit	
1. Headworks					
(1) Extension of right side wall	1	no.	1	no.	100%
(2) Maintenance of sluice gate	1	no.	1	no.	100%
2. Canal					
(1) Plastering of main canal	130	m	130	m	100%
(2) Plastering of secondary canal	2,500	m	2,500	m	100%
3. Field structures					
(1) Improvement of division box	2	nos.	2	no.	100%
(2) Installation of steel gates at offtakes	23	nos.	23	nos.	100%
(3) Provision of culvert	1	no.	1	no	100%
(4) Construction of cross drainage	1	no.	1	no.	100%
Total					100%

3.Man-Power Supply

Staff/Labor	Unit	Man-days			
		Dec.	Jan.	Feb.	Total
OIDA Staff	MD	70	150	80	300
Masonry	MD	650	600		1,250
Labor	MD	1,040	800		1,840
Farmers Participation	MD	28	72		100

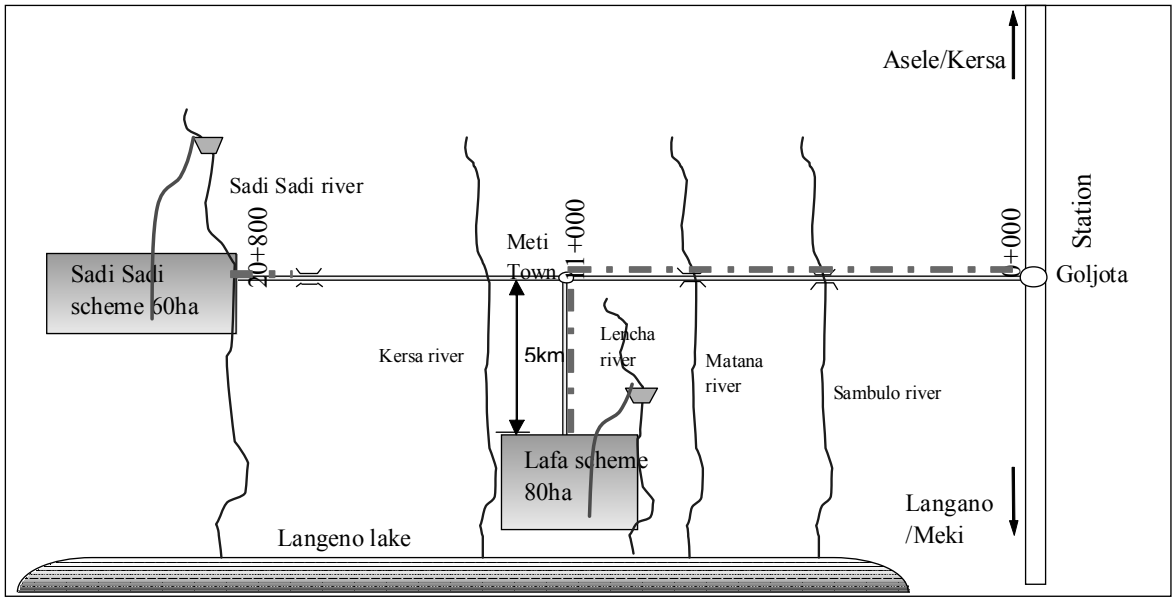
4.Material Supply

Material	Unit	Quantity			
		Dec.	Jan.	Feb.	Total
Cement(1quintar=100k	quintar	300	280		580
Sand	m3	59	40		99
Stone	m3	44	40		84
Gate	nos	0	23		23

Figure 6.4.2 Work Progress Record of Rehabilitation Works in Lafa Scheme (As of the End of December 2003)

Project Name : Access Road between Goljota and Sadi Sadi / Lafa

1. Schematic Work Progess



: Completion of road clearing work

2.Work Progress

Work Items	Total Work Volume		Completion Work		Progress
	Q'ty	Unit	Q'ty	Unit	
1. Road clearing work	15.2	km	15.2	km	100%
Total					100%

