MINISTRY OF AGRICULTURE AND IRRIGATION MINISTRY OF LIVESTOCK AND FISHERIES MINISTRY OF COOPERATIVES

THE DEVELOPMENT STUDY ON SUSTAINABLE AGRICULTURAL AND RURAL DEVELOPMENT FOR POVERTY REDUCTION PROGRAMME IN THE CENTRAL DRY ZONE OF THE UNION OF MYANMAR

FINAL REPORT

AUGUST 2010

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) SANYU CONSULTANTS INC., TOKYO, JAPAN

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PREFACE

In response to a request from the Government of Myanmar, the Government of Japan decided to conduct a study, the Development Study on Sustainable Agricultural and Rural Development for Poverty Reduction Programme in the Central Dry Zone of the Union of Myanmar, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Kosei HASHIGUCHI of Sanyu Consultants Inc. and composed of members from the said consultancy company between May 2006 and August 2010.

The team held discussions with the officials concerned of the Government of Myanmar and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of the development programmes identified therein and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Myanmar for their close cooperation extended to the study.

August 2010

TAKASHIMA Izumi Vice-President Japan International Cooperation Agency Mr. TAKASHIMA Izumi Vice-President Japan International Cooperation Agency Tokyo, Japan

Letter of Transmittal

Dear Mr. TAHASHIMA,

We are pleased to submit herewith the Final Report on the Development Study on Sustainable Agricultural and Rural Development for Poverty Reduction Programme in the Central Dry Zone of the Union of Myanmar. This Report presents the development programmes of the target Central Dry Zone (CDZ) area formulated with the advices and suggestions of the authorities concerned of the Government of Japan and your Agency. Also incorporated were comments made by the national steering committee members chaired by the Ministry of Agriculture and Irrigation during the technical discussions on the draft final report, which were held at Nay Pyi Taw in June 2010.

The overall goal of this Study lies in providing a design for action plans for the purpose of comprehensively promoting poverty reduction and regional development targeting the CDZ of the Union of Myanmar. The Study has been conducted in partnership with and by guidance from the concerned three ministries of Agriculture and Irrigation, Livestock and Fisheries, and Cooperatives. The process of this Study centered on the following which themselves are the objectives of the Study:

- 1) To formulate Action Plans with practically applicable measures to the CDZ for reducing poverty, focusing on the livelihood of those who live in the area, and
- 2) To develop capacity of formulating plans and implementing projects for counterparts, extension workers, farmers and targeted communities in the target area.

To attain the above objectives, this Study was carried out in a phasing manner divided into two; namely, Phase I dealt mainly with situation analysis, participatory workshops, formulation of the draft Development Programme and identification of some potential pilot projects, and Phase 2 undertook the preparation and mobilization of the pilot projects and its implementation, and presented the final version of the Development Programme upon feed-backing all the lessons therein. The Phase I study was commenced in May 2006 and completed at the mid of March 2007, and the Phase II study started in June 2007 and ended with the presentation of this final report.

We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs and relevant authorities of the Government of Japan. We also wish to express our deep gratitude to the Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries and Ministry of Cooperatives in the Union of Myanmar for the close cooperation and assistances extended to us during our surveys and study.

Very truly yours,

HASHIGUCHI Kosei Team Leader of the Study Team



PHOTOS OF THE STUDY AREA



The Study Area holds a vast area, extending latitudinally about 560km, longitudinally about 130km. Though most of the areas extend in plains, there are hills as shown in the photo, heights of which range often over 100m or so. In this vast space, natural conditions like precipitation, topography, soils etc. diversely vary, so do inhabitants' livelihoods.



Climatic character of arid and semi-arid areas lies not only in the scarcity of rainfall but its pattern is also highly variable with sites in an area giving serious impact on spot crop yields. Instability of rainfall is not confined on time sequence but it occurs on horizontal space. Under this situation, straight forward investment may result in vain and here risk-hedged activities should be pursued as development strategy.



Upland farmlands are called Ya in Myanmar where pulses and beans, and oil crops have long been cultivated by the CDZ population, which can not grow well in wet areas. The Central Dry Zone produces as much as 40 - 90% of whole pulses and beans produced in Myanmar except for black gram (this is cultivated in Delta area), and about 70 - 90 % of whole oil crops also produced in Myanmar.



Except for Bago Hills and its surrounding areas, most of the lands in Central Dry Zone are quite plain where one can see relatively intensive agriculture. A typical intensive agriculture can be seen in paddy cultivation areas, some of which are even equipped with irrigation facilities. Such very intensive paddy cultivation is found along the Ayeyarwady Rive and its tributaries.

PHOTOS FOR PILOT PROJECTS



A Demonstration Plot with Crop Calendar: This is one of demonstration plots of Integrated Crop Management (ICM). The chart was produced by Magway divisional MAS office.



A Paddy dryer (Legaing Village): Using rice husk, they are now drying pre-monsoon paddy which is usually harvested during the onset of rainy season, thereby needing drying.



Chick Pea Seed Regeneration with An Improved Seeder (Magyi Village): With the seeder they can try line planting and save seed by about two thirds.



Extension Materials produced by Kyaukse Township: Crop calendar on the back and leaflets, photos, manual, one-point illustration (folded), and even MP-4 player.



Goat Raising (Mingan Villlage): 5 she-goats are provided to each beneficiary of a group, and they have to revolve same 5 she-goats to the second generation beneficiaries.



Pig Revolving (Legaing Village): 2 pigs are provided to the 1st generation beneficiaries, and they are required to hand over same 2 pigs to the 2nd generation beneficiaries.



Knitting Production (Ma Gyi Sauk Village): Altogether 50 members come up to the 5 knitting machines, and skilled members transfer the technology to their peers besides.



Embroidery Promotion (Ma Gyi Sauk Village): 10 persons were trained on this embroidery, fetching added value on, e.g. longyi, shirt, pillow, etc.



A Children's Nutrition Improvement Center (North Pabe village): Children are provided nutritious food at this centre and at the same time washing-hand, etc. are taught.



A Paddy Husk Bio-gas Power Generation (Mon Taw Gyi Village): Bio-gas from charcoaled husk can run diesel engine, thereby generating electricity for the 380 households there.



A Kick-off Workshop for Launching Pilot Project (at Mandalay): Over 80 concerned officers were invited to this workshop for arriving consensus between the Team and them.



A Stakeholder M&E Tour: Over 40 donor/government stakeholders participated in the M&E tour, to whom one of village representatives presents their achievement.

EXECUTIVE SUMMARY

1. INTRODUCTION

1.1 The CDZ is located in the central part of the Union. The Zone has merely 700 - 1,000mm of annual precipitation since south-westerly monsoon blown from Bengal Bay is intercepted by the mountain range of Rakhine that runs nearly south to northward at the western border of the Union. Rainfall is concentrated in a few months of rainy season with erratic duration and with wide annual deviation in annual precipitation. This meteorological character not only very often brings about droughts with crop failure but casual intense showers during mid rainy season also result in floods in the watershed of Ayeyarwady River. Such climatic casualty makes environment of agricultural production as major means of livelihood of the population unfavorable as compared to that of other parts of the Union.

1.2 What's more, such state has further been exacerbated by other unfavorable factors such as pressure of increasing population versus migration of labor population in the form of seasonal outflow of workforce for piecemeal and deterioration of natural resources. Further increase of poverty-prone population is threatened unless relevant countermeasures are taken. With a view to ameliorating such undesirable state, the Government of the Union of Myanmar requested the Government of Japan to conduct a study on comprehensive agricultural and rural development in the CDZ. Upon this request from the Government of the Union of Myanmar, JICA dispatched a preliminary and appraisal mission in February 2005, and the Scope of Works (SW) was agreed and signed on November 16, 2005 between the two governments. The Study commenced in May 2006 and completed in August 2010.

1.3 The overall goal of this Study lies, as stated in the Scope of Works (SW), in providing a design for action plans for the purpose of comprehensively promoting poverty reduction and regional development targeting the CDZ of the Union of Myanmar. The whole process of this Study therefore centers on the following, which themselves are the objectives of the Study:

- 1) To formulate Action Plans with practically applicable measures to the CDZ for reducing poverty, focusing on the livelihood of those who live in the area, and
- 2) To develop capacity of formulating plans and implementing projects for counterparts, extension workers, farmers and targeted communities in the target area.

1.4 In early 2006, SANYU Consultants Inc. of Japan was contracted by JICA to carry out the Study. The Study Team first arrived at Yangon on May 14, 2006 and began phase 1 field surveys. The Team has conducted necessary surveys and studies agreed in the SW during the first year's survey period, and presented a draft version of the action plan, a sort of master development plan of the CDZ. Then, from phase 2 survey onward, pilot projects had been commenced centering on poverty reduction by dealing mainly with 4 sectors of agriculture, livestock, cottage industry and living environment improvement. All the planned activities under the pilot projects had been completed by the end of February 2010, and lessons were fed-back in refining the action plan of the CDZ. With these works having been successfully completed, this Final Report is presented.

2. DEVELOPMENT AND POVERTY OF THE UNION

2.1 Although economic growth in early 1990s had been weak, it achieved high rates of growth, 6 - about 10% per annum, during the period from around 1992/93 to mid 1990s. In 1997 the Country joined ASEAN anticipating much foreign investment by this occasion, however, it ended up in overall failure as affected by Asian economic crisis occurred in the same year. The GDP growth rate resulted in 5.7% in 1997/98 followed by 5.8% in 1998/99. Then the GDP growth rate showed a sudden surge in 1999/2000 at 10.9%, and has been marking high growth ratio over 10% to date. The average

growth rate from 1999/00 to 2007/08 is 12.66%, at which rate total GDP could be doubled in just 6 years. Sources such as Economic Intelligent Unit, Asia, now raise some concerns in its interpretation.

2.2 As regards GDP composition of the Union of Myanmar by rate, since mid-1990s a tendency of gradual dwindling in the share of agricultural sector coupled with gradual replacement by the share of trade and services (transport, communication, social and administrative services are included) has been observed. With regard to the share of agricultural sector in GDP, the contribution reached 55% in 1994/95 owing very much to exports of pulses initiated in early 1990s. Later, it has turned into a gradual decrease affected by tapping of natural gas that was launched since 2001. Notwithstanding, even in 2007/08 the share of agricultural sector to GDP accounted for 35% suggesting that the mainstay of the Union of Myanmar is still agriculture.

2.3 At any rate, typical profiles observed in GDP composition of the Union reside firstly in large share of the primary industries, inter alia agricultural sector, secondly in the sustained state of sluggish decline in the GDP share of the primary sector (agricultural sector). The fact that the rate of contribution of agricultural sector to GDP has not been sharply declining suggests us that agriculture sector has achieved some growth in keeping pace with the growth of GDP itself. Long term trend shows continuous high rate of growth in agricultural sector since 1999/00 except for that in 2002/03 recording 4.7% only. The growth rates are for example 10.5% (1999/00), 11.1% (2000/01), 8.1% (2001/02), 4.7% (2002/03), 9.3% (2003/04), 10.2% (2004/05), 10.7% (2005/06), and 9.2% (2006/07).

2.4 In 1970s, the Union stood at the leading rice exporting country in the world. The highest share on the basis of export value was in fact from rice, and 42% in overall exports of the Union was recorded in 1980/81. However, later rapid dwindling of the share of rice on foreign currency earning took place to the level of only a few percent, with the largest 9% in 1995/96. In place of rice, pulses expanded their shares on export earnings until they have reached the top of share composition during the period from mid 1990s to 1998/99. Their shares recorded 27% in 1995/96, 23% in 1996/97, 22% in 1997/98 and 18% in 1998/99. Later, garment industry expanded the exports in 1999/00 and 2000/01, followed by export of natural gas to Thailand that has gained the regular delivery since 2001 accounting for the share of as much as 40% in overall export earnings as of 2007/08.

2.5 The Union of Myanmar also accelerated the pace of stepping up its rank in HDI reaching 0.549 in 2001, 0.551 in 2002, 0.578 in 2003, 0.581 in 2004, and 0.582 in 2005 but it still remains at considerably low position of HDI ranking, i.e., 138th out of 182 countries in the world in which HDI data is available. Cambodia (ranked at 137th) and Laos (133rd) have similar positions to that of the Union among ASEAN members. With regard to per capita GDP mentioned above, the Union produced 465\$, less than two third of that of Cambodia with 756\$ and that of Laos with 918\$ (all the products were measured as of 2008). Under these situations, the reason why HDI of the Union is ranked almost same as those of Laos and Cambodia could lie in an indication that health and educational indicators of the Union have higher values than those of the two countries.

3. THE STUDY AREA

3.1 DEMOGRAPHY AND NATURAL CONDITION

3.1 The total Study Area, the CDZ, covers around 75,169km² equivalent to 11% of the total national territory, extending over 150 km or so to the east - west axis and about 500 km to the south - north axis. The Area is located in such three divisions of Mandalay, Sagaing, and Magway wherein there are 11 districts and 51 townships. Average areas of a district and a TS are 25,000km² and 1,480km² (about 38kmx38km). Population in the Study Area counts at 9,841,620 as of 2003, accounting for about

18% of the total national population. Demographic density in the Study Area is estimated at 131 persons/km², or 1.7 times as much as the mean national population density, implying that the Study Area is fairly densely populated.

3.2 Rainy season in the CDZ ranges from late May to October. One of the characteristics of the rainfall pattern is intermediate decline in July in the course of the rainy season. The annual rainfall is between 700mm to as much as 1,000mm according to area where it stands. Dry season covers the duration from November to early May and it is classified into two periods; namely 1) summer or pre-monsoon period during March - first half of May, and 2) winter period during November - February that is to follow rainy season. Mean maximum temperature which appears in May is around 32 Celsius degrees while it goes down to around 20 Celsius degrees during winter.

3.3 Rainfall pattern in semi-arid zone like the Study Area is characterized by firstly low annual precipitation and also instable distribution pattern with capricious or erratic occurrence. Instability of the rainfall is not confined on time sequence but it occurs on horizontal space. Despite that scarce rainfall has caused large yield decrease in an area, timely rainfall may have been received resulting in ordinary crop harvest in its neighboring township areas or districts in the same year. As far as such cases actually happen, occurrence of crop failure in a village is not readily visible in the statistical data covering broader areas. The fact that annual precipitation is not stable is interpreted as that farming has a dimension of uncertainty or a kind of gamble.

3.2 AGRICULTURE

3.4 Although the Study Area is called "dry zone", it has already created its position as a key agricultural production area of the Union. The total population in the 3 divisions, wherein the Study Area lies, accounts for 34% of the national total. It is evident that many crops show by far higher share as compared with demographic ratio. Also, it is really amazing that paddy production, that is first priority in Myanmar, in terms of total of rainy season crop and dry season crop in this area has share of 22%, and that in terms of only dry season crop (irrigated one) has share of 29% on the national total. In addition, this area is known as a production area of oil-crops and pulses, where production share reaches 70 - 90% in the case of oil-crops and around 40 to over 90% in terms of pulses except black gram that is produced in the delta.

3.5 In CDZ, ratio of lowland farm and upland farm is 28% : 72%, implying as much as about 30% of the whole farm lands could be planted with rice if rainfall allows. This Study estimated per-capita rice production based on milled weight by using a conversion factor of 0.6 from paddy to white rice. Here, annual per capita consumption of milled rice in the Union is supposedly around 150 - 180kg though differed by data sources. When this amount of consumption is superimposed onto the production of milled rice in the CDZ area, one can see about a half of the level of self-sufficiency in Mandalay, around 70% in Magway and more than two times as much as the self-supplying level in Sagaing.

3.6 As a vast paddy tract develops from its center, Shwebo, to the area of Sagaing Division that is equipped with irrigation facilities constructed in the dynasty era, it has the third rank of per capita rice production in the Country after Ayeyarwady Division and Bago Division. It is likely that from this Division rice marketing to Mandalay has been evolved. Magway is also a rice deficit area, and it is said that rice transported from the delta offsets the shortage of rice in Magway in addition to rice delivered from Sagaing Division. With such variation by area, the Study Area as a whole is anyhow producing rice nearly at the level of self-sufficiency. The fact that such an amount of rice is produced in what is called a dry area is very much noteworthy though data of 1999 and onward may have concern of credibility.

3.7 Oil crops have the second priority in the agriculture of the Union. As it is often referred to that the nation of Myanmar consumes large amount of edible oils, oil-seeds are considered as one of the most important crops. Traditional edible oils consumed in the Union mainly consist of sesame oil and groundnut oil, to which sunflower oil may be added. Sesame production in 3 Divisions in the CDZ accounts for 89% of the total production in the Union, groundnut production does 69% and sunflower production has share of 70% as of 2004/05.

3.8 However, the Union is importing great deal of palm oil, ranging from 80 thousand MT to 160 thousand MT every year. The equivalent of domestic sesame seed quantity required for the import substitution of 160 thousand MT could be about 400 thousand MT. Production of sesame seed has been at most around 500 thousand MT even in the record crop in 2004/05. This is to say how large the imported palm oil volume is. Palm oil is in fact cheaper than domestically produced oils. So far as food constitutes a culture, it may be hardly possible to change people's preference in short time by the grade of prices only. However, under the current situation where palm oil has enormously been imported, one may say that oil-crops' future prospect would not be so rosy judging from their comparative advantages.

3.9 The third priority in the agricultural sector production in the Union is placed on pulses. The reason of high priority may reside in intake of protein from these pulses, but more convincing reason exists in the significance of earning foreign currency with their major export destination targeted to India. India has driven its policy toward economic liberalization in 1991. Pulses produced in the Union have stronger international competitiveness from the view point of international trading prices. Therefore, most of the current pulses produced in the CDZ are of export-oriented with the principal destination to India. MAS has also promoted pulse production by means of provision of high quality seeds of green gram and chick pea for distribution among farmer producers oriented to the exports during the period 1990s - early 2000s.

3.3 LIVESTOCK

3.10 The Study Area has been known as livestock producing area in the Union. Draft cattle, indigenous cows, hybrid dairy cows, sheep and goats suitable for dry zone climate, and also some fowls are reared in the CDZ. Cattle share in the CDZ as against whole Union is 49 % that is more than the population composition of 34%. In this Country little farm mechanization has taken place so far. Cattle are therefore prerequisite for tillage and transport in upland as well as in paddy land for those who do agriculture as their mainstay. Sheep and goats are much more existing in the CDZ as posed at 77 % share against the population percentage of 34. This is simply because of their nature adjustable to dry land climate. Agricultural productivity as major means of livelihood is always unstable in the CDZ with scarce and unreliable rainfall. By this reason domestic animals serve literally as "live bank (=livestock)" that can quickly be cashed whenever need arises.

3.4 COTTAGE INDUSTRY

3.11 Cottage industry, with their markets targeted within villages or nearby townships, such as weaving oriented more to self-supply or sewing by the use of few sewing machines is run in almost all villages in the CDZ. They include wide variety of business activities such as manual weaving with its historic background origin of dynasty era, stoneware, lacquer ware and jaggery. Expansion of scale in these industries is taking place in the outskirts of larger townships – for example nearby Mandalay City – where access to materials is easier. Some villagers try to establish new type of small-scale industries like rice milling by investing the surplus gained in agricultural activities, or others try to enlarge the scale of existing industries that has so far been confined in the scale of cottage

industry.

3.5 RURAL SOCIETY : LANDLESS PEOPLE

3.12 Not all the people in rural area are farmers. They are divided into farm households to which land cultivation right is vested by the Union and off-farm ones without its right. The landless is categorized into the latter. The rates of off-farm households in the 51 TSs of the Study Area vary considerably. The lowest rate of off-farm households is found in Ayadaw TS (5%) in Sagaing Division, whereas the highest is recorded in Pakokku TS (80%) in Magway Division. The large differences in the rate of farm/ off-farm households by TS are said to have bearing on whether land reform has been executed in the past or not.

3.13 Based on the data given from concerned TS PDC offices, those who are categorized as off-farm households constitute of 42% of the rural population in the Study Area. Another survey done at 6 pilot project villages in the CDZ showed that 46% of the 419 sampled HHs were off-farm households. Taking into these account, one may say about 40% to 50% of rural population in CDZ are landless. The landless are engaged in several livelihoods such as farm labour, cottage industry, livestock rearing, etc. to make their life sustained. Among the landless, those who earn most of the income from farm labour are regarded as the poorest of the poor. They constitute of about 60% of the total landless, namely 20 - 30% of total rural population.

3.14 Among the society of Bamar race, there found almost no difference between male and female in educational level for younger generations (in elder generations, gap exists). Daily household affairs including financial management are delegated to mother and household account is around 100% managed by the wife. As to contents of works, women are engaged not only in simple wage labour, but also many of them have broader activities including management of businesses. Thus, it can be said that women's status is not lower than male status. High status of women enables them to do many things including access and control, to a great extent, of resources and opportunities; for example they can put resources on their children's health as well as children's education, also reducing gender gap between boy and girl.

3.6 HEALTH AND EDUCATION

3.15 Infant and under-5 year child mortalities in the Study Area are lower than those of the Union. Looking at the under-5 year child mortality, for example, the mortality in the Study Area ranges from 31 - 44 by division with the average of 38 amongst 1000 live births while that of the Union is 106 (UNICEF) or 62 (Myanmar Statistical Yearbook 2008). This low rate may be because; 1) immunization has been widely done with a background of high status of women, giving cares to their children well, and 2) of its nature as dry area for the CDZ where not much endemic and epidemic diseases prevail as against tropical humid areas. In relation to the 1st statement, Myanmar has put an emphasis on mother and child health since socialist era, leading to nowadays high immunization ratios as 80 to 100% in the 6 villages where pilot projects were carried out.

3.16 Literacy ratio in the Study Area is higher than that of the Union and also higher than those of ASEAN countries. The ratio of the Study Area has reached as high as 96% (average between male and female adults, not available by gender), while the ratios in Thailand and Singapore that are economically very much progressing are 93% and that of the Union is 90%. This high literacy ratio in the Study Area is attributable to nowadays' 80 - 100% primary enrollment and even elder generation once used to attend monastic school where they learned how to read and write. There are 264 monasteries in the Study Area as of 2006, all of which provide education, contributing to raising literacy ratio of those who cannot go to school or who dropped out of school due mainly to economic

difficulties.

4. DEVELOPMENT PLAN FORMULATION

4.1 DEVELOPMENT OPPORTUNITIES & CONSTRAINTS

4.1 A host of development potential can be identified in the Study Area. Here, available potentials in promoting development of the CDZ can be amongst others; 1) farming system and animal husbandry in conformity with environmental characteristics in the CDZ, 2) high status of women and high social indicators, and 3) cottage industries with high technical level. On the other hand major development constraints in the Study Area could be; 1) low staffing and insufficient logistics arrangement for stationing agricultural extension staff and livestock extension staff belonging to TS who contact with villagers at the frontline, 2) fruit-figure-the-principle of fulfilling norm for norm sake, and 3) the recognition of livestock by livestock extension staff in its context of 'livestock' but as animal for veterinarian doctor.

4.2 POVERTY LINES AND RATIOS

4.2 This Study estimates poverty line with referring to Cost of Basic Needs method based upon baseline survey result, which sampled 419 households in the 6 pilot villages undertaken in FY 2007/08. The poverty line is generally composed of 2 basis; 1) food poverty line and 2) non-food poverty line. The former poverty line, food poverty line, is estimated as necessary expenditure to purchase a food basket which can ensure 2,300 kcal for per-adult equivalent per day. This is estimated at 163,903 Kyats per adult equivalent per annum (130\$ referring to a market rate of 1,260 Kyats per dollar).

4.3 The non-food poverty line, on the other hand, is estimated as necessary expenditure required for those items as education, health care, medicine, clothing, housing, etc. The non-food expenditure shows big difference between farm households and non-farm households. For the former households, what comes first is the payment of wage to farm casual labors and the 2nd biggest expenditure is on purchasing of agriculture input e.g. chemical fertilizer, seeds, etc. These 2 expenditures, payment to farm casual labors and purchasing of agriculture input, do not take place in non-farm households, thereby non-food poverty line shall be set separately. The non-food poverty line for farm household is estimated at 98,044 Kyats (78\$) while that of the latter household estimated at 67,147 Kyats (53\$).

4.4 The Poverty Line as aforementioned is the sum of Food Poverty Line and Non-food Poverty Line. The lines estimated are 261,947 Kyats (US\$ 208) per adult equivalent per annum for farm household, 231,050 Kyats (US\$ 183) per adult equivalent per annum for non-farm household. The shares of the food poverty line out of the poverty line are 63% and 71 % for farm household and non-farm household respectively. By multiplying number of typical family members into the poverty line per adult equivalent per annum gives us a typical poverty line now estimated per household per annum. The poverty lines per household per annum are worked out at 1.2 million Kyats (US\$ 973) and about 1.1 million Kyats (US\$ 858) for farm household and non-farm household respectively.

4.5 Poverty ratio by all the sampled households is 43%, and the ratio for farm household only is 33% whereas the one for non-farm household is 55%. This clearly shows poverty for non-farm household is deeper than that of farm-household. Further, the poverty ratio for farm casual labor is as high as 75%. This result clearly shows where the poorest people are; that is in the category of farm casual labors. Poverty ratio by gender shows deference as expected; namely, the ratio for male-headed household is 43% while the one for female-headed household is 49%. Though the sample number for female-headed household is not enough, say only 34 samples (only 8% out of

whole 419 sample households), yet we can see the tendency for female-headed household suffering more in poverty.

4.6 Poverty gap ratio indicates the depth of the poverty; corresponding to the distance between the poverty line and the average of expenditures for those who fall below the poverty line. In other words, adding the monetary value calculated by multiplying the poverty gap ratio into the poverty line, the person can be lifted up to the poverty line. The poverty gap ratios are; 11%, 8%, 14%, and 20% for whole sampled households, farm household, non-farm household, and farm casual labor household. It is indicated that the depth of the poverty for non-farm household is deeper than that of farm household, and again that of farm casual labor household is further deeper than that of non-farm household. The poverty for farm casual labor household is more than 2 times deeper than that of farm household (20% vs. 8%).

4.3 INCOME AND ITS DISPARITY

4.7 Gini Index was also estimated to know about income inequality. Gini Index ranges from 0.197 for Mingan village being the lowest to 0.411 for Legaing village being the highest with an average of 0.387 for the 6 villages where pilot projects were carried out in FY 2007/08. Average household income in Mingan village is 817,317 Kyats per year which is the lowest amongst the 6 villages. People in Mingan village can be said equitably poor. Legaing village is, on the other hand, blessed with irrigated paddy fields, whereby big income gap between the farmer and the landless. Average annual income for farm households is 2.2 million Kyats while that of farm casual labor households is only 748,000 Kyats, about one-third.

4.8 Taking into account above results, one may suggest that income for the poor should be increased. In fact, even in case that both husband and wife have been engaged in farm casual labor work throughout year, they cannot get out of the poverty, as indicated by their annual income 648,000 Kyats (1,800 x 360 days) vs. 1,081,314 Kyats that is the poverty line for non-farm household. They need to find additional means of income, or they cannot get out of the poverty. Assistances of increasing their income or diversifying their income should be provided. In addition, a distribution policy from the rich, mostly farmers, to the poor may have to be put in place by modifying land tax system wherein it is only 5 Kyats per acre for a productive land and as little as 1 Kyats per acre for non-fertile lands.

4.4 DEVELOPMENT VISION AND TYPOLOGY

4.9 A variety of livelihood and life are sustained adapting to various natural environment in the CDZ. In view of these situations, it has been agreed in the Scope of Works prior to the commencement of this Study to elaborate development programmes including 4 major scopes consisting of 1) agricultural development, 2) creation of off-farm income sources, 3) living improvement and 4) supporting activities, focusing on the inhabitants livelihood. Taken these scopes into account, development vision in the CDZ – future scope of development – is proposed as "Area Wherein People Enjoy Well-beings Based Primarily Upon Agriculture and Livestock Production Suitable to the CDZ Environment, Off-farm Incomes from Cottage Industry, Good Living Environment and also Better Supporting Systems".

4.10 In formulating development plan of the CDZ, typology is established for the vast area based on relevant indicators. Typology is tried at TS level, for which 51 TSs are included in the Study Area. TS is a frontline where many government offices are placed, and data required for the basis of typology are available at this level. Five types are proposed as typology that are positioned in between two extremes, one representing TS located mostly along Bago Hills where the most extensive

upland farming takes place and the other representing that with irrigated paddy land where the most intensive paddy farming is engaged. Thus, the nature of farming shifts from extensive to intensive as the Type proceeds from I towards V. Likewise, annual rainfall progressively augments from Type I to Type V. Coinciding with this shift of precipitation, high rate of goat/sheep observed in Type I or Type II shifts to high rate of cattle in Type V.

4.11 Since TSs falling into Type I - II are susceptible to drought damages it is not so easy to step up themselves with the accumulated surplus from farm production. On the contrary, TSs falling into Type IV and Type V are possible to practice highly productive farming under stabilized environment. From inhabitant's extent of poverty point of view, Type I has the highest poverty rate, and the rate becomes lower as the type proceeds to Type V. Type V, however, in which farmers are engaged in the most intensive irrigated paddy farming has wider disparity between irrigated landholders and the landless. Namely, though TSs falling into Type I are poor but the villagers are uniformly poor, whereas those falling into Type V has higher average income but with larger economic disparity.

4.12 Precarious rainfall typically in the CDZ tends to occur in the area under Type I where livelihood tends to be unstable. In contrast, TSs under Type V with high irrigation rate have capability of yielding stable and high level outputs. Reflecting these conditions, TSs under Type I require measures to stabilize currently unstable livelihood, or development based on risk-hedging as the development strategy. Whereas, TSs under Type V have tools, e.g. irrigation facilities, that can control natural vagary, enabling to follow straightforward process of growth that entails increased outputs. A kind of linear growth oriented development can therefore be applied in this Type V as the development strategy. Two bipolarized strategies should be pursued in those extremes of the Study Area, and practically somewhat combined strategy with one or the other more prioritized as to which extreme the concerned TS is nearer should be applied.

4.5 DEVELOPMENT FRAMEWORK (MACRO LEVEL)

4.13 The development planning is based on a series of participatory workshop inviting villagers as well as government officers from the concerned 3 ministries as agriculture, livestock and cooperatives. Summing up all the works done in the workshops together with contributions by the JICA Study Team, a prioritized macro level CDZ framework is presented together with project/ programme description in a simplified project design matrix (PDM). Development framework can be a guide when the concerned 3 ministries try to carry out development activities in the CDZ because the framework provides with concrete development components, those priorities by sector and by area (TS) at which what projects should be carried out.

4.14 This Study had carried out a series of participatory workshops inviting villagers engaged in 6 target villages for the pilot projects done in 2007/08, TS level government officers, district, divisional and also headquarters' level officers. The participatory workshop for the purpose of development planning was done 2 times in 2007 at the same time when mid-term and final evaluation workshops for the pilot project were held. It was observed that villagers prioritized agriculture, cottage and livestock in its order, and then followed by education, infrastructure and health, and by environment. The government officers prioritized agriculture, infrastructure, education in its order, and followed by livestock. Cottage industry was ranked at 2nd last next to environment.

4.15 The results implies that the villagers think of such 3 sectors as agriculture, livestock and cottage industry being most important while TS government officers give more priority to infrastructure and education after agriculture. This tendency can be seen commonly; namely, common people tend to put priority on such sectors in which they can make livelihood while government side tends to give priority to public service provisions which in this case appeared in infrastructure and education.

Though health was given 2nd last priority, it may not necessarily mean they think so less important but it might be a sign that people feel health condition is not much poor.

4.16 Following the sector prioritization, villagers and TS government officers went to a problem analysis session, in which PCM problem analysis was employed as the tool. The problem analysis dealt with only 3 sectors of agriculture, livestock and cottage industry which are the major sectors aimed to improve under the Study's scope. Next step was to identify the priority development purposes taking into consideration the problem statement and those priorities. Basically those focus problem statements were converted into positive statements, now called development purposes here. Development purposes were also prioritized during the workshop by such 3 levels as; villagers, TS officers and higher government cadres' officers, and then aggregated.

4.17 Development framework is a kind of guiding that shows us the tangible way of reaching the development vision aforementioned. It shows development sectors (approaches) and development purposes sought to achieve the development vision, as well as intervention activities that are usually called development project or development programme. The framework should also have the priority at different levels of, e.g. sector, purpose, project/ programme, with which we can consider which development interventions should be put in implementation given limited resources.

4.18 Development framework is now established (as shown in Figure 4.5.6, see main text), by taking into consideration what was practiced through the workshops as well as Study Team's findings. The sectors are identified as in improving or promoting of 'Agriculture', 'Livestock', 'Cottage Industry', 'Education', 'Health', 'Infrastructure' and 'Environment' with those priorities from top side to down side according to the Study scope and also taking into account the priorities ranked by villagers and TS government officers (though TS government officers prioritized education and infrastructure higher than livestock and cottage sectors, the top 3 sectors are aligned according to the Scope of Work of this Study, that are 'Agriculture', 'Livestock', and 'Cottage'). Purposes are also placed under each of the sectors according the priority, and accordingly projects/ programmes which were identified by the JICA Study Team together with the counterpart personnel.

4.19 The Study area is categorized in 5 types, and therefore if the framework can relate those projects/ programmes with the typology, it could be great help for those who are participating in developing the central dry zone area. This means that given the relationship we can know which project/ programme should be implemented in which type of the area, making development intervention easier according to the characters of the types categorized and increasing the efficiency in fund allocation as well. Matrix having such symbols of \bullet , \odot , \bigcirc shows the guidance of which projects/ programmes should be carried out in which typology with how much of priority. The prioritization in the matrix was done by cross cutting from top to bottom by the typology.

4.20 The macro development framework is planned to be used by current government offices. To utilize the development framework, the entry point is the Budget Estimation Meeting held in September every year by respective department heads under each ministry. The departmental heads will discuss the next year's activities during the meeting with reference to the programmes and projects shown in the development framework. When they find a specific programme or project in the framework, which have not been undertaken so far, they should try to include them into their budget estimation. In so doing, programmes and projects presented in the framework are to be incorporated in the government budget estimation, becoming a part of the government programme. With regard to areas (TS) at which a programme/ project is to be implemented, priority matrix by typology shown in the development framework should also be referred.