3.Man-Power Supply

Staff/Labor	Unit	Man-days				
		Nov.	Dec.	Jan.	Feb.	Total
OIDA Staff	MD	150	60	60	30	300
Masonry	MD	0	0	0	0	0
Labor	MD	0	0	0	0	0
Farmers Participation	MD	6,000	0	0	0	6,000

4.Material Supply

Material	Unit	Quantity			
		Dec.	Jan.	Feb.	Total
Cement(1quintar=100kg)	quintar	0	0	0	0
Sand	m3	0	0	0	0
Stone	m3	0	0	0	0

Figure 6.4.3 Work Progress Record of Rehabilitation Works of Access Road (As of the End of December 2003)

Figure 9.2.1 Time Schedule of Rehabilitation Works in Oromia Region (2003/4)

No.	Scheme	Branch	Zone	District	Command area(ha)	Beneficiaries (HH)	Fund	Cost (Birr)	2003 Oct.	2003 Nov	2003 Dec	2004 Jan	2004 Feb	2004 Mar	2004 Apr	2004 May	2004 Jun	2004 Jul	2004 Aug	Rehabilitation Progess As of June 2004
1	Kawa	Central	Arsi	Gedeb	200	500	Ethio-Italy	N.A	(Completed before October 2003)											100%
2	Ketar-01	Central	Arsi	Tiyo	110	276	JICA	350,400												100%
3	Ketar-02	Central	Arsi	Tiyo	200	180	JICA													100%
4	Ketar-03	Central	Arsi	Tiyo	90	114	JICA													100%
5	Gedamso-01	Central	Arsi	Munesa	80	60	JICA	160,700												100%
6	Gedamso-02	Central	Arsi	Munesa	90	34	JICA													100%
7	Sadi Sadi	Central	Arsi	Munesa	60	240	JICA	473,833												100%
8	Lafa	Central	Arsi	Munesa	80	140	JICA													100%
9	Bosha-01	Central	Arsi	Tiyo	60	233	NGO	77,590												N.A.
10	Bosha-02	Central	Arsi	Tiyo	100	220	IFAD	41,968												0%
11	Shoba	Central	Arsi	Munesa	120	440	NGO	126,907												N.A.
12	Hassen Husmaan	Central	Arsi	Xichoo	230	317	IFAD	86,974												0%
13	Sheld-02	Central	Arsi	Ziway Dugda	30	100	IFAD	119,626												0%
14	Homba	Central	Arsi	Merti	100	400	Ethio-Italy	N.A	(Completed before October 2003)											100%
15	Kujur	Western	W/Wollega	Nedjo	57	110	UNDP	80,370												N.A.
16	Abono-02	Western	E/Wollega	Diga Leeka	80	248	UNDP	197,482												100%
17	Koba Guda	Western	I/A/Boora	Gachi	56	210	UNDP	-												0%
18	Waja	Western	E/Wollega	Gida Kiramu	60	130	UNDP	61,199												100%
19	Mudanu Sailo	Eastern	E/Hararghe	Girawa	46	160	UNDP	34,341												0%
20	Galan Sadii	Eastern	E/Hararghe	Dadar	100	360	IFAD	35,470												0%
21	Ramisi	Eastern	E/Hararghe	Calanqoo	60	273	IFAD	54,590												0%
22	Burqaa Danaba	Eastern	E/Hararghe	Girawa	76	215	UNDP	39,412												N.A.
23	Chafee Guraatti	Eastern	W/Hararghe	Tulloo	100	220	FAO	62,779												N.A.
24	Midhagduu	Eastern	W/Hararghe	Baddeessa	200	250	FAO	18,444												N.A.
25	Jarjartuu	Eastern	E/Hararghe	Malka Balo	60	240	FAO	79,981												100%
26	Oda Roba	Southern	Bale	Ginir	70	150	IFAD	229,555												0%
27	Dinik	Southern	Bale	Ginir	200	450	IFAD	116,116												0%
28	Gomgoma	Southern	Bale	Mana Angentu	70	213	UNDP	216,090												N.A.
	Total				2,785	6,483														