4.21 Utilization of the framework should be pursued not only along above-mentioned technical line but also by involving PDCs. For example, divisional managers bring back the development

framework from the headquarters and then explain what the development framework shows to the chairman of divisional PDC during a divisional meeting held at least once in a month. Divisional PDC chairman can also become familiar what programmes / projects should be required in his area with what priorities and also the relationship between the programmes / projects and TSs where those programmes / projects should be implemented. In fact, PDC has its own operation budget mostly coming from registration fee, license fee, market fee, etc. Therefore, if the divisional PDC agrees what is presented in the year's activities well linked up with the framework but with little financial endorsement, the PDC may consider to provide some supplemental budget.

4.22 To implement the programmes and projects presented in the framework, government fund should be utilized as much as possible including PDC fund. Included in the government funds are loan provision by e.g. Myanma Agricultural Development Bank and Myanma Livestock & Fisheries Development Bank. The loan provide by the Agricultural Bank ranges US\$ 35 – 40 per farmer and thus it is not big enough. However, when looking into the total disbursed amount in the 3 divisions of CDZ, it reaches as much as US\$ 19.5 million as of 2007. As for livestock sector, Myanma Livestock & Fisheries Development Bank now provides considerable amount of loan even to small scale livestock farmers. In Magway division for example, as much as 418 million Kyats (equivalent to about US\$ 418,000) loan is available in FY 2009/10, which can help the small scale livestock farmer purchase the initial stock and then s/he can enlarge the stock.

4.23 Besides, there are some INGOs and international donors which are operating in the CDZ with whom there may be a possibility to collaborate. For agriculture sector, OISCA has been active in CDZ already over 10 years. The INGO promotes organic farming and in fact a pilot project under this Study linked up with the OISCA, training over 40 MAS staff in FY 2008/09. OFID may have a possibility of proving certified and good oil seeds. In addition, livelihood improvement is undertaken by such INGOs as PACT Myanmar, AMDA and Save the Children. In fact, PACT has been engaged in rural credit sector, and covered as many as 1,736 villages with 212,008 customers in total as of 2009. The total disbursed amount in 2009 reached about US\$ 11.21 million, considerably big coverage. With this loan, credit beneficiaries can start mushroom culture, vegetable cultivation, native chicken rearing, etc.

4.24 As for rural water supply, BAJ (Bridge Asia Japan) has been operating over 10 years based at Kyaukpadaung TS. This INGO has covered 10 townships near Kyaukpadaung TS. In and around these areas, groundwater is deep often more than 150 m. The depth of a tube-well in this area therefore reaches as deep as over 200m. One tube-well may cost about US\$ 40,000 or more. The INGO has sunk about 10 tube-wells per year over the 10 years operation. To construct a deep well, collaboration with BAJ should firstly be pursued. Furthermore, KOICA is now operating in forestation sector. Though the project is not much big, covering about 150ha in Nyaung-U TS, forestation programme presented in the development framework should seek a collaboration with KOICA.

4.6 DEVELOPMENT FRAMEWORK (MICRO, VILLAGE LEVEL)

4.25 Aforementioned 'Development Framework (Macro Level) is the core of a sort of master plan targeting whole CDZ area taking into account typology by township. With the development framework and accompanied project descriptions, concerned ministries can know what activities are required to develop CDZ with priorities. The projects/ programmes specified in the development framework are designed able to be implemented by current government institutional setting-up. As a result of what each government organization has played their roles, several activities would be brought into a village, thereby comprehensive intervention covering plural sectors could be achieved.

4.26 On the other hand, there is different approach in development intervention, which is to directory undertake comprehensive intervention at village level. In this approach, what comes first is a village at which several development interventions are planned taking into different livelihoods we can see even in a village. In most cases, there are agriculture, livestock and cottage related livelihoods even in a village. Here development intervention is planned to undertake all these livelihoods from the very village level. In putting this approach into implementation, there should be a coordinating team as JICA study team undertook in implementing pilot projects covering different sectors. This kind of team may be set up by concerted efforts by the concerned ministries, or otherwise with a help of external organization.

4.27 To realize above-mentioned approach, there should be another development framework established based on village, so called micro development framework or village level development framework. This framework should refer to the livelihood of the villagers. There are by definition farm households and non-farm households in the CDZ rural area. Farmers who cultivated farmlands in Type IV and Type V are blessed with better natural resources. Whereas, in Type I and Type II areas, farmers are suffering from erratic and marginal rainfall and even soils there are not fertile in most cases. As one moves towards Typology V, the more resource rich farmers the one can meet while towards Typology I the more resource poor farmers the one will see.

4.28 As for non-farm households, there are different livelihoods they are engaged in but amongst them the livelihoods are livestock rearing, cottage industry employed, and farm casual labor work. Goat and sheep can be seen in dryer areas and therefore as one moves to Type I area, more goats can be found. Cottage industry can be found in almost all villages in CDZ though the scale becomes small in Type I and Type II where severe climatic condition prevails. Concerning farm casual labors, they are more found in better environmental areas like Type IV and Type V. This is simply because farmers in these areas are rich enough to employ the farm casual labors.

4.29 With those above taking into account, Development Framework for Village Level was established (see Figure 4.6.2 in the main text). Development intervention (component) is demarcated by 2 categories at first, namely, a group of interventions, which benefit specific target villagers and the other benefiting whole villagers. Then, upper part of the framework demarcates the intervention by the category of farmer households and non-farmer households, and further elaborates by category of farmers and also by category of livelihood such as cottage industry, livestock, etc. In case of macro development framework discussed above, those interventions placed at upper part of the framework were given higher priority. However, the village level framework established here does not give any priority by the location wherever it is placed but just according to the category of the livelihoods.

4.30 Cost shown in the village development framework is an indication of how much should be required in carrying out such components at a village. Therefore as number of villages to be undertaken increases, the cost will automatically multiply. Not all the projects (components) are required in just one village of course. Therefore, those project costs should not be simply summated to know the total investment in a village. At first, project components should be carefully selected according to the typology where the village is situated, and then the villagers' needs should also be confirmed. Components only met with the villagers' needs should be put into implementation.

4.31 There are now two development frameworks presented. Since resources are always limited in terms of not only human resources but also financial resources, there should always be strategic collaboration wherever more than one approach are tried in the same area. Aforementioned macro framework intends to carry out wide coverage activities, basically based on extension, except for such projects as irrigation facility construction, ring levee construction, etc. which require huge investment at a place. Then, another framework, village level or micro level framework is for a village. In

carrying out both approaches, there should be of course strategic collaboration. In this case, as an example, we can say the village development based on the micro framework can work as a model or as a demonstration village to all those ones undertaken by macro level development framework.

4.32 Very simple example can be given in Certified Seeds Dissemination Programme, Paddy Cultivation Improvement Programme, etc. Project carried out based on village level framework may establish demonstration farms to which other villagers can also be invited to see specific technologies. In this way, those programmes carried out under macro framework can be benefited. In sum, demonstration farms should be not only for those benefited by latter approach, micro frame based approach, but also for those covered by macro frame based programme. Another simple example can be given in livestock project. If micro frame based project has established an improved mode livestock house, e.g. floor-elevated goat house, those benefited by macro frame based programme should also see the improved animal house.

5. THE PILOT PROJECT

5.1 DESIGN OF THE PILOT PROJECT

5.1 Pilot projects have been carried out over 2 financial years of 2007/08 and 2008/09. The pilot projects in FY 2007/08 were carried out in 6 villages in 6 TSs identified referring to typology of the Study area aforementioned. Adding further 6 TSs, total 12 TSs were undertaken in FY 2008/09 pilot projects. In FY 2007/08, pilot components were identified at village level workshop wherein problems were identified in sectors of agriculture, livestock, cottage industry, living environment improvement, etc., and projects were designed to tackle those problems. In this regards, one may say the designing of the pilot projects in FY 2007/08 is of integrated rural development approach.

5.2 The pilot projects in FY 2008/09, on the other hand, extended the activities further by including new components, by implanting in TS recurrent extension works, by inviting extension officers to training courses, etc. The last implementation approach is new in FY 2008/09 pilot projects where participated TS officers formulated their own action plans based upon what they have learned during the training courses administered by the pilot projects, and thereafter they implemented their own plans in the course of discharging their extension activities. In any case of both years pilot projects, such 4 sectors were covered as agriculture, livestock, cottage industry and living improvement.

5.2 EVALUATION RESULTS OF THE PILOT PROJECT

5.3 The project evaluation was carried out from the 5 aspects and ranked in a range of 1-5 with the 1 being the least and 5 being the highest while evaluation 3 means the project has performed as designed. Evaluation itself was done by all the project members engaged in February 2010, e.g. 3 JICA members, 4 counterparts and 3 national staff having been engaged in the monitoring of pilot projects. Evaluation results for the FY 2007/08 pilot projects are briefed below by sector:

1) Agriculture related pilot projects such as raised-bed cultivation, improved seeding practice and chick pea seed regeneration have in general marked relatively high mark. In fact, chick pea seed regeneration was evaluated higher than others because harvested seeds were revolved to the succeeding 2nd and 3rd generation beneficiaries. On the other hand, Bokashi compost making was evaluated low. Though beneficiaries recognized the effectiveness of Bokashi, it is a sort of tiresome work to prepare for and thereby not much extension from farmer to farmer was made. This current status resulted in lower mark. As for mushroom cultivation, it has been smoothly carried out in Legaing village while in Ar La Ka Pa village mushroom was

competed by natural sprout mushroom. Therefore the evaluation for mushroom cultivation in Ar La Ka Pa village stayed low.

- 2) As for livestock sector, goat revolving pilot project marked very high evaluation. Local cattle improvement was also evaluated high with the background that most of the farmers in the CDZ depend on draught cattle. Sheep was recognized to have high relevance. However, reproduction ratio of sheep was lower than that of goat, thereby giving lower mark than that of goat. Pig raising had been performing very well till end of December 2008, and then it was faced with swine influenza. The price of pig in fact nose-dived at that time. However, since late 2009, the price has been recovering and this situation lead to good evaluation result. As for improved feeding system and intercropping sorghum and rice bean were recognized important but the farmers did not like such tiresome activities, which contributed to lower marks. Animal house improvement cannot go well alone since most of the villagers do not want to spend on such construction.
- 3) In the sector of cottage, the evaluation varies by component very much. Tinsmith strengthening and guitar-key strengthening were rated lowest. There was big hike in material cost and also since late 2008, cheap Chinese made products started flowing into Myanmar. The beneficiaries had lost competitive power against Chinese made products. On the other hand, embroidery, knitting and weaving for which beneficiaries are female members, have performed better. Sandstone ware production tried in Mingan village also marked good evaluation result, and paddy dryer did the same. Paddy dryer together with improvement of milling has created a lot of added values, which contributed to high evaluation result. Fruit processing was not extended to business level except 2 3 women during paddy transplanting period when it is in big demand.
- 4) Living improvement projects have marked relatively high evaluation. Those projects undertook basic infrastructure, which were met with villagers' need. Also, the benefit has extended to almost all the villagers. This resulted in high evaluation results. Those projects earned the highest result especially in terms of relevance, which means the projects were really met in their needs. In addition, skilled technicians can be found even in rural areas of Myanmar. With this background, the sustainability was also rated high.

5.4 The evaluation for FY 2008/09 was made in the same way as FY 2007/08, namely in a range of 1 - 5 from the view point of 5-aspect. Evaluation results for the FY 2008/09 pilot projects are summarized as below by sector:

- 1) For agriculture pilot projects, improved paddy cultivation was given higher evaluation result and also improved seed regeneration project earned high marks. Organic farming promotion with the introduction of IMO culture, on the other hand, was not evaluated so high since extension from farmer to farmer did not take place so much. Besides, storage and minimum tillage did not receive higher marks either. In most of the CDZ villages, farmers' production is not so much and therefore the usage of storage at village level was limited but at the household level. This status contributed in lower marks. For the minimum tillage cultivation, unfortunately perennial leguminous crops had withered due to hot and dry weather which prolonged in 2009.
- 2) Livestock pilot project shows more or less same results as those in FY 2007/08. Goat revolving was given higher evaluation result. Goats are adjustable to the CDZ weather and can be reared by landless poor people on grazing ground. This situation contributed to higher marks. Pig revolving was once evaluated very low due to swine flu affect. However, pig raising can be a good income opportunity for landless people especially in paddy areas,

therefore giving high mark in relevance. Also pig price started coming back in late 2009, and therefore good marks were given to the final evaluation results. Livestock feeding improvement is very important, leading to relatively high mark in terms of relevance. However, since it requires a cumbersome step in making UMMBs and also villagers are poor to buy necessary materials, it was not extended.

- 3) In cottage sector, establishment of revolving fund has been tried either at group level or at village level. The evaluation result varies from village to village or by component. In Magyi village, the evaluation is relatively low because they lost market in Thailand due to world wide financial crisis. In Ma Gyi Sauk village, member-to-member technical transfer had taken place, and also the main committee lent about 600,000 Kyats to weaving group out of rental fees of the machines. These activities gave high marks to that of Ma Gyi Sauk village. In Ar La Ka Pa village, amortization fee which came from tractor rental fee contributed to village development, e.g. repair of motor for water drinking facility and also lent 300,000 Kyats to renew breeding bull. These performances contributed to high evaluation results.
- 4) For living improvement, most of the pilot projects were given higher evaluation results except firewood substituting bio-fuel promotion project and improved cooking stove in some villages. In this pilot project, an extractor for *Jetropha* oil was fabricated and it worked. However, since the availability of seeds in rural areas is not yet enough, it has resulted in less usage of the extractor. For improved cooking stove, it was not needed in village where there are still a lot of firewood while in North Pabe village, it was required due to high risk of fire in that village and also shortage of firewood. Paddy husk power generation was given high evaluation result since it has contributed to raise the villagers' living standard and also it is well maintained. Rural development centre, started as children's nutrition improvement centre, was also given good marks in evaluation.

5.3 LESSONS LEARNT FROM PILOT PROJECT IMPLEMENTATION

5.5 Through the experiences from the pilot project implementation over 3 years period, there are lots of lessons and issues which have been referred to in the design of the relevant projects presented in the development frameworks. Following are some specific lessons that development practitioners should refer to whenever they are to embark on similar projects:

- 1) Mushroom culture can provide beneficial income source for the landless because it doesn't require arable land. Yet, it seems to be rather high-hurdled income generating activity for the poorest, farm laborers' households to begin with. Namely, they have to overcome a host of conditions such as access to telephone, procedures for paying inputs, provision of initial cost, yield character with great variability and access to markets etc. This may have resulted in the fact that among 15 culturists who were respondents of an interview survey conducted in Legaing Village in 2008, only 2 households engaged in farm labor service were included.
- 2) Lessons learnt in goat rearing include the method of procuring stock goats, selection of livestock breed to rear and their mortality etc. The beneficiary villagers have made a few devices as to the investment to an improved goat hut. One of them is to build the hut with readily available materials within their place, and another is to build it for joint use to save the cost per member. In Myanmar, sheep and goats are thought to have equal value with the same price per live weight. However, when it comes to the reproduction of offspring, twining ratio is higher in the case of goats, leading to more advantageous herd expansion as compared with the case of sheep. In this context, goat rearing should have priority in the planning.

- 3) Timely period of piglet's delivery or measures of keeping suitable temperature within pig hut during wintertime is a key issue for piggery project. Piglets were delivered in around November under the Pilot Project in 2007. Atmospheric temperature happens to lower around this period, causing death toll of 6 heads out of 30 piglets delivered (20% of mortality). This suggests the necessity of recognition on timely delivery within the period of high atmospheric temperature, and awareness of the beneficiary villagers to take measures for keeping ambient temperature of piglets warm.
- 4) Pig raising project was affected by a external factor since March 2009 very much; that is swine flu. The price was about 150,000 170,000 Kyats per adult-head in 2008, but nosedived to 50,000 70,000 Kyats due to the swine flu. If they try to keep the pigs, they have to bear feed expenditure. Many of the beneficiries could hardly feed them and started selling out at cheaper price. For example, there were 40 beneficiaries in FY 2008/09 pig revolving project, but as of August 2009, there were only 12 beneficiaries who still keep the pigs, and others sold out. This is a typical external project risk, which can be hardly expected at the project commencement. To cope with this kind of project risk, maybe one of the measures could be to minimize the investment, say 1 piglet to provide instead of 2 piglets in order to mitigate the shock.
- 5) There are a lot of farm casual labor households in CDZ as aforementioned. According to a sample survey under this Study, it is learnt that ordinary upland crops require farm labor of about 40 70 man-days/ ac. /crop, while vegetables such as onions and cabbage do about 140 150 man-days/ ac. /crop. Namely, vegetable cultivation creates more labor opportunities, by 20 at maximum 40% than labor required for ordinary upland crops. Thus, vgetable cultivation can contribute to creating job opportunities for landless households.
- 6) According to the result of a trial in Ya (upland farm), the yield performance for Chick pea was as low as 4.8 basket/ ac with considerable input of chemical fertilizer, 30kg/ ac. This example suggests difficulty in applying chemical fertilizers in the (semi) dry land, above all in Ya where the ground gets severely dry. In Ya, it may be necessary to improve soil physical property so that soil layers can retain sufficient moisture, as well to make device on manuring such as application of liquid fertilizers (for example foliar fertilizer) in place of applying granular type ones.
- 7) Knitting (production of sweaters etc) is one of the women group activities in Ma Gyi Sauk Village. Only 5 trainees participated in the training, who mastered the knitting techniques using Double Decker knitting machines. Initial members in the knitting group counted 52, and other members except for the trained people have received technical transfer of knitting techniques by sitting at the side of trained ladies or the first generation and by practicing knitting work together with them. It is worthwhile to remind that in Myanmar there are lots of landless people in rural areas. Given such circumstances, it should acutely be necessary to provide project designs in which technical transfer is made to as many member-participants as possible to ensure their means of livelihood.
- 8) As an example of a good synergy effect, both introduction of paddy drier and improvement of milling techniques evolve benefits as separate projects, but they bring increased benefit to the farmer's side, as well. In this case, if farmers use the paddy drier and the improved milling machine with improved milling techniques, they can enjoy with both of these activities. Besides, operation and management committee of the paddy drier has provided low-interest loan service. Taking all these into account, this value-added chain system evolves not only synergetic effect of the project, but also does real outcome (positive impact) covering the overall

participants.

- 9) An improved cooking stove was introduced in 4 villages. Of the 4 villages, 2 villages of Pabe North in Chauk TS and Magyi in Ngazum TS showed very positive impact, but in the remaining 2 villages did not succeed. Villagers who live in firewood scarce areas and also in fire-risky areas accepted the improved stove. For example, the villagers in Pabe North are really delighted with the fact they can use the stems of pigeon peas as firewood substitute. However, villagers in Nga Zin Yine and Kan Pyuu do not like the introduced stove because they have other means to cook or are not worried about firewood. In future, they may accept the improved stove, but at this moment they would go simple pre-fabricated stove or even with conventional stoves. Thus even if technology itself is good, whether or not it works depends on the context where people make living.
- 10) Under cottage sector, there are 2 projects which are very dormant in operation or almost have ceased the operation. These are 07C1 Tinsmith Strengthening Project and 07C2 Guitar key Strengthening Project in Khaungkawe village. The reason why they are not well operational are; 1) at first the beneficiaries in tinsmith and guitar key production were hit by fuel price hike having taken place in year 2008, 2) though the fuel cost became cheap, unfortunately material costs have not become cheap, and 3) guitar key had difficulties of competing with Chinese made cheap and good-looking keys. Though it is very difficult to predict these outside factors, there may be a lesson; If there is competition to be expected with products which can be produced cheaply, e.g. Chinese made guitar key, there should be well-thought consideration.
- 11) A series of training courses were arranged under pilot projects inviting MAS and LBVD officers. Agricultural extension officers came from 12 TSs and livestock officers from 6 TSs. The training courses undertook not only lectures and practices but also peer-peer learning. There were sessions wherein they listed problems and constraints they have faced in their jurisdictional areas and exchanged how they have solved or why these have not yet been solved. Their achievements were also discussed. Through these sessions they exchanged their experiences, which we believe enriched their capability as extension worker. In any opportunities of trainings, we should think of arranging such opportunities of peer-peer learning aside from lecturings.

6. EXTENSION MATERIALS

6.1 This Study produced some extension materials. The extension materials consist of technical manuals, one-point illustrations, and promotion videos. Technical manuals were once drafted in FY 2007/08 and FY 2008/09, and have been utilized through the pilot project implementation. One-point illustrations were prepared by TS officers who participated in a series of trainings administered in FY 2008/09. The promotion videos portray actual success stories covering 3 sectors of agriculture, livestock, and cottage industry.

6.2 The Technical Manuals are composed of 2 parts; namely Part I and Part II. Part I briefly discusses the salient features of the Central Dry Zone (CDZ) by which the readers will be familiarized with the contexts wherein the people make their livelihood. Part II elaborates technologies based on the experiences of the Study, which were included in the implementation of pilot projects to examine the best ones appropriate in the context of the rural areas in the CDZ. The Technical Manual shows the practical process of various technologies to help frontline extension workers of concerning ministries with extension services to be provided. Process description method was employed in producing this Manual, with which a step-wise detailed explanation is made together with illustrations.

6.3 One-point illustrations were prepared by TS extension officers (both MAS and LBVD) who participated in the relevant trainings held on October 2008. They chose activities to be illustrated by themselves, and presented them after completion, and then some modifications were conducted according to suggestions by other participants. In addition, some MAS TS offices have made some additional illustration-based extension materials. An example is Kyaukse TS, which portrayed the process of how to make rice husk charcoal on a big vinyl sheet. Aside from the example, Magway divisional office ordered a computer shop to print out an summarized ICM (integrated crop management) technology on a paddy growing calendar. The divisional office distributed such big extension material to all the TS MAS offices in the division. Such technologies were the ones undertaken during the training, and extended to farmers with their own creative extension materials.

6.4 Technical videos were prepared to extend success stories to common villagers. It is generally observed even in rural areas that people enjoy watching TV/Video at video house or teashop even from early morning. Therefore, the technical videos were made taking into consideration those village's behaviors to extend technologies and activities and to show them some advanced technologies. The video covers three sectors of agriculture, livestock and cottage industry, all of which are based on real success stories of villagers. The agriculture video shows improved paddy cultivation, the livestock video shows how the poor can improve his livelihood by raising goat, and the cottage one suggests keys of how to succeed in business as exampled by a slipper maker.

7. CONCLUSION AND RECOMMENDATIONS

7.1 CONCLUSION

Taking into account the points outlined below, this Study concludes that the implementation of the Development Plan presented in this Report would be the most appropriate comprehensive approach in reducing the poverty in the Central Dry Zone (CDZ). This is because the Plan according to the priorities made by all the concerned stakeholders would coordinate actions/ projects at a sectoral as well as area levels and make balance each other amongst all the 51 townships in the CDZ. The Government should therefore embark on the CDZ development guided by the Development Plan. Other divisions/states in the Union would also benefit from this Study by introducing the new approach of formulating the area and sector-wise development programmes centering on poverty reduction.

- 1) The Development Plan has incorporated voices of all cadres of stakeholders; divisional officers, district officers and township officers, all of whom are from the relevant 3 ministries, and village members and leaders, local authorities e.g. TS PDC, etc. The stakeholders have worked not only in analyzing CDZ situation but also throughout the process of planning, exercising consensus making all the time. Situation analysis was also carried out mainly from quantitative point of view wherever data were available. Then, the results facilitated the stakeholders to well understand where the CDZ stood and how it looked like in comparison with other parts of the Union as well as with other countries, e.g. ASEAN countries. Exercising the participatory approach has contributed to making the Development Plan comprehensive and also responsive to the needs from the different cadres of stakeholders.
- 2) Development framework presented in this Report can be a very guide when the concerned 3 ministries try to carry out development activities in the CDZ because the framework provides with concrete development components, those priorities by sector and by area (township) at which what projects should be carried out. In addition, any organizations which work in CDZ can refer to the framework from which they can know where to carry out their development intervention

with what priority. In this way, the frameworks can also work as a development platform where all the concerned development partners can make concerted efforts. The framework guides the development stakeholders to the most needy people as prioritized and leads to avoidance of misallocation of funds to activities that are not a priority, thereby accelerating CDZ development as a whole.

7.2 RECOMMENDATIONS

During the process of undertaking this development study and implementation of the pilot projects, the Study Team encountered a number of issues that led to the recommendations presented below. However, as is the case with continuous processes, these recommendations are by no means exhaustive and may need to be changed or modified, depending upon the prevailing condition. Nevertheless, it is believed that the ones covered here constitute a broader spectrum on which the implementation of the Development Plan will have to be pursued:

For the Government:

- 1) The agriculture practiced in the CDZ is in fact somewhat bipolarized. Along Ayeyarwady river, there are lots of Le (lowland) which enable paddy cultivation and also irrigated paddy fields wherein the farmers can enjoy good harvest as expected. On the other hand, agriculture practiced in Ya (upland), especially along Bago Hills side, is affected by its unstable rainfall both in terms of volume and pattern. Under the former condition, straight-forward growth could be achieved corresponding to how much s/he has invested if one desires so. Under the latter condition, farming practices should automatically center on low-input agriculture. On top of this, the government officers, especially TS MAS officers, should be able to provide with the extension services which can pursue risk hedged development apart from what has been practiced that is for the straight-forward increase of product.
- 2) If a farmland is blessed with irrigation system, there is a proportional relationship between input and harvest until it reaches a threshold. However, upland agriculture totally depends on natural rainfall which does not behave as expected by human beings. For example, in areas along the Bago Hills, farmers cannot expect normal harvest over 3 years according to interviews. Here, under this condition, inputting of chemical fertilizer automatically entails risks, very often making them insolvent debtor. In upland areas dependent on rainfall, people should exercise risk-hedged livelihood activities and also try to diversify their livelihood. Diversifying of their livelihood is due required apart from their mainstay of agriculture; e.g. combined with livestock rearing, cottage activities. MAS extension staff at TS level should therefore be linked up with other TS level government offices of LBVD, Cooperative, etc.
- 3) From an angle of rural development aspect, many measures in Myanmar have centered almost all on the improvement of agriculture, especially of rice. This in turn resulted in not centering on landless people, leaving them out of the sight of development. Poorer people can be found in the landless. There are rarely institutional or project measures to improve the welfare of the landless people, especially farm casual labors. Some projects targeting landless people should therefore be put in place. Through the experiences from pilot projects, we recommend for the landless people such projects as mushroom cultivation which can be practiced in house yard, goat revolving, pig revolving, promotion of vegetable cultivation which can create a lot of farm casual labor works, and cottage activities for example weaving, knitting, embroidery, etc.
- 4) Aside from the above measures to raise the livelihood of the landless people, in any case, however, one may say that there comes already a time of introducing institutional measures, e.g.

distribution of welfare through progressive taxation system, reform of land taxation system, etc. It is recommended that the government revise the land tax rate which is not consequential as it is only 5 Kyats/ac for good farmlands and as little as 1 Kyats/ac for infertile farmlands. Though it is not always the case, wealthier people can be found in farmers while the poorer people in landless as is shown by poverty ratios; 33% for the former and 55% for the latter and 75% for farm casual labors (the poorest). Therefore, upon the institutional arrangement of land tax revision, re-distribution of wealth from the farmers to the landless people can be tried.

- 5) In the Union, instruction from the top to the bottom, that is village level, is very much efficiently done through the line of PDCs established at all the levels of state, division, district, township, and village tract. There is a regular monthly meeting at each level of the PDCs including technical officers as well as village chairmen in case of TS PDC where instructions are straight forwardly delivered to the bottom. Turning to the ground where extension activities take place, there is a difficulty of getting feedback from the ground and therefore forwarding it to the upper authorities. What is required for the extension officers is to report if the pre-set numerical targets have been achieved or not and not to report the process itself of how the targets have been achieved (or not achieved). The closer we go to the ground, the more important the process of achieving the targets becomes. Officers should try to get as much as feedback from the ground.
- 6) The role of women in the Study Area is so important that they engage in domestic financial management for daily life, small animal rearing, fodder management for large animals. For the distribution of property left (farmland as major one), women have equal share to men, so that sometimes farmland given to a woman from her parents when she marries is bigger than the one the husband receives from his parents. This point indicates that rural development cannot go without women's involvement or consent. However, it is frequently observed that women do not like discussion and they stand behind men (normally their husband) and outside. Therefore, it needs to take into consideration: 1) do not make decision immediately in the meeting and take the issue back home first, 2) do not let them hurry in decision making even when the opinions differed, and 3) ask both husband and wife to participate in development activities.
- 7) Under cottage sector pilot project as well village electrification project, there was a trial to establish village revolving fund. The logic is that necessary equipment is supplied to the system of cottage industry promotion, but the involved members are supposed to amortize the amount of capital fund or have to pay user rental fee to the main committee established at the village level. Also, the electricity charge paid by the villagers are collected at the committee in charge which is established at the village level, whereby it can work as village fund. This trial has been tried in 7 villages under pilot project, and several outcomes were observed; 1) low-interest loan provided to mushroom cultivation beneficiaries, 2) replacement of old breeding bull by proving top up fund, 3) repair of a motor for domestic water facility, etc. This kind of village fund in fact works as safety net in the village, and therefore project which is to provide certain investment should always try to establish such system.

For Donors:

1) This Study presented 2 development frameworks; 1) one for development from macro point of view and 2) the other for development from village level point of view (micro). In putting the latter approach into implementation, there should be a coordinating team as JICA study team undertook in implementing pilot projects covering different sectors. This kind of team may be set up by concerted efforts by the concerned ministries, or otherwise with a help of external organization. Given this kind of task team, comprehensive development intervention at village level dealing with different livelihoods can be realized. For this purpose, donors may consider to

undertake the development with the latter development framework. The frame starts with people's different livelihoods to which workable development components are presented. Donors especially engaged in rural development can accelerate their activities with the framework reflecting the people's livelihoods.

- 2) When carrying out development interventions based upon above village level development framework, there should be of course strategic collaboration with the activities conducted under the macro development framework. Very simple example can be given in Certified Seeds Dissemination Programme, Paddy Cultivation Improvement Programme, etc. Project carried out based on village level framework may establish demonstration farms to which other villagers can also be invited to see specific technologies. In this way, those programmes carried out under macro framework can be benefited. In sum, demonstration farms should be not only for those benefited by latter approach, micro frame based approach, but also for those covered by macro frame based programme.
- 3) Under pilot projects, a series of training courses were arranged inviting MAS and LBVD officers. The training courses undertook not only lectures and practices but also peer-peer learning. There were sessions wherein they listed problems and constraints they have faced in their jurisdictional areas and exchanged how they have solved or why these have not yet been solved. Through these sessions they exchanged their experiences, which we believe enriched their capability as extension worker. When we carry out workshop, we very often can find similar situation. In workshop there is no chairman but only facilitator. Facilitator does not govern the floor but just facilitates exchange of opinions, exchange of views, on which participants themselves try to find a way by learning each other. Teaching is in fact important in a training session, but at the same time donors can arrange a venue wherein the participants can learn each other whereby themselves. Learning peer-peer is a crucial reciprocal opportunity to develop the capacity of officers, for which donors can contribute to arrange.

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ACRONYMS AND ABBREVIATIONS

AED	Agricultural Extension Division		
AMD	Agriculture Mechanization Department		
AMDA	Association of Medical Doctors of Asia		
ARCPCA	Applied Research Center for Perennial Crops		
BMI	Body Mass Index		
CARI	Central Agriculture Research Institute		
CARTC	Central Agriculture Research and Training Centre		
CBM	Central Bank of Myanmar		
CBO	Community Based Organization		
CD	Cooperative Department		
CID	Cottage Industry Department		
CRDI	Credit for Rural Development Institution		
CSD	Cotton and Sericulture Department		
CSO	Central Statistical Organization		
DAP	Department of Agricultural Planning		
DAR	Department of Agriculture Research		
DOF	Department of Fisheries		
DZMO	Dry Zone Micro-finance Organization		
FAO	Food and Agriculture Organization		
FMD	Foot and Mouth Disease		
GDP	Gross Domestic Product		
GOJ	Government of Japan		
GOM	Government of Myanmar		
GRDP	Gross Regional Domestic Product		
HDI	Human Development Index		
ICDP	Integrated Community Development Project		
ICM	Integrated Crop Management		
ICRISAT	International Crops Research Institute for Semi-Arid Tropics		
ID	Irrigation Department		
IMO	Indigenous Micro Organism (In Myanmar, it is called dochakukin as in Japanese)		
IRRI	International Rice Research Institute		
JFAD	Jute and Fiber Allied Division		
JICA	Japan International Cooperation Agency		
LBVD	Livestock Breeding and Veterinary Department		
LFDB	Livestock and Fisheries Development Bank		
LUD	Land Use Division		
MADB	Myanma Agricultural Development Bank		
MAPT	Myanma Agricultural Produce Trading		
MAS	Myanma Agriculture Service		
MC	Ministry of Cooperatives		
MCSE	Myanma Cotton and Sericulture Enterprise		
MDG	Millennium Development Goal		
MEIS	Myanmar Export and Import Service		
MFI	Micro Finance Institution		