:Completed :Under Rehabilitation :Planed to be Rehabilitated

Attachment-1

Results of Analyses of OIDA Database

Attachment - 1 Results of Analyses of OIDA Database

1. Current Positions of the Projects

1.1 Project Works

(1) Water Source

Irrigation Schemes Categorized by Water Source (May 2000)

Unit : No. of Scheme

Branch Office	River	Spring	Lake	Combined	Total
Central	29	7	1	1 (R+S)	38
Western	24	0	0	0	24
Eastern	8	15	0	0	23
Southern	13	0	0	0	13
Total	74	22	1	1	98

(2) Intake Structures

Irrigation Schemes Categorized by Intake Structure (May 2000)

Unit : No. of Scheme

Branch Office	Dam	Headworks	Pump	Total
Central	3	33	2	38
Western	0	24	0	24
Eastern	0	23	0	23
Southern	0	13	0	13
Total	3	93	2	98

(3) Headworks

Type of Headworks (October 2001)

Branch Office	Broad Crest Weir	Ogee Weir	Trapizoidal	Barrage	Free Intake	Gabion	Spring Intake	Unknown	Total
Central	11 (16.5, 1.7)	2 (16.5, 1.8)	2 (11.1, 0.9)	0	1	0	0	6	22
Western	10 (17.9, 1.2)	5 (21.7, 1.9)	0	3	0	0	0	5	23
Eastern	2 (26.5, 1.6)	0	0	0	0	2	5 (15.8, 2.0)	1	10
Southern	3 (9.8, 0.9)	5 (13.2, 1.0)	0	0	0	0	0	5	13
Total	26	12	2	3	1	2	5	16	68

Remarks: (average crest length in meter, average crest height in meter)

(4) Canal Systems

Average Canal Length (October 2001)

Unit : km per scheme

Branch Office	Main Canal s	Secondary Canals	Tertiary Canals	Total
Central	2.68	1.76	4.05	8.49
Western	3.39	1.59	5.26	10.24
Eastern	4.29	0.73	4.50	9.52
Southern	2.52	1.84	3.49	7.85

(5) Related Structures

Average Number of Related Structures (October 2001)

Unit : no. per scheme

Branch Office	Division Box	Turn-out	Off-take	Drop	Culvert	Flume	Chute	Cross drain	Others
Central	3.9	23.2	14.6	52.4	8.5	0.4	0.1	0.4	0.1
Western	0.9	25.8	5.1	16.7	2.4	0.9	0.3	0.2	0.2
Eastern	0.3	18.3	37.0	8.3	1.7	0.0	0.0	0.0	0.0
Southern	2.5	19.3	7.3	31.7	2.3	0.4	0.2	0.2	0.3

(6) Irrigation Area (Plan)

Planned Irrigation Area (May 2000)

Unit : no. per scheme

Branch Office	<50 ha	50 – 100 ha	101 – 150 ha	151 – 200 ha	201 – 250 ha	251 – 300 ha	301 ha<	Total
Central	6	14	11	2	3	0	1	37
Western	8	10	3	3	0	0	0	24
Eastern	8	10	2	1	1	0	1	23
Southern	1	6	3	0	2	0	0	12
Total	23	40	19	6	6	0	2	96

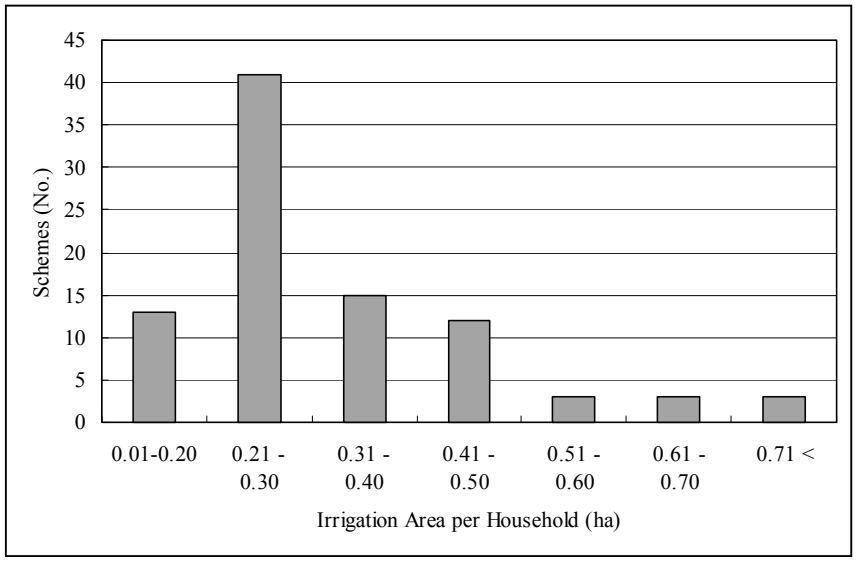
1.2 Project Beneficiaries

(1) Performance in Beneficiaries

Number of Beneficiaries (May 2000)

Branch Office	Nos. of Scheme	Scheduled		Actual		Achieve-ment
		(HH)	(%)	(HH)	(%)	(%)
Central	37	13,484	50%	8,128	51%	60%
Western	24	5,173	19%	1,676	11%	29%
Eastern	23	5,423	20%	4,682	30%	92%
Southern	12	2,904	11%	1,277	8%	44%
Total/Average	96	26,984	100%	15,763	100%	58%

(2) Irrigation Area per Household (Plan)



Irrigation Area per Household

1.3 Project Status and Documents

(1) Project Status

Project Status (October 2001)

Unit : No.

Branch Office	Completed	Not Completed	Unknown	Total
Central	18	3	1	22
Western	17	3	3	23
Eastern	8	2	0	10
Southern	7	3	3	13
Total	50 74%	11 16%	6 10%	68 100%

(2) Documents and Drawings

Documents and Drawing (October 2001)

Unit : No.

Branch Office	Design Documents			Design Drawing		
	Exist	Not	Partial	Exist	Not	Partial
Central	1	16	0	2	6	12
Western	9	12	1	9	8	4
Eastern	0	9	1	0	9	1
Southern	8	1	4	1	10	2
Total (No.)	18	38	6	12	33	19
(%)	29%	61%	10%	19%	51%	30%

1.4 OIDA's Supports for O&M

(1) Dispatch of OIDA DA (Development Agent) and Farmers Training

OIDA DA and Farmers Training (October 2001)

Unit : No. of Schemes

Branch Office	OIDA DA			Farmers Training		
	Exist	Not	Unknown	Done	Not	Unknown
Central	20	2	0	16	3	3
Western	20	2	1	20	3	0
Eastern	8	2	0	0	10	0
Southern	5	4	4	13	0	0
Total (No.)	53	10	5	49	16	3
(%)	78%	17%	9%	72%	24%	4%

(2) OM Manual and OM Charge

OM Manual and OM Charge (October 2001)

Unit : No. of Schemes

Branch Office	OM Manual			OM Charge		
	Exist	Not	Unknown	Collected	Not	Unknown
Central	0	14	8	1*	9	12
Western	4	18	1	0	22	1
Eastern	0	10	0	0	10	0
Southern	3	7	3	0	11	2
Total (No.)	7	49	12	1	52	15
(%)	10%	72%	18%	1%	77%	22%

Remarks : * Lemi Scheme in North Shoa Zone (Birr 3 per HH per year)

(3) Water Shortage and Dispute

Water Shortage and Dispute (October 2001)

Unit : No. of Schemes

Branch Office	Water Shortage			Dispute in Water Use		
	Exist	Not	Unknown	Exist	Not	Unknown
Central	12	6	4	5	13	4
Western	5	17	1	4	17	2
Eastern	7	3	0	8	2	0
Southern	3	10	0	3	10	0
Total (No.)	27	36	5	20	42	6
(%)	40%	53%	7%	29%	62%	9%