MFR	Ministry of Finance and Revenue		
MFTB	Myanma Foreign Trade Bank		
MICB	Myanma Investment and Commercial Bank		
MICDE	Myanmar Industrials Crops Development Enterprise		
MJI	Myanma Jute Industries		
MOLF	Ministry of Livestock and Fisheries		
MLFDB	Myanma Livestock and Fisheries Development Bank		
MOAI	Ministry of Agriculture and Irrigation		
MOF	Ministry of Forestry		
MRTLC	Myanma Rice Trading Leading Committee		
MRTSC	Myanma Rice Trading Sub-Committee		
NCD	Newcastle Disease		
NGO	Non-Government Organization		
NPD	National Project Director (the Chief Counterpart to the JICA Study)		
NPK	Nitrogen, Phosphate, Potassium		
ODA	Official Development Assistance		
OISCA	Organization for Industrial, Spiritual and Cultural Advancement-International		
PCFD	Perennial Crops and Farm Division		
PDC	Peace and Development Council		
PPD	Plant Protection Division		
PPP	Purchasing Power Parity		
PRA	Participatory Rural Appraisal		
SAMB	State Agricultural Marketing Board		
SD	Seed Division (under MAS)		
SD	Sugarcane Department (under MICDE)		
SLRD	Settlement and Land Records Department		
SPDC	State Peace and Development Council		
TS	Township (the smallest administrative unit where government institutions are placed)		
UMMB	Urea Molasses and Mineral Block		
UNDP	United Nations Development Programme		
VICO	Village Credit Organization		
WFP	World Food Programme		
WRUD	Water Resources Utilization Department		
YAU	Yezin Agriculture University		

FARMLAND TERMS IN MYANMAR

Le	Paddy land or wet land which can be used as paddy land
Yar	Upland
Kaing	Farmlands which appear in the flood lands in Ayeyarwady River as the water recedes
Kyun	Farmlands which appear on the alluvial sandbars in Ayeyarwady River as the water
	recedes

UNIT CONVERSION

1 basket	Paddy	20.9 kg
1 basket	Wheat	32.7 kg

1 basket	Maize (seed)	24.9 kg
1 basket	Sorghum	28.1 kg
1 basket	Sesame	24.5 kg
1 basket	Mustard	26.1 kg
1 basket	Sunflower	14.5 kg
1 basket	Groundnut	11.4 kg
1 basket	Butter Bean	31.3 kg
1 basket	Sultani	31.3 kg
1 basket	Sultapya	31.3 kg
1 basket	Chickpea	31.3 kg
1 basket	Pebyugalay	31.3 kg
1 basket	Pegyi	31.3 kg
1 basket	Pegyar	31.3 kg
1 basket	Pigeon Pea	32.7 kg
1 basket	Black Gram	32.7 kg
1 basket	Green Gram	32.7 kg
1 basket	Bocate	32.7 kg
1 basket	Soybean	32.7 kg
1 basket	Cowpea	32.7 kg
1 basket	Peyin	32.7 kg
1 basket	Sadawpea	32.7 kg
1 basket	Payazar	32.7 kg
1 basket	Pe-nauk	32.7 kg
1 basket	Other Pulses	31.7 kg
1 pyi		8 nohzibu
1 basket		16 pyi
1 viss		1.64 kg
1 lb (pound)		0.453 592 kg
1 inch (in.)		2.54 cm
1 feet (ft.)		30.5 cm
1 acre (ac)		0.405 ha
1 hectare (ha)		2.47 ac
1 ac-ft		1233.4 cum

CURRENCY EQUIVALENTS (AS AT JUNE 2010)

1 US\$	=	450.99 Myanmar Kyats (TTB)
1 US\$	=	91.10 Japanese Yen (TTB)
1 Kyat	=	0.202 yen
1 US\$	=	980 Myanmar Kyats (Market Rate)
1 lakh	=	100,000 Kyats

MYANMAR FINANCIAL YEAR

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MAIN REPORT

CHAPTER 1 RATIONALE AND GOALS OF THE STUDY

1.1 Rationale of the Study

The Union of Myanmar, located at the north-western edge of the South-East Asia, holds 677,000 km² of the total territory accounting for about 1.8 times as much as that of Japan with the population of 57,500,000¹ (as of 2007/08). The mainstay of the Union, bestowed with abundant water resources and fertile land resources that are mainly distributed in the delta of streams, is primary industries represented by the sector of agriculture where 66% of the total labor population are engaged and 43% of GDP as well as 35% of the export earnings are produced². The fact that no occurrence but only one time in 1800s of famine³ has ever been recorded in the Union since the historical era implies its high potential of agricultural productivity. Notwithstanding, from the economic and social indicators points of view, the Union has been ranked as an LLDC with a nominal per capita GDP of only 333 US\$ as of 2007⁴, also with a low rank, 138 out of 182 nations in the world, of human development index (Human Development Report, 2009).

The CDZ is located in the central part of the Union, situated at about 500 km north from the old capital Yangon. The Zone has merely 700 - 1,000 mm of annual precipitation since south-westerly monsoon blown from Bengal Bay is intercepted by the mountain range of Rakhine that runs nearly south to northward at the western border of the Union. Rainfall is concentrated in a few months of rainy season with erratic duration and with wide annual deviation in annual precipitation. This meteorological character not only very often brings about droughts with crop failure but casual intense showers during mid rainy season also result in floods in the watershed of Ayeyarwady River. Such climatic casualty makes environment of agricultural production as major means of livelihood of the population unfavorable as compared to that of other parts of the Union.

Livestock is also engaged in the Study Area where draught cattle and goat acclimatized to dry zones are mainly reared. Particularly, as it is literally called as "live-stock", goats and sheep play a role of live risk-hedge for emergency use coping at unstable livelihood in the Dry Zone. Rearing goat is especially important in the CDZ where credit infrastructure is not fully developed since they can readily be sold for cash whenever needy cases arise. Even though the Ministry of Livestock and Fisheries provides extension services mainly comprising vaccination of livestock, basic feeding techniques practicable to villagers have hardly been disseminated at the village level because livestock herds have mostly been kept as small-scaled farmyard feeding.

In the Study Area, such small-sized cottage industries as weaving, spinning, dying, masonry, carpentry, tapestry and their expertise have been developed as the dynasty emerged. Small-scaled as it may be, these cottage industries have been rooted in almost all villages, providing precious cash-earning means for smallholder farmers and also landless villagers in rural areas. In most cases, these industrial activities have been developed as cottage industries and the products have been marketed within the villages or at nearby townships, though in some cases the scale has partly been escalated by the investment of surplus gained from agricultural production by lead-farmers. There is high potential of value addition by installing co-managed stores or introducing new techniques, but it has not been realized due to very limited assistance from administrative sources and other reasons.

Thus, various livelihood means including agriculture, livestock and small-scaled industries have been employed singly or at times in a combined way in this area. However, instability of agricultural

¹ Statistical Yearbook 2008, Central Statistical Organization, Nay Pyi Taw, Myanmar, 2009

² Statistical Yearbook 2004, Central Statistical Organization, Yangon, Myanmar, 2005

³ The Moral Economy of the Peasant – Rebellion and Subsistence in South-east Asia, 1976, James C. Scott

⁴ ASEAN Finance and Macroeconomic Surveillance Unit (FMSU) Database, 2009

production owing to erratic rainfall characterized by the climate of dry zones – character of rainfall in dry zones is not merely scarce but its pattern is highly variable – becomes chronic whereas livestock and cottage industries as supplemental means of livelihood have not yet been enough developed to materialize their potentiality. Such physical environment has been making people's life unstable, and the area has been impoverished. The state of poverty in this area is chronic where instable livelihood limits access to education, health care and other public services allegedly making take-off from poverty difficult.

What's more, such state has further been exacerbated by other unfavorable factors such as pressure of increasing population versus migration of labor population in the form of seasonal outflow of workforce for piecemeal and deterioration of natural resources. Further increase of poverty-prone population is threatened unless relevant countermeasures are taken. With a view to ameliorating such undesirable state, the Government of the Union of Myanmar requested the Government of Japan to conduct a study on comprehensive agricultural and rural development in the CDZ. Upon this request, JICA dispatched a preliminary and appraisal mission in February 2005, and decided to carry out "the Development Study on Sustainable Agricultural and Rural Development for Poverty Reduction Programme in the CDZ of the Union of Myanmar."

1.2 Objectives and the Scope of the Study

The overall goal of this Study lies in providing a design for action plans for the purpose of comprehensively promoting poverty reduction and regional development targeting the CDZ of the Union of Myanmar. The process of the Study centers on the following which themselves are the objectives of the Study:

- 1) To formulate Action Plans with practically applicable measures to the CDZ for reducing poverty, focusing on the livelihood of those who live in the area, and
- 2) To develop capacity of formulating plans and implementing projects for counterparts, extension workers, farmers and targeted communities in the target area.

The action plan to be formulated in this Study comprises of those undertaken by the counterpart organizations including the Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries, Ministry of Cooperatives that are involved in this Study in order to solve compound issues/ constraints impeding the poverty reduction in the CDZ. Above all, the plan should be elaborated from the aspects of agriculture, livestock, off-farm income sources (for example cottage industries) and living environmental improvement relating to the life of those who live in the CDZ. At the same time, the Study designs a framework of promoting the action plans by the related organizations proposing as an assisting framework of development activities where possibility of participation by other stakeholders such as donors and NGOs is expected.

Selecting and adopting some of the action plans with high priority, some projects are actually implemented during the Study period as pilot. Then, making use of the findings obtained from the implemented Pilot Project, action plans with higher efficiency/ sustainability will be elaborated as final proposals. Also, a technical manual is provided through the implementation of the Pilot Project in which useful techniques for improving the livelihood of the people in the CDZ are summarized for users. This manual envisages being applied to daily extension activities through handy use by extension workers of the counterpart Ministries.

To attain the objectives above, this Study is divided into two phases; namely, Phase I from the first quarter of year 2006 to the first quarter of year 2007 and Phase II from the second quarter of year 2007 to the third quarter of year 2010. A Poverty Profile (draft version), Action Plans (draft version), and

the preliminary plan of Pilot Projects were prepared during Phase I study. The Pilot Project(s) are implemented in the Phase II study, during latter part of which final version of the poverty profile, action plans as well as technical manuals were finalized. Following are the scope of the Study by phase and the overall schedule, which were agreed upon in the S/W;

1.2.1 Scope of the Phase I Study

- 1) To collect and analyze existing data and information and conduct field surveys including interviews with relevant authorities as well as with local communities. These activities will be carried out in the above-mentioned Study Area,
- 2) To review projects and programmes which have been implemented in the Central Dry Zone,
- 3) To compile information and data about present situation, development constraint(s) and potential(s) of the Central Dry Zone,
- 4) To propose Development Components of the Central Dry Zone in the following four areas with potential issues, 1) Agricultural development (e.g. Agricultural Crops, Livestock, Water utilization), 2) Non-agricultural Income Generation (e.g. Agricultural Product Processing, Handicrafts, etc.), 3) Livelihood Improvement (e.g. Household Management), 4) Supporting System of Development Activities (e.g. Microfinance, Training, Community Empowerment),
- 5) To develop a set of criteria to categorize project area,
- 6) To prepare draft Action Plan that includes above item 4 and 5 and implementation strategies, and
- 7) To formulate the plan of pilot project(s) based on the Action Plan, considering 1) to select priority development component(s), 2) to set criteria for the selection of the model villages, and 3) to select the model villages where pilot project(s) will be implemented.

1.2.2 Scope of the Phase II Study

- 1) To implement pilot project(s) in model villages with following purposes: 1) to verify the respective validity of the Development Components, 2) to verify implementation strategy of the pilot projects that is proposed in the draft Action Plan, 3) to enhance capacities of Myanmar counterpart personnel, extension officers and key farmers as well as concerned communities,
- 2) To monitor and evaluate the pilot project(s),
- 3) To prepare Technical Handbook for the use in the Central Dry Zone, and
- 4) To finalize the Action Plan(s) on the basis of findings of pilot project(s).

Year	2006				20	07			20	08			20	09			2010		
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd
Phase I																			
Phase II																			
Report	lc/R		P/R1		P/Prof It/R1		P/R2		lt/R2		P/R3		lt/R3		P/R4		It/R4 Tech/HB	DF/R	FR

 Table 1.2.1
 Overall Study Schedule

Note : P/Prof means Poverty Profile

1.3 The Study Area

The target area of the Study agreed in the S/W includes 12 Districts and 54 Townships (TS) in the Divisions of Mandalay, Sagaing and Magway. Out of these, however, 3 TSs (Yamethin, Pyewbe, Tatkon) in the District of Yamethin are located within the newly established metropolitan zone of Nay Pyi Taw to which Capital functions are now relocated according to the announcement by the Government in November 2005. By this reason, these 3 TSs, identified as a part of target area for

capital sphere development programme, were excluded from the Study Area in the Steering Committee meeting held on 22 May 2006.

Accordingly, the newly determined Study Area encompasses 11 Districts and 51 TSs within the same 3 Divisions. The total Study Area covers around 75,169 km² equivalent to 11% of the total national territory, extending over 150 km or so to the east - west axis and about 500 km to the south north axis, comparable to the area of Hokkaido Island of Japan. Average areas of district and TS are 25,000 km² (equivalent to about 160x160km) and 1,480km² (equivalent to about 38kmx38km), respectively. Population in the Study Area counts at 9,841,620 as of 2003⁵, accounting for about 18% of the total national population (approximately 53,224,000 as of 2003). Demographic density in the Study Area is estimated at 131 persons/km², or 1.7 times as much as the mean national population density, implying that the Study Area is fairly densely populated.

As aforementioned, this Study has carried out pilot projects since fiscal year 2007/8. In year 2007/08, all the townships were categorized in 5 types, from which representative villages were selected for the implementation of the pilot projects. Basically the selection of the villages was done each per every type, but 2 villages from type-3 TSs, thus a total of 6 villages, one each from 6 TSs, were chosen for the pilot project in 2007/08.

In fiscal year 2008/09, original plan was that new additional pilot projects were to be added in the same 6 TSs. However given such request from the Government saying pilot project, especially centering on agriculture extension, should be extended to other TSs as well. Responding to this request, 2 pilot projects, dealing with paddy improvement and organic agriculture promotion were extended to 12 TSs including the original 6 TSs (see Figure 1.3.1 for TSs for pilot project implementation).

Population in the Union of Myanmar:

The Population Census in 1983 is the latest one in the Union. In this Country, population up until 1993 was estimated based on this census by applying the rate of increment at about 2%. Later, it has been estimated from the same census but referring also to the results of Myanmar Population Changes and Fertility Survey conducted in 1991 in addition to the census. In these demographic estimations the rate of growth has been fixed at around 2%. The demographic estimation was made up to 2007/08 as of March 2010.

On the other hand, more detailed demographic data at TS level happen to occasionally be available but there are lots of inconformity amongst the data. For instance, population up till 2004 has been available for TSs in the Study Area as of 2006, where sudden leap from 9,841,620 in 2003 to 12,261,898 in 2004, or an increment of around 25% during this just one-year period. For this reason, demographic data in 2004 is deemed invalid and actually the data as of 2003 kept by TS has been referred to. The latest statistical yearbook, Yearbook 2004, also posts the population in year 2003 as the latest figure.



1.4 The Study Approach

The CDZ development plan this Study produces should be a comprehensive development plan at the broadest level of economic and social planning and a plan which could be actually practiced in the relevant villages of the CDZ as well. The development programme should coordinate actions/ plans at a sectoral as well as area, say division, wide levels, and has to balance each other at the divisional level, making itself comprehensive. The development plan should also fit into the higher level plans

⁵ Combined data from township PDC offices, for this population see the Box.

such as national development plan which is statutory policy document prepared by the central relevant offices of the Government.

Learning from past experiences in planning an area-wide development programme, this Study contains two new elements apart from conventional plan formulation: which are 1) poverty profiling involving not only the community people on the ground but also frontline government offices mainly at township level where most frontline data are available. and 2) implementation of pilot projects before the finalization of the development plan. The Development Plan is, therefore, characterized by the active involvement of the people and also frontline officers in the CDZ through poverty profiling as well as pilot project implementation. Also, before the development plan is finalized, several of the most important hypotheses of the draft development plan are to be verified from which workable implementation arrangement for the development of all the CDZ area is to be proposed.

This formulating process of the Development Plan is shown in Figure 1.4.1. As shown in the figure, the approach to formulating the plan may be called a hybrid type, composed of both conventional sector approach, which may be called top-down approach, and a participatory approach which entails bottom-up movement from the people on the ground and also from the frontline government offices. In order



Figure 1.4.1 Overall Study Framework and Flow

to gain a clear overview of the Study Area, understand overall resource availability and maintain a balance with other alternative plans, a certain degree of top-down approach needs to be adopted. On the other hand, a bottom-up approach is also required.

Implementation of the pilot projects is another key to formulating the development plan that could really work on the ground. As mentioned, this Study is composed of two phases, Phase I and Phase II. During Phase I, a draft development plan is prepared and a number of pilot projects are to be identified. Phase II of the Study puts some of the identified projects into practice, and converts the draft plan into the final CDZ Development Plan for poverty reduction of the inhabitant by feeding back into it the experience and lessons coming up through the implementation of the pilot projects. Also the pilot practice will identify a soundest mechanism with which the CDZ development plan is to

be put into real implementation.