1.5 Water Users Association (WUA)

(1) Establishment and Legal Registration

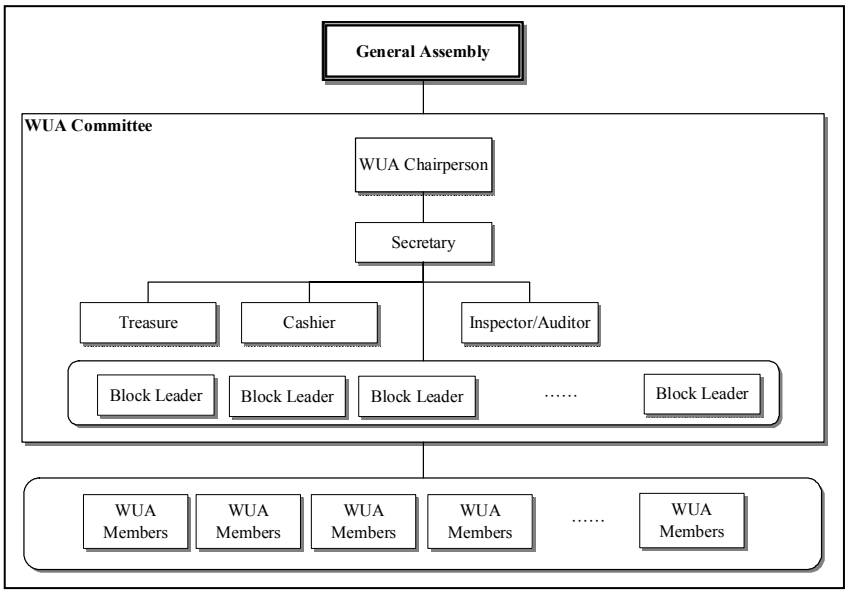
WUA Established and Registered (October 2001)

Unit : No. of Schemes

Branch Office	WUA Establishment			Legal Registration		
	Confirmed	Not	Unknown	Registered	Not	Unknown
Central	3	0	19	0	1	21
Western	20	0	3	2	18	3
Eastern	1	9	0	0	10	0
Southern	0	13	0	0	13	0
Total (No.)	24	22	22	2	42	24
(%)	36%	32%	32%	3%	62%	35%

(2) Organization of WUA

In general, a WUA of an OIDA scheme is managed by a WUA committee headed by a chairperson as illustrated below.



Organization of WUA

2. Problem Analyses

2.1 Headworks

Out of 68 schemes, 28 schemes or 41% suffer from lack or damaged sluice gates. As well, 24 schemes have the problems of intake gates. Damaged intake structures (13) and damaged wing walls (9) were also observed. Although the schemes need the government assistance to renewal of those gates and fix new gates, it was reported that some of the gates were stolen. The security control by the community of water users is highly important. Apart from the structural and mechanical defects, silt deposits and weed infestation in the upstream side of the headworks. Riverbank erosion is serious in six schemes.

Problems of Headworks (No. of Schemes)

No.	Problems	Central	Western	Eastern	Southern	Total
1.	No/damaged sluice gate	8	5	7	8	28
2.	No/damaged intake gate	8	2	9	5	24
3.	Silt deposit in u/stream	7	3	2	8	20
4.	Damaged intake structure	2	2	5	4	13
5.	Damaged wing walls/No back fill behind wing	3	1	0	5	9
6.	River bank erosion	0	2	3	1	6
7.	Weed infestation	1	-	1	4	6
8.	Temporary diversion problems	-	4	-	-	4
9.	Lack of outlet protection	2	-	-	-	2
10.	Uncontrolled water distribution	2	-	-	-	2
11.	Stilling basin problems	-	2	-	-	2
12.	Lack of spillway, sluice and others	-	-	2	-	2
13.	No inspection box on pipe intake	1	-	-	1	2
14.	River course not excavated in d/s	1	-	-	1	2
15.	River course changed	1	-	-	1	2
16.	Stoplog of barrage broken	-	1	-	-	1
17.	Low weir height	1	-	-	-	1
18.	Deteriorated dam structures	1	-	-	-	1
19.	Crest submerged	1	-	-	-	1
20.	Sliding soils into spring	-	-	1	-	1
21.	Stilling basin problems	-	-	1	-	1
22.	Approach canals broken	-	-	1	-	1
	Total	39	22	32	38	131