1.5 Implementation Arrangement of the Study

The counterpart organizations of this Study are the Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries, Ministry of Cooperatives. Out of these, Department of Agricultural Planning (DAP) of the Ministry of Agriculture and Irrigation is responsible for superintending the Study at the central level, while Myanma Agricultural Service (MAS) that has local offices in 17 divisions and states (see Box right) as well as in 63 districts and around 370 TSs takes charge of the implementation of the Study as main counterpart organization at the local level. This is why the chief counterpart (CP) is appointed from the MAS while as need arises relevant CPs are appointed and sent from the Ministry of Agriculture and Irrigation, for example from the Department of Irrigation, from the

Divisions & States of the Union of Myanmar

The Union of Myanmar is administratively divided into 8 divisions and 9 states. The 8 divisions cover catchment of the main stream as well as tributaries of Aveyarwady River and the large alluvial area situated in the central part of the Country where Sittoung River flows. The latter 9 states surrounding these 8 divisions consist of plateaus and mountain ranges. CDZ that is the Study Area of this Study and Ayeyarwady delta are located in the divisions where Burma race inhabit. Current divisions stem from Burmese State that English colonial administrators put under the direct control. On the other hand, current states mainly comprise the area of indirect jurisdiction under the mandate of indigenous chieftains who had existed before colonial control where ethnic minorities inhabit. Distinction between division and state can be defined as the difference between the inhabitance of the majority of Myanmar, the Burma race, and that of other ethnic minorities historically originated from

Ministry of Livestock and Fisheries as well as from the Ministry of Cooperatives as the Study proceeds on.

At the central level, a Steering Committee is established comprising of directors and managers of the related three ministries, which is chaired by the Director General of DAP. The Study Team and CPs report, together with various reports produced in the process of the Study, what has been studied to the Steering Committee where representative of JICA office in Myanmar is also to attend. Thus the Study is implemented in line with the consultations made in the Committee. Likewise, at the local level, a Pilot Project Implementation Unit composed of regular staff of division, district and TS under the related MAS as well as of the staff of the related local offices of the Ministry of Livestock and Fisheries and the Ministry of Cooperatives is established that functions as a joint promoter in implementing the Pilot Project.





CHAPTER 2 PHYSICAL FEATURES, MACRO-ECONOMY, DEVELOPMENT AND POVERTY IN THE UNION OF MYANMAR

This chapter deals with physiography, macro-economy, the state of development and poverty referring to the existing references, publications and the limited results of interviews to the people in the Study Area. The Union of Myanmar followed a typical policy and economic strategies called Burmese Socialism during the period of post military coup back on March 2, 1962 until the democratic movement in 1988. Current regime that emerged in 1988 has concluded that redundant Burmese Socialism induced a lingering economic stagnation and since 1989 the regime renounced it switching the policy into so-called market-oriented economy.

In the course of this change in its policy, the regime attained a formal leap of the rate of economic growth by escalating trade with its neighbors including China, India and Thailand. Nevertheless, it might be said that some inconformity arises as to a host of statistical data in this Country¹. For instance, the average rate of GDP growth during 1999/2000 - 2007/08 has formally been estimated at $12.7\%^2$ in spite of the actual period suffering from economic sanction. On the other hand, financial indicators related to the basis of such a high growth rate have not been made public so far. Though statistical indicators may not be in conformity to some extents, it is also likely that the actual state economy of the Union of Myanmar surpasses the publicized level of per capita GDP US\$333 (ASEAN FMSU, 2007) taking advantages from border trade, etc.

At any rate, the fact that no famine but only one time in 1800s has ever been experienced by the nation in the past suggests us high potentiality at least in its agricultural sector. Similarly, it is well known that Burmese women in particular have high status in their families. Under this circumstance, they tend to have high-level health indicators mainly in the category of maternity - infantry health because of thorough catering for infantry health by the mothers. Further in the field of education, monasteries are fairly functional where many people including aged population once learned how to write and read. These facts imply that the Country is surely an LLDC on the basis of formal per capita GDP, but it is unlikely that degree if poverty in the people's real life actually matches with this GDP per Capita. Following discussion deals with these issues and current status of the Union.

2.1 Geo-political Features of the Union of Myanmar : focused on Relationship with Thailand, China and India

The Union of Myanmar is neighboring with anticlockwise Thailand and Laos at the east, with China (Yunnan Province) at northeastern to north also with India and Bangladesh at its western side. The total length of continuous frontier amounts to around 6,000 km. Beginning with the boundary with Thailand located at a part of Malayan Peninsula at around South Latitude 10°, the border extends to the north via North Latitude 16° (Yangon is located at North Latitude 16°40′) until it reaches North Latitude 28° and the total length of this part of the border comes to approximately 1,400 km excluding the part of Malayan Peninsula. In longitudinal direction, the territory extends between East Longitude 92° - 101° from east to west, length of which is about 900 km.

The total land area of the Union of Myanmar is $677,000 \text{ km}^2$, the largest amongst Southeast Asian countries, where 57.5 million is populated, equivalent to over 80% of the population of Thailand that is not small as compared to neighbors. The Union has potential for developing agricultural, forestry and mineral resources, natural gas etc, and it is deepening relationship with its neighbor countries.

¹ For example, About Sustainability of Macro-economy in Myanmar, Japanese version, Asian Economy, LVIII-2 (2007.2), Koji KUBO, and Burma's Economic Prospects, Testimony before Senate Foreign Relations Subcommittee on East Asian and Pacific Affairs, March 2006, Dr. Sean Turnell

² Statistical Yearbook 2008, Central Statistical Organization, Nay Pyi Taw Myanmar, 2009, ASEAN Statistical Yearbook 2009

Referring to major trade partners in 2005, Singapore had the largest share, that is 28%, as single

import destination represented by the import of machinery etc, whereas 3 directly bordering countries, namely China, Thailand and India accounted for 62% of export share and 40% of import share³ (refer to Figure 2.1.1). Apart from the economic blockage imposed by the western countries affecting the national economy, neighboring nations including Thailand, China and India occupy crucial position as far as trade of the Union is concerned.



2.1.1 Relationship with Thailand

The largest source of foreign currency earning for the Union is Thailand. As export destination, Thailand accounted for 38% of the total exports from the Union as of 2005 (refer to above Figure 2.1.1). This is mainly attributable to the export of natural gas through the pipeline that has been launched to the orbit since 2001. In fact, the overall export share to Thailand was 14.4% in 2000 but it marked a great leap to 31.5% in 2001. From the side of Thailand, natural gas accounts for over 80% of the total amounts of imports from the Union of Myanmar. Besides, Thailand continues a policy of relocating its core of labor-intensive industries to the border front of the Union or even into the Union where cheap labor force entailing very big benefit to Thailand is available.

Given a sample of relocating the core sites of labor-intensive industry in Thailand, we can see Mae Sot Town at the Thai side of the border with the Union where many garment factories have been

established. It is said that about 30 thousand Myanmar employees are employed in these factories as of year 2006⁴. Those who were engaged in garment industry in the Union had counted at around 60 thousand as of 1997 and it was said to have swollen up to about 300 thousand at the peak in 2000. Nowadays, however, under the economic sanction the number of employees hired by garment industries within Myanmar is said to have become around 50 - 60 thousand⁵.

Above example tells us how large the scale of mobilizing cheap labor force by the neighboring country of Thailand is. Since sewing industries can hardly get along with escalated wage level prevailing in Thailand, they established their factories nearer to the boundary in search of cheap and better quality labor force offered by people of the Union. From the reference



³ ARC Report 2006, World Economic Information Services

⁴ World Trend, No.134, Asia Research Institute, Japanese Version

⁵ Labor Immigration to the Capital Yangon and Employment Situation – a Survey of Garment Factory -, March 2004, Nang Mya Kay Khaing, Japanese Version

comparison of monthly wages for general factory workers in urban areas shown in Table 2.1.1, it is obvious that cheapness of wage level in Yangon is outstanding.

From the CDZ, among others from Magway Division, many seasonal workers have been flown out to garment factories in the outskirts of Yangon. According to the result of survey on garment factories by Nang Mya Kay Khing in 2000, seasonal workers from local homelands other than Yangon area accounted for 2,136 (34.8%) out of the sampled 6,141, where the maximum was about 33% from

Table 2.1.1 C	omparison of	Wages b	y Major	Cities

City	Wage of Factory Worker (\$)	Year
Yangon	20 – 48 \$/month	2003
Dacca	29 – 60	2003
Beijing	79 – 139	2003
New Delhi	124 – 146	2003
Hanoi	78 – 143	2003
Ho Chi Min	122 - 135	2003
Bangkok	196 – 354	2006

Source : JETRO 2003, & Data of Ministry of Labor for Bangkok

Ayeyarwady Division followed by the second 21% from Magway Division and the 5th was 9% from Mandalay Division. From this fact it is anticipated that not a few seasonal laborers are engaged in the garment industry works in the above-cited Mae Sot in Thailand.

Weaving industry is kept viable in CDZ that can trace the origin of this industry to the era of dynasty, where people are engaged in weaving in many villages along with small-scaled cottage sewing of the woven cloth. In fact, over 90% of about 25 villages visited directly by the Study Team until June 2007 engage some villagers in weaving and sewing at cottage scale. It is therefore believed that under the influence of traditional vocation garment factories have been placed as a destination of seasonal workers from poverty prone strata of the CDZ⁶. Currently, the Union cannot use US- and Euro-markets as an outlet of sewing products from the Union due to the economic sanction imposed by the US and other countries. Yet, there remains still high possibility of restoring export-oriented garment industries taking advantage of inexpensive and better quality labor supply, whereby labor force from the CDZ among others can be absorbed.

2.1.2 Relationship with China

Territorial relationship between the Union of Myanmar and China is very unique and importantly interpreted in the development of Mekong watershed areas. Figure 2.1.3 shows the related countries to the Greater Mekong Sub-regional Development and economic corridors passing through them from east to west and from south to north where the development area includes Yunnan Province of China. The South – North corridor can connect Bangkok area to Yunnan Province and further to inner areas of China, but for the access to the ocean route to Middle East and Europe it is easier to use the route leading to Shan State of the Union of Myanmar, and then via Mandalay and the new capital Nay Pyi Taw and finally to Yangon, rather than from Yunnan Province through south north corridor via Thailand. Moreover, as shown in Figure 2.1.4, the marine route for Middle East and Europe from Yunnan Province via Viet Nam or



⁶ In fact the works in the garment factories are so called CMP; namely, cutting, making and packing, which is quite different from the traditional hand weaving works in nature. However, though the process is different from each other; there is a similarity in which they are dependent much on manual work. From this point of view, villagers who are at present engaged in cottage weaving industry can also be engaged in CMP industry without much difficulty in terms of technical gap.

Thailand needs to pass Malacca Strait at the offshore of Malaysia. The alternative route, i.e., from Yunnan Province via Shan State - Mandalay - new capital Nay Pyi Taw and then Yangon in the Union of Myanmar can secure the access to the Middle East and Europe in shortest distance. In addition, an agreement on the construction of a pipeline was made in 2006 to transport petrol and natural gas from Sittwe Township in Rakhine State facing to Bengal Bay situated in southeastern part of the Union to Kunming City of Yunnan Province in China⁷. This enables China to carry petrol and natural gas of Middle Eastern and African origin without passing Malacca Strait into inland part of China.

As such, great significance in physiographical term is found in securing marine route to connect inland China with the Middle East, Europe and Africa via the Union of Myanmar. Even at present, commodities are flowing very vigorously from Yunnan Province in China through Mandalay and Nay Pyi Taw to Yangon and in this case Mandalay City serves as a relay point. From now onward, it can be predicted that the route passing the east side of the Study Area from north to south through Mandalay City



and Nay Pyi Taw City to Yangon City will become an economic corridor of the Union. That is to say, this economic corridor would possibly stimulate the eastern area of Mandalay Division within the Study Area to undergo change into peri-urban villages.

2.1.3 Relationship with India

India is the second export destination of the Union of Myanmar after Thailand. Commodities for India are mainly composed of timber and pulses. In particular, the exports of pulses have recorded a

great growth since early 1990s. India herself has pursued economic liberalization since 1991 transforming hitherto closed type economic policy to open market economy policy. Simultaneously with this economic reform India allowed rapid increase in the imports of agricultural commodities into herself where the Union of Myanmar, supported by competitive farm labor cost, played a big role of supplying *dahl* that is an important food in India.

Rate composition of GDP of India in 1991 shows the relative contribution from primary industries of 34%, secondary ones of 24% and tertiary ones of 42%, respectively. In 2008, the rate composition moved to 17%, 26%, and 57% respectively, indicating that principal industry is shifting from agriculture to



⁷ Asia Times (November 1, 2006): Chinese engineers are preparing to begin a \$2 billion gas pipeline from Sittwe, which supports oil and gas platforms in the Andaman Sea, to Kunming this year for completion in 2009, according to an April China Daily report. Industry analysts speculate that those Myanmar-situated pipelines will be designed to transport oil and gas arriving by tanker from the Middle East and Africa to inland China, potentially saving Beijing time and money now spent sailing through the choked, pirate-infested and vulnerable Malacca Strait to China's east-coast ports.

service industries (see Figure 2.1.5). In other words, transformation of industrial structure has already taken place in India. In the near future, it is highly probable that shift to the industrial structure of developed country type firmly proceeds on in India wherein foods are imported in exchange of the surplus from secondary and tertiary industries rather than enhancing level of self sufficiency of agricultural products. It follows that exports of pulses from the Union to India possibly continue or even increase.

Peasants in the Union of Myanmar have long suffered from the compulsory cropping and compulsory delivery regimes of rice and other agricultural products throughout the era of Burmese Socialism. For example, before 1988 compulsory delivery of rice had been imposed at the price level of around 1/4 as cheap as market price, and later at the level of about 1/2. The compulsory delivery quota of rice was completely abolished only in year 2003, but the compulsory on cotton and sugar cane is still effective. However, pulses exportable to India have almost been free of centrally planned economic intervention. What's more, MAS positively diffused high quality seed of these pulses for producing exportable pulses.

Under such circumstances, farmers expanded cropping of pulses that had already been popularized in the CDZ because of its adaptability to dry climate, in response to market demand in accompany with the emergence of gigantic Indian market. In the CDZ, farmers have also increased year after year area under chickpea (Cicer arietinum L.) as a catch crop



of paddy field that can grow with only residual soil moisture in addition to hitherto pigeon-pea (Cajanus cajan Millsp), and also increased acreage under green gram (Vigna radiata L.) as a pre-monsoon or monsoon crop. Cropping of black gram (Vigna mungo L.) is also expanded as a catch crop after paddy in the Ayeyarwady Delta area with higher atmospheric temperature but it is not much cropped in the CDZ.

A long-term trend of production of green gram is illustrated in Figure 2.1.6 where accelerated

production since early 1990s is markedly recorded coincided with India's policy change into open economy. Indian market surely played the role of driving force though some reservation remains in its increment rates as to the data of 2000 and onward.

Figure 2.1.7 shows the total amounts of exports of chickpea, green gram and pigeon pea since 1999/00 to India and others separately⁸. From this Figure it can easily be understood that about 60 -



⁸ Myanmar Agricultural Statistics 2006 Yangon, Myanmar

85% of exports of pulses that are mainly cropped in the CDZ is oriented to India. CDZ, as shown in Figure 2.1.6 as one example of green gram, has by far large share of pulse production in the Country, namely, 51% of green gram, 93% of pigeon pea and 97% of chickpea⁹, implying that the "Indian pulse market" has great economic significance for the people of CDZ.

2.2 Macro-economy in the Union of Myanmar

Immediately after the establishment in September 1988, the current regime actively deployed its tactics towards market-oriented economy. Although economic growth in early 1990s had been weak, it achieved high rate of growth during the period from around 1992/93 to mid 1990s. With a success in getting rid of economic stagnation that had triggered the democratization movement in 1988, the national economy seemed to quickly recover and to maintain a high growth of GDP, but eventually economic growth experienced somewhat stunt in the latter half of 1990s. The GDP growth rate was curtailed from 6.9% in 1995/96 to 6.4% in 1996/97. In 1997 the Country joined ASEAN anticipating much foreign investment by this occasion, however, it ended up in overall failure as affected by Asian economic crisis occurred in the same year. The GDP growth rate resulted in 5.7% in 1997/98 followed by 5.8% in 1998/99 (see Figure 2.2.1).

Later, since the latest edition in 1998/99, publishing of "Review of the Financial, Economic Social and Conditions" has been suspended, which used to publicize up-dated economic indicators of the Union annually. Whereas, the annual growth of GDP has continued high rates over 10% with sudden surge in 1999/2000, and the most



recent edition of "Statistical Yearbook 2008" gives as high as 11.9% as the rate of GDP growth in 2007/08. The average growth rate from 1999/00 to 2007/08 is 12.66%, at which rate total GDP could be doubled in just 6 years. Sources such as Economic Intelligent Unit, Asia, now raise some concern in its interpretation.

In so far as the Study Team engaged in this Study has interviewed in the target villages of the Pilot Project, farmers felt improvement in their livelihood owing to escalated producer prices of pulses and rice brought about by market liberalization since 1988 though the extent thereof is still limited. In addition, in Mandalay Division among others, cheap Chinese products have recently become available in markets that enabled those who are engaged in small-scale industries to purchase industrial materials, eventually leading to positive contribution to income betterment. In other words, it is quite confident that throughout 1990s and even after 2000 local economy in CDZ has continued its growth. However, whether the rate of growth with over 10% has been achieved or not is still uncertain.

As regards GDP composition of the Union of Myanmar by rate, Figure 2.2.2 shows rate of GDP composition since 1980/81 (the rate of GDP is calculated on nominal price basis). Since mid-1990s a tendency of gradual dwindling in the share of agricultural sector coupled with gradual replacement by the share of trade and services (transport, communication, social and administrative services are included) has been observed. Likewise, manufacturing shows certain rising trend since mid 1990s

⁹ Based on production in 2004/05 recorded in Myanmar Agricultural Statistics 2006 Yangon, Myanmar

but still remains at 15% even in 2007/08. Even though extremely competitive labor force with high literacy is found in the Union as compared with its neighbors, the Figure 2.2.2 implies that such a potential is not yet put into function due to economic sanctions and various trade restrictions.

With regard to share of agricultural sector in GDP, Figure 2.2.3 indicates its long-term trend since 1980/81 with livestock, fisheries and forestry sectors. Contribution to GDP by agricultural sector reached 55% in 1994/95 owing very much to exports of pulses initiated in early 1990s (here the rate of share is expressed in the rate of current prices). Later, it has turned into a gradual decrease affected by tapping of natural gas that was launched on an orbit since 2001 and by other reasons.



Notwithstanding, even in 2007/08 the share of agricultural sector to GDP accounted for 35% suggesting that the mainstay of the Union of Myanmar is still agriculture.

Also, the share of livestock/ fisheries sector lately comes to about 8% only of GDP. At any rate, typical profiles observed in GDP composition of the Union reside firstly in large share of the industries, primary inter alia agricultural sector, secondly in the sustained state of sluggish decline in the GDP share of the primary sector (agricultural sector) despite the fact that state policy pursues market oriented economy (under market oriented economy, secondary industry is gaining



share instead of agriculture industry declining, however this situation has hardly taken place yet in Myanmar).

The fact that the rate of contribution of agricultural sector to GDP has not been sharply declining suggests us that agriculture sector has achieved some growth in keeping pace with the growth of GDP

itself though the rate of agriculture sector growth must be lower than that of national GDP. Figure 2.2.4 indicates growth rate of agricultural growth in the Union of Myanmar. It shows continuous high rate of growth since 1999/00 except for that in 2002/03 recording 4.7% only, though the growth rates in agriculture sector are not evenly comparable to the overall GDP growth rate always over 10%.



2.3 Role of Agricultural Sector in National Trade of the Union of Myanmar

Figure 2.3.1 gives export shares by commodity of the Union¹⁰. In 1970s, the Union stood at the leading rice exporting country in the world. At that time, over one million MT of rice had annually been exported. As shown in Figure 2.3.1, the highest share on the basis of export value was in fact from rice, and 42% in overall exports of the Union was recorded in 1980/81.



However, later rapid dwindling of the share of rice on foreign currency earning took place to the level of only a few percent, with the largest 9% in 1995/96. In place of rice, pulses expanded their shares on export earnings until they have reached the top of share composition during the period from mid 1990s to 1998/99. In the meantime, their shares recorded 27% in 1995/96, 23% in 1996/97, 22% in 1997/98 and 18% in 1998/99. Later, garment industry expanded the exports in 1999/00 and 2000/01, followed by export of natural gas to Thailand that has gained the regular delivery since 2001 accounting for the share of as much as 40% in overall export earnings as of 2007/08. Currently the value of export of natural gas to Thailand is ranked top of exports earnings.

Though yielding the position of export share to newly developed sources of export earnings including natural gas, relative decline agricultural of commodities - in particular pulses - in the share of the total export value is not at all means decline in the export amount. Figure 2.3.2 shows the export quantities of rice (inclusive of broken rice and rice bran), pulses and traditional timber including



teak and other species. It is seen from the Figure 2.3.2 that till 2001 pulses had firmly been expanding export amount in spite of casual stagnancy experienced in late 1990s and in 2000s it has been marking over 800,000 tons.

Export potential of rice likely remains even nowadays, but it is imperative to offer national staples at very affordable price for the sake of well-beings of the population as well as administrative stability. Supply of cheap rice can secure welfare for the poor who have to purchase rice in markets. It also enables laborers to save cost for procuring staples, leading eventually to stable supply of competitive (cheap) labor force to the labor market holding comparative advantage in international competitiveness.

In consequence, export of rice in large quantity requires considerate judgment under the current regime (rice export itself is not banned as of January 2010, but only large scaled cultivators who own

 $^{^{10}\;}$ Statistical Year Book 2002 '& 2004, Myanmar Agricultural Statistics 2006

over 3,000 acres and the Government can deal with rice export). On the other hand, pulses still keep share of around 10% on the entire foreign currency earnings for the Union, though its share itself has been declining. Major exportable species of pulses include black gram, green gram, chick pea, pigeon pea, cowpea (Vigna unguiculata L.) etc, and these are all chief products in the CDZ except for black gram that is cropped in delta region. Hence, the CDZ plays an important role in earning foreign currency to the Union.

2.4 Functionality of Markets in the Agricultural Sector of the Union of Myanmar

During the socialistic era in the Union, compulsory delivery of various crops, especially of rice had been imposed to farmers by which they had to sell crops to the Government at the prices equivalent to around 1/4 as cheap as the prevailed market prices¹¹. Such system however was eased to a large extent since 1989 and finally completely abolished in 2003 except for compulsory cropping of rice in irrigated farm land, and compulsory cropping and delivery of sugar cane and cotton (rice can be sold at the farmers' will). As for pulses, private exports to India were made from the beginning without any government intervention. Therefore it can be said that paddy and pulses that are major crops of the CDZ can be traded through market mechanism.

Fujita and Okamoto¹² illustrated an example of rapidly rectified market functions by the economic liberalization since 1989 through the comparison between the GDPs labeled by 1985/86 fixed prices and those labeled by current prices ¹³, even though there are still a host of constraints. Figure 2.4.1 indicates the result of both price levels where gradual divergence develops between GDP share of agricultural sector calculated by 1985/86 price and that given by current prices towards



1994/95 and thereafter the difference is converged into a constant of about 17%. This can be interpreted as rapidly rectified market functions towards around 1994/95 from various market biases including compulsory delivery of rice at very cheap prices equivalent to a fourth of then prevalent market prices.

They further analyzed the process of rectifying price biases caused by too much depressed price levels of farm produce during socialist regime relatively to non-agricultural commodities by means of the changes in price indices of agricultural products. Figure 2.4.2 shows retail price indices of agricultural products against consumer price indices in Yangon from similar viewpoint to what was reported by Fujita and Okamoto, though confined to those which were cropped in the CDZ and data available in the Statistical Yearbook. In this Figure 2.4.2, 1985/86 price is defined as 100, that is to

¹¹ Under the regime where the Government hold land ownership it was competent for the Government to confiscate farmland from those who did not obey food procurement system. Even today land belongs to the government, however fear of confiscation of land, in essence transfer of cultivation right to others, is not as much as it used to be since nowadays farmers can cultivate at their own will except for rice in irrigated land, sugar cane and cotton. Farmers are obliged to cultivate rice in irrigated farmland but can sell to anyone according to the market. For the sugar cane and cotton, farmers who are around government operated factory are obliged to plant and also sell to the government, namely compulsory delivery still in effective, at the fixed price by the government.

¹² Change of Transitional Economy in Myanmar (Japanese version), Chapter 5 Myanmar Agriculture under Transitional Economy, PP174, Koichi Fujita and Ikuko Okamoto, The Institute of Developing Economies, Japan External Trade Organization

¹³ In Statistical Yearbook 2004, GDPs at constant price after 2001/02 are based on 2001/02 price, whereby constant price based GDP before 2001/02 cannot be comparable to those of after 2001/02. Therefore the Figure shows the GDP share in agriculture only until 2000/01.

say, consumer price index of 100 becomes 5,217 in 2003/04. Meanwhile, the price of rice, pigeon pea and chickpea recorded hike at higher rate outweighing consumer price indices. Taking year 2003/04 for instance, pigeon pea has 8,526, chick pea has 6,495 and rice has 7,240 as against consumer price index of 5,217.

According to Figure 2.4.2, price hike of rice and mainly export oriented pigeon pea and chickpea occurred simultaneously with the introduction of market economy. This was basically considered attributable to rectified price that had once been greatly biased by compulsory delivery of quota as of 1885/86 as far as rice is concerned (namely market correction concerning rice), and for pulses attributable to domestic price escalation relative to consumer price indices affected by internationally traded prices. In this connection, the rates of rise for prices of sesame and groundnut have been lower than escalation rate of consumer price indices, but Fujita and Okamoto interpreted it as affected by cheap import-competing crops. Edible oils have high priority next to rice in the Union but domestically produced sesame and groundnut do not have competitiveness with cheap palm oil imported from Malaysia etc, thus the hike of domestic prices of these crops have been limited.

Since Figure 2.4.2 shows only the retail prices in Yangon, it is not known whether the price escalation rate given in the figure is directly reflected into farm-gate prices. However, as far as exportable pulses are concerned, it has been identified under full competition according to the field survey conducted by Okamoto et al. Similarly as to rice, though intervention exists in such a way that price hike has been controlled through export restriction (that is to say, by realizing domestically the state of oversupply of rice), no intervention like state commodity board etc. exists in so far as domestic trade is concerned. As regards rice processing, abundant village rice millers, many of which are side business of lead-farmers in the villages, are processing paddy and private dealer purchase polished rice after the processing. Of course, compulsory delivery system still exists in sugarcane and cotton, but market functions in the field of rice and in the



case of pulses for which no marketing restriction has ever been imposed can be judged as normal.

2.5 Trends of Rice Prices in Myanmar and their Comparison with Prices of Rice in Thailand

The top-priority crop in Myanmar is rice. As stated above, rice is currently freely traded in free markets though its exports are controlled. It follows that the Government applies a policy to keep domestic prices of rice at low level. The following describes the long-term trends of farm-gate prices of paddy since 1840s in Myanmar and compares with those of Thai rice for the period of 1995 and later. Thereby how rice prices of Myanmar have behaved towards international rice market is sought.

2.5.1 Long-term Trends of Paddy Prices in Myanmar

Figure 2.5.1 indicates the trend of farm-gate paddy prices per 100 baskets during the period from 1840 to 2007 where the graph is presented in logarithmic unit for price level. From this figure some features can be observed as to the long-term trend of paddy prices in Myanmar, which are summarized



- In 1877, conspicuous price escalation suddenly took place. Such a boosting was brought about by an stimulated rice exports from Myanmar attributed to a great famine occurred in the area centered by South India (about 5 million people were sacrificed by the famine ¹¹). The price recorded in 2 years before the famine, or in year 1875, had been 65 Kyats/100basket (data of antecedent year is not available), but the boost was later in 1877 tripled to 195 Kyats/100basket.
- 2) A lingered price fall was observed since 1920. At that period, Myanmar was under the control of Indian Government that was then a British territory, and in 1921 then 4 major enterprises associated a union (Bullinger Pool) and it succeeded in monopolizing rice markets and establishing a cheap fixed price therein. It consequently served as a food-supplying base exporting cheap rice to India, thus contributing to keep lower consumer prices in India.
- 3) For years since the end of 1920s a big-scale collapse of rice price was experienced. It occurred prior to the global financial depression caused in 1930, eventually inducing the large-scale price fall of rice and giving catastrophic damage to rice export markets. It led to subsequent large surplus of rice in Lower Myanmar, dropping price of rice to a large extent. Paddy farmers were heavily indebted, while farm laborers lost their chances of employment, resulting in peasant riots. The largest-scale rebellion took place in December 1930 known as Sayesen's insurrection. Such negative impact in the form of global panic, so to speak negative globalization effect, had already taken place so early.
- 4) From 1942 the largest price fall of paddy prices ever experienced evolved. It was attributable to the start of occupation by Japanese army since 1941 in Myanmar and this resulted in almost complete lift of rice exports to Europe. Due to this market loss, large amount of rice produced in lower Myanmar lost its outlets entailing in a great break of prices. Also, the fact that many rice mills were crashed in riots fostered recession of rice industries (in this connection, it was most likely that a form of paying wage in paddy to farm laborers arose around this period as the result

¹ By the way, the famous Bengalese famine evolved in 1943 with death toll of around 3 million people.

of large surplus happened in Lower Myanmar).

- 5) Gen. Ne Win came into power by a coup taken place in 1962 and Burmese socialism regime continued until 1987. Trend of price hike during this period was exceedingly sluggish. The price level once rose up in 1874 from 634 Kyats to 955 Kyats, but later this level at 955 Kyats had been maintained for 13 years. During this period, government personnel and farm laborers enjoyed availability of cheap rice. Although this had a positive social welfare implication, but to paddy producers it gave hardship due to imposition of compulsory rice delivery at the prices fixed by the government.
- 6) The government liberalized domestic rice markets once in 1987 but this triggered 5-fold price hike from 955 Kyats in 1986 to 4,751 Kyats in 1987. Later, a high pace of rice price hike has been resumed with incessant domestic inflation. In this context, a level of 170,000 Kyats / 100 baskets was recorded in 2003 followed by a temporal recovery to 120,000 Kyats / 100 baskets but again showed a big surge up till 2007, for example price recorded in 2005 at 175,000 Kyats / 100 baskets in 2006 (1.37 times as compared to the previous year level), also in 2007 to 300,000 Kyats (1.25 times as compared to the previous year level).

2.5.2 Comparison of Rice Prices in Myanmar with Those of Rice Produced in Thailand

In Myanmar, priority in agricultural production was attached to paddy cultivation oriented to rice exports at the stage of British regime of colonization. Rice exports were initiated at Sittwe in Rakhine area in 1830 - 31, since then export-oriented paddy cultivation became popular and popular. Later, up till 1970 sandwitched with the World War II Myanmar was the largest or leading rice exporter. Later on, exported quantities decreased year after year but nowadays large post-consumption surplus has evolved in the statistical figures, leading to positive capacity of rice exports as far as publicated figures are referred. Yet, under a firm policy aiming at serving cheap staple to the nation, exports have not been exercised except for petty amount.

Under the condition that large surplus of rice is domestically deposited, rice price level of Myanmar is relatively inexpensive to those prevailing in neighboring countries. It has brought export competitiveness at international rice market to Myanmar. Here, how much extent the rice produced in Myanmar is competitive against that produced in other countries is assessed. Namely, rice retail prices in Yangon , converted into US\$ applying market ratio, is compared with export FOB prices of rice produced in Thailand.

Thailand has been the world largest exporter of rice. It follows that FOB prices of Thai rice determine international rice prices. In this regard, retail prices and FOB prices that give shipping price at the ports of shipment are different, but these two prices are ultimately not so much different because the latter are based on the rice price purchased in bulk (that is to say, purchased at cheaper price than retail prices) and cost of shipment.

The bar graphs shown below indicate price rates of Myanmar rice and Thai rice (the unit is given at the left edge). In these graphs, it is shown that the prices of Myanmar rice are equivalent to ranging about 30 - 60% during the period 1995 - 2001, and it approached once to Thai price in 2003, but again indicating a stabilized level of around 30% in 2004. In other words, except for the year 2003, Myanmar rice has considerably been cheaper than Thai rice, resulting in an implication of export potential as far as price is concerned.

Meanwhile, accompanying with price hike of Myanmar rice since 2005, difference in the price level has been narrowed. The most recent price of Myanmar rice recorded in 2007 already reached about 70% of that of Thai rice. It implies that though Myanmaer rice is cheaper by about 30% than Thai rice, the quality of the former is inferior to the latter, and it can be said that export competitiveness of



Myanmar rice is no more effective if current trend of price level continues.

In these graphs, retail price of Myanmar rice istelf is plotted with lines (the unit is given at the right edge). The polygonal line at the left side graph represents the trend of retail price of Myanmar rice expressed in Kyats. It is observed that it shows a sharp rise since 2004. As inflation proceeds on, the nominal price, or rice price expressed by Kyats inevitably and considerably rises on and on. Here, whenever inflation takes place, value of local currencies are being decreased in terms of US\$, i.e., world-wide basal currency. It follows that if the values expressed in local currencies are converted into the values expressed by US\$ with market currency exchange rates, it is possible to convert into the price at the referred countries in which inflation effect therein is adjusted allowing some time-lag of the exchange rates between these two currencies.

The polygonal line in the right side graph represents price of Myanmar rice equivalent to US\$ at market exchange rate. It shows almost no significant change during the period 1995 - 2004 though it fluctuates. That is to say, assuming that the converted price is considered as conventionally adjusted one for eliminating distortion by inflation, Myanmar rice hasn't marked substantial price upsurge during the period 1995 - 2004 though some fluctuation is observed. However, later, since 2004 toward 2007 it recorded a sharp rise. This is interpreted as a provision of environment for paddy farmers in which incentive for paddy production is given to them but on the other hand degraded environment with eroded welfare for the social strata that have to purchase rice for their consumption.

The real reason why sudden price hike has recently emerged in Myanmar rice is not known at moment. In the statistics there has been surplus of rice but actually its production might have been reduced due to climatic vagary, and it has likely led to consequent price hike of rice in domestic rice markets. Alternatively, it might be possibly brought about by stagnation in the growth of paddy production under pump irrigation during dry season attributed to large price rise of fuel in 2007. Real facts can hardly be grasped because of some ambiguous points around statistical issues, especially on the quantities of internationally traded Myanmar rice and market rates of exchange, but it should be carefully followed up.