2.2 Main Canals

Canal seepage was observed at 32 schemes 47% of the inspected 68 schemes. Cracks of lined canals and concrete structures were identified at 21 schemes. These defects should be focused and rectified with the government supports. Some schemes have the problems derived from missing structures such as turn-outs, extension canals, intercept drain, slabs, etc. Further clarification is required for causes of these problems, e.g. design mistake, lack of budgets during the construction period, etc. In this regard, it is also important to verify the background of the

incomplete projects. 11 schemes or 16% of the inspected 68 schemes are not completed. Problems such as silt deposits, weed growth, illicit water tapping and damaged canal embankment are as a result of poor O&M under the responsibilities of the water users.

Problems of Main Canals (No. of Schemes)

No.	Problems	Central	Western	Eastern	Southern	Total
1.	Seepage/leakage of canals	8	13	4	7	32
2.	Silt deposit	10	5	4	5	24
3.	Cracks of lined canals / concrete structures	9	4	1	7	21
4.	Canal embankment damaged by animals	8	3	3	0	14
5.	Weed growth	10	-	-	3	13
6.	No design canal shape	7	2	3	0	12
7.	Embank. damaged by human/Canal body used for cultivation	4	-	-	2	6
8.	Canal breach	-	5	-	-	5
9.	Insufficient canal longitudinal slope	2	2	-	-	4
10.	Gates fixed not properly	-	-	4	-	4
11.	Illicit water tapping	2	-	-	1	3
12.	Overtopping of water	3	-	-	-	3
13.	Missing structures (turn-out)	1	2	-	-	3
14.	Missing structures (canal ext.)	1	1	-	1	3
15.	Damaged structures by flood	-	3	-	-	3
16.	Erosion of bank fill materials	-	-	-	3	3
17.	Damaged by land slide	-	2	-	-	2
18.	No gates for division boxes	2	-	-	-	2
19.	Deblis dropped from banks	2	-	-	-	2
20.	Damaged drops & division boxes	2	-	-	-	2
21.	Structures no strength	-	-	-	2	2
22.	Missing structures (intercept drain)	1	-	-	-	1
23.	Missing structures (slabs)	-	-	-	1	1
24.	Embank. damaged by flood	1	-	-	-	1
25.	Emergency spillway	1	-	-	-	1
26.	Damaged by scoring	-	1	-	-	1
27.	Broken turn out	-	1	-	-	1
28.	No spillway	-	-	-	1	1
29.	Miss use of drainage crossing	-	-	-	1	1
30.	Lined canals not back filled	-	-	-	1	1
31.	Construction incomplete	-	-	-	1	1
	Total	74	44	19	36	173

2.3 Secondary and Tertiary Canals and Drainage System

The water users are in a position to take responsibilities for weed control, repairing works of canal embankment, desilting, etc. Most of on-farm structures are also repairable by farmers' skills. Further inventory is required to calrifay the current status of drainage systems in 14 schemes and seepage problems of SC in 5 schemes and flumes in 5 schemes.

Problems of SC, TC and Drainage (No. of Schemes)

No.	Problems	Central	Western	Eastern	Southern	Total
1.	Weed growth	11	0	0	4	15
2.	Poor drainage	3	2	1	8	14
3.	Embankment Damaged	7	0	0	3	10
4.	No gates for division boxes	2	-	-	7	9
5.	SC seepage/Leakage	-	2	-	6	8
6.	Silt deposit	3	1	-	4	8
7.	Canal breaching	1	-	-	5	6
8.	Erosion of bank fill materials	6	-	-	-	6
9.	Seepage/damage of flume	-	4	1	-	5
10.	TC Construction not yet completed	-	-	5	-	5
11.	No design canal shape	1	-	-	3	4
12.	SC Construction not yet completed	2	-	1	-	3
13.	Structures destloyed	-	-	-	3	3
14.	Submerged off-take to TC	2	-	-	-	2
15.	Removal of fill soil	2	-	-	-	2
16.	Less footpath and cattle crossing	-	2	-	-	2
17.	Leakage of TC	-	1	-	-	1
18.	Missing structures (intercept drain)	1	-	-	-	1
19.	Lack of division box	1	-	-	-	1
20.	More structures (drop, off take)	-	1	-	-	1
21.	Incomplete construction (flume)	-	1	-	-	1
22.	Syphon not functional	-	-	1	-	1
23.	Lack of back fill	-	-	-	1	1
24.	Canal body used for cultivation	-	-	-	1	1
25.	Poor plastering	-	-	-	1	1
	Total	42	14	9	46	111

3. Basic Information of Initial Investment for OIDA Schemes

3.1 Objectives

In view of limited fund availability, it is important to optimize the level of investment when irrigation project works are constructed. The investment can be justified from the standpoints of project sustainability. Over-investment has also to be avoided. Through the analyses on the database being constructed, the past trend of the initial project costs was preliminarily clarified. The information obtained will be taken into account when the rehabilitation works will be formulated.

3.2 Project Cost

(1) Total Investment

The information for initial investment is available for the 81 schemes, which were constructed in the period between 1991 and 1999. They are summarized below.

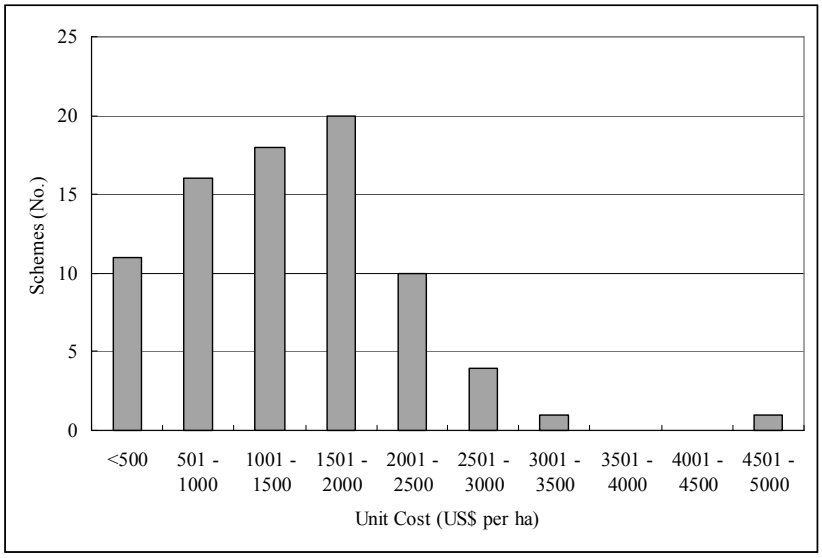
Annual Investment in 1991 - 2000

Year	No. of Schemes	Project Cost (Birr 1000)	Exchange Rate * (Birr/US$)	Project Cost (US$ 1000 evquiv.)
1991	2	852	2.0700	411.7
1992	0	0	2.8025	0.0
1993	7	1,352	5.0000	270.4
1994	19	8,249	5.4650	1,509.4
1995	16	9,765	6.1583	1,585.7
1996	16	10,610	6.3517	1,670.5
1997	13	10,659	6.7093	1,588.7
1998	7	4,984	7.1159	700.3
1999	1	922	7.9423	116.1
2000	-	-	8.2173	-
Total	81	47,393		7,852.8

Source : * Commercial Bank of Ethiopia

(2) Unit Cost

The project cost per hectare falls in a range from less than US$ 500 to US$ 5,000. Their frequency is illustrated below.



Unit Cost of Irrigation Development