2.6 Relationship between the Determination of GDP Growth Rate of the Union and That of Targets in the Agricultural Sector

Mentioned here is how to determine the targets of cropping area and crop production in the Union of Myanmar and also how these are adjusted during the process of establishing goal of GDP of the entire Union. As mentioned above, agricultural sector has still considerable share, as high as 35 - 40% in the GDP even in recent years. This is equal to say that growth rate of agricultural sector should be

achieved with topmost priority in order to fulfill the goal of GDP growth of the entire Union. Likewise, it would also be true that state intervention is more readily practiced in the primary industrial sector (above all agricultural sector) as compared to secondary and tertiary sectors since the state owns land proprietorship.

"From top to down" is often heard in the Union of Myanmar. In agricultural sector, the Central Government fixes such targets figures as cropping areas, unit yield and production quantities and they are allocated to divisions and states, then what are allocated is further allotted to such subunits as districts and townships. Such a method had actually been practiced under planned economy regime before 1988. However, as far as formulation of "plans" in agricultural sector is concerned (in this case "plans" basically mean crop production), what is practiced now is not so rigid "from top to down".

Nowadays, in the Union, cropping area, production by crop and yield by crop in the Union are compiled from township level. What is compiled in townships is brought to districts, and they are handed over to divisions/ states until they are summarized in the headquarters of MAS. These compiled results are sent to the Ministry of National Planning and Economic Development together with plans, for example, formulated in Irrigation Department under the same Ministry of Agriculture and Irrigation. As a matter of course, planning reports from all the sectors – in short planned production – are collected to the Ministry.

Given the planned GDP growth rate is fixed at 10%, all the target production data submitted from all ministries and state agencies are examined in this Ministry. If the summed up result doesn't reach the goal of GDP growth rate at 10%, the revised target of production quantity (and cropping area) is specified for example in the agricultural sector where the share of GDP composition is very high and the administrative intervention is easier with the leasehold right used as warrant. Then, the revised target is sent back to the MAS and MAS distributes the break down of the revised target to the level of division/ state, the level of district and township.

The cropping area by crop revised in the central government is thus reallocated to township level, where MAS staff working in the township formally deliver to the related attendants at the regular meeting of TS PDC (TS Peace and Development Council) established at each township. PDC meeting is held as a rule once in a month where participation of such delegates from technical ministries/ agencies as staff of MAS, village tract chairman (as representative of villagers) is liable. Target cropping area, target production quantities etc. are specified in this meeting and the attended village tract chairmen inform village leaders under him/her these targets.

Here, the priority crops specified by the government of the Union include firstly paddy, secondly oil crops and thirdly pulses. The basis of this priority stems from the following purposes; i.e., rice paddy for supplying staple at cheap prices to the nation, oil crops for saving foreign currency expenditure because of imports of edible oils and pulses for inversely earning of foreign currency. How strongly these policy frameworks can impose compulsory cropping to farmers is not accurately known to outsiders all right, but at least cropping of paddy in irrigated farmland is a "must".

However, compulsory rice delivery at very low procurement price that lasted up till 2003 was already terminated and escalation of farm-gate prices of rice has now already taken place. Thus incentive for cultivating paddy is functioning through market mechanism for farmers. With this, environment of paddy cultivation for farmers in response to the incentive has been well provided except for the plots where irrigation water is not enough to cover paddy water requirement or sandy soils develop.

It may be plausible that some farmers prefer planting of pulses than oil crops, given easier cash earning through exports. Despite, actually pigeon pea that is typically cultivated among farmers for

example is often observed as cropped mixing with sesame that is an oil crop. From this observation sharp decline in planting oil crops is unlikely. In this connection, according to a result of interview with MAS, currently there is no case of ordering compulsory cropping of oil crops with warrant of leasehold right even if a farmer crops pulses in place of quota of oil crop (before 1988 message of leasehold transfer to a third person was informed to those who did not follow crop quota). When cropping of oil crops does not reach the target in rainy season, MAS gives advice and instruction so that oil crops are cultivated in pre-monsoon or winter seasons, and accordingly the target is "almost attainable" in any case throughout the year.

As cited above, the deeply rooted concept of cropping area and production quantity based on planned economy in the era of socialism still remains but farmers have tried their best to maximize their income by timely reacting to available markets within such limitations. Current issues under a state of functioning domestic markets might lie in the concept towards "market" and "fulfillment of the given targets" radically different from the way of thinking of those who live in "liberalized market sphere under open economy" rather than "top - down" system as mentioned earlier.

In sum, the way of formulating plans (in the agricultural sector) in this Country is not so typically "top - down" as one may consider, though in the process of implementing the decided plans a "top - down" system may still be put in place. Here, the essential difference between Myanmar officers and those who live in liberalized market economy may be found in "the intention of directly controlling" means of fulfillment, which is not sought by the latter.

The term "market" in the sense of "liberalized market sphere under open economy" is so to speak extremely excellent amongst what have been artificially created by human beings. However, the salient feature of this "market" resides in the fact that it is never directly controllable. In other words, in liberal world for example, in achieving the target we take actions to the environment, or design a system or mechanism to fulfill it. Here we don't have any concept of designing the market itself, but only designing and streamlining systems such as subsidies for particular activities, or legislations with limited duration to protect domestic production, or establishment of information media to stimulate marketing functions, or improvement of infrastructure to promote commodity flow.

That is to say, when individual actors in the market economy make effort of maximizing their own utility given favorable environment, their aimed goals of agricultural production or rate of growth will be achieved in the course as eventual outcome of their actions. Whereas, in the Union of Myanmar, officers tend to directly take actions to the production means and objects, or at least tend to think they should discharge direct actions on them instead of exerting influence on environment – namely instead of designing institutional framework. This is what is different the most between the systems of two economic spheres.

2.7 Households, Families and Women in the Union of Myanmar (Bamar Race)

According to the Census of 1983 (latest census in the Union), the racial composition rates stand at Bamar race accounting for 69%, indigenous races for 25.7% (ethnic minorities are included here, with the largest minority of Shan race accounts for 8.5%, followed by Kayin race accounting for 6.2%, the third ranked Rakhine race for 4.5%), Indians and Pakistanis for 1.3%, Chinese for 0.7%, European and other races accounting for 3.3%. Out of these, the majority living in three Divisions in the Study Area comprises Bamar race. The following give outline of households, families and women of Bamar race¹⁴.

Bamar race doesn't have family name. It may imply that the race has little concept of keeping "a

¹⁴ Based on interviews conducted by JICA Study Team and also referred to 'Society and Education in Burma (Japanese Version)', Yasuko KAWANAMI, 1994

house" beyond generation as prevailed in Japan, but fundamentally forming a nuclear family just after marriage. As often referred to as patri-matrimonial, there is no particular succession priority in the Bamar race. It follows that no gender preference exists as to social status although gender difference is present in labor division and area of activities and range of management.

Such an equity can be recognized in the way of calling kindred and family members. Burmese word "Mi Thar Zu" means "mother, son, gathering", and here the usage signifies assembly of a mother and her children, without any conception of "house" which Japanese generally have. They call parents "Mi Ba" that means "mother, father" where mother comes before father. As to the way of calling a married couple, sometimes husband comes first, like "Lin Mayar: husband, wife", and "Zanee Maung Hnan: wife, husband, couple", and in any way it can be said that husband and wife in a family create a complementary relationship.

In the case of inheritance, there is no definite rule to prefer sons to daughters. In some cases priority of succession is given to the eldest child, but also gender has no bearing on this matter. Land ownership is attributed to the Union, but leasehold right is legitimately inherited from the former cultivators to the successors. In this occasion, it is often observed that the bride is married with leasehold right inherited from her father, and leasehold right of farmland is inherited to any children irrespective of gender. Also, in inheriting property including leasehold right no particular traditional rule exists and in many cases more property is allotted to poorer children, thus a tendency is recognized to treat equitably children regardless of gender and regardless of seniority.

Table 2.7.1 indicates number of landholders by gender holding leasehold (legally tillage) right in the entire Union. Because leasehold right is to be registered as a rule as the property of the family 95% after the marriage, of the landholders of married households are male and only 5% are female. However, it can be seen in this table that in the

Table 2.7.1 Land Holding Nate by Gender in the Onion of Myanmar							
Marital Status	Male		Female				
Marital Status	Nr.	%	Nr.	%			
Total	2,945,100	85	519,669	15			
Never married or single	183,625	59	128,761	41			
Married	2,627,756	95	131,136	5			
Widowed	124,357	34	246,835	67			
Divorced/separated	9,362	42	12,937	58			

Table 2.7.1 Land Holding Rate by Gender in the Union of Myanmar

Source : Advanced Report Myanmar Census of Agriculture 2003

cases of unmarried status 41% of females and also in the cases of divorce 58% of them hold farmland. Hence, it is interpreted that access to land is also secured for women. This system is quite different from that of the neighbors, like India that is situated in the west of the Union and Bangladesh.

During our interviews in the Study Area, in all cases respondents reply that the president is the husband but financial minister or home affairs minister is the wife in a family. That is to say, father is deemed as leader mainly by reason for which he is the bread earner of the household. In addition, a salient feature of Bamar race is found in the fact that women's status has traditionally been high as proved by the example cited above and also by "Bamar as I Saw It"¹⁵ written by Brown R.G. of England in 1926.

Daily household affairs including financial management are delegated to mother and household account is around 100% managed by the wife. Even in the case of double-income married couples mostly living in urban areas income of the husband is in most cases handed over to the wife, and the spouse receives necessary expenses from his wife when need arises. Examples of separate account among families are interpreted as married couples in which either one of them is of other race than Bamar.

Among the society of Bamar race, decision-making on the treatment of property or purchase of assets

¹⁵ In the literature, he wrote that Burmese women are much liberalized than British women in spite of her being unmarried or married.

is jointly made. There found almost no difference in educational level between male and female. As to contents of works, women are engaged not only in simple wage labor, but also many of them have broader activities including management of business. Thus, it can be said that women's status is not low than male status. High status of women enables them to do many things, for example they tend to care for their children's health as well as children's education, also reducing gender gap between boy and girl. This is quite unique point for Bamar race as compared to the neighbors in its western side and also north eastern side.

2.8 Social Indicators of the Union of Myanmar as Compared with Those of ASEAN

The Union of Myanmar joined ASEAN on 23rd July 1997. ASEAN aims at development of economic as well as social base of Southeast Asia. Partly affected by economic blockade from Western nations, most of external trade of the Union is with Asian countries. In addition to China and India, the Union has traded with ASEAN countries including Thailand, Malaysia and Singapore. In this section, various indicators of the Union are compared with those of other ASEAN members to elucidate the position of the Union among ASEAN members.



2.8.1 Comparison on the Scale of Population and Economy among ASEAN Countries

According to the basal data on the Statistics of ASEAN Economy¹⁶, Indonesia has the largest population among ASEAN members (about 230 million estimated as of 2008), while the Union has the scale of population following the Philippines, Vietnam and Thailand (refer to Figure 2.8.1).

Figure 2.8.2 shows GDP of ASEAN members estimated as of 2004, in which the Union has larger economic scale than that of Laos, Cambodia and Brunei, but fairly smaller than those of other 6 countries. GDP of the Union is equivalent to 1/3 of Vietnam, and to about 1/19 of that of Indonesia with the largest GDP among ASEAN member countries.

As a result, as shown in Figure 2.8.3, GDP per capita in the Union becomes much smaller, ranked at the lowest level among ASEAN members with per capita GDP estimated at only 465\$ as of 2008. In this regard, though it is argued that border trades are not precisely reflected in the statistics in the economy of the Union, limited economic scale is self-evident



¹⁶ ASEAN Finance and Macroeconomic Surveillance Unit (FMSU) Database、ASEAN Statistical Yearbook 2005, etc.

taking into account the big scale of population against rather smaller GDP irrespective of the size of border trade.

The Union of Myanmar and Thailand, the former being adjacent to the latter at its eastern border, had been alike in population and GDP until late 1950s. Whereas, at present wider disparity has grown between these two countries in the economic scale though scale of population is still comparable each other. Thailand has larger population than the Union by 14% only while it has GDP of 10 times as much as that of Union, thus large disparity in GDP of the both countries is resulted as shown by 9 times difference in terms of per capita GDP. Although extent of poverty cannot be measured by economy scale alone, the way of disparity emergence may radically be related to economic policies of both countries.

2.8.2 Contribution Share among 3 Major Sectors to GDP in ASEAN Countries

Figure 2.8.4 indicates share of GDP among 3 major sectors (service sector, industry and agriculture) in ASEAN countries in 2000^{17} . Among ASEAN members, Laos has highest share of agricultural contribution to GDP, followed by Myanmar. Cambodia has also high share of agriculture on its GDP. These three countries are in fact typical agricultural countries as shown in the figure, in contrast to other ASEAN countries where industrialization has fairly been progressed. Even in Viet Nam followed market oriented economy that relatively later than other ASEAN countries, share of agriculture on GDP has been declined to 23% as of 2000. Thailand, one of



neighboring countries of the Union, has only 10% of agricultural sector contribution to GDP.

2.8.3 Human Development Index of ASEAN Countries

Human Development Index (HDI) is the indicator measured by 3 different human development domains, namely 1) long-lived and healthy life, 2) knowledge and 3) human living standard, calculated from such indicators as those of average life expectancy, school-enrollment and literacy as well as income etc. HDI can indicate the extent of development of a country from broader aspect rather than judging by income - namely economic dimension - alone. Figure 2.8.5 displays trend of HDI in ASEAN members during $2001 - 2004^{18}$. The figure shows that



all ASEAN countries mostly have gradually elevated their ranks¹⁹.

¹⁷ Statistics of ASEAN Economy base data, 2005

¹⁸ Human Development Report 2001-2004, UNDP

¹⁹ HDI ranks countries by using an index raging between 0 at its minimum and 1 at its maximum. This means that even if a country's average life expectancy, enrollment and literacy rate and also income have increased from previous year, that country's index may fall if other countries' development in these 3 aspects have progressed more than the country.

The Union of Myanmar also has accelerated the pace of stepping up its rank reaching 0.549 in 2001, 0.551 in 2002, 0.578 in 2003, 0.581 in 2004, and 0.582 in 2005 but it still remains at considerably low position of HDI ranking, i.e., 138th out of 182 countries in the world in which HDI data is available. Cambodia (ranked at 137th) and Laos (133rd) have similar positions to that of the Union among ASEAN members. With regard to per capita GDP mentioned above, the Union produced 465\$, less than two third of that of Cambodia with 756\$ and that of Laos



with 918\$ (all the product were measured as of 2008). Under these situations, the reason why HDI of the Union is ranked almost same as those of Laos and Cambodia may lie in an assumption that health and educational indicators of the Union have higher values than those of the two countries.

2.8.4 Health Indices and Average Life in ASEAN Countries

The values of health indices in the Union - mainly infant mortality and under-5 year mortality - greatly differ depending on their data sources. When referring to the data of UNICEF "MDG Estimate" and that of UNDP "Human Development Report", higher (worse) values are given to both of infant mortality and under 5-year mortality than those reported in the "Statistical Yearbook" of the Union. For example, UNICEF and UNDP reported that the under-5 year mortality in the Union is 106 out of 1,000 live births (as of 2004) whereas the Statistical Yearbook of the Union made it public as 70 out of 1,000 as of 2004 (or 62 in 2007 according to the latest Statistical Yearbook 2008). Also, as to infant mortality, the sources of UNICEF/UNDP gave the value as 76 (as of 2004) against 45 as of 2004 made public in the Statistical Yearbook 2004 of the Union (or 43 in 2007 by the latest Yearbook).

Health indices given in Statistical Yearbook 2004 of the Union are summary of data reported from townships. About 360 - 370 townships are said to exist throughout the Country as of 2009, while 189 townships made report of health indices for year 2004 to the central government as shown in the report of Statistical Yearbook 2004. It follows that the health indices in the statistical report in the Union are based on those reported from around a half of the total townships existing in the Country. In this regard, it is most probable that 189 townships that reported in year 2004 are mainly belonging to divisions where Bamar race predominates as observed in the Study Area.

Confining to the townships in the Study Area, relatively higher (better) values of health indices are anticipated considering density of established health centers, rate of the vaccinated population etc. It means that possibility of having favorable values of health indices is higher for Divisions than for States and such favorable values may be reflected in the statistical publications of the Union. Focusing on the limited Divisions populated by Bamar race within the Study Area, they most probably show higher health indices than the average level of the Union, but this matter will separately be discussed and here, comparison between the Union and other ASEAN members is made by employing the indices given by UNICEF/UNDP. In this context, handling data for the comparison are in conformity with the basic data for estimating HDI since these values basically consit of HDI.

Figure 2.8.7 shows number of death of under-5 year child per 1000 live births, and Figure 2.8.8 does number of death of under 1 year old infant per 1000 live births. Mortalities of under-5 year child and under-1 year infant are both high in the Union, ranking at the worst 2 among ASEAN members. Mortality of under-5 year child per 1000 live births counts 106, meaning one out of nine infants would die before reaching 5 years old, and that per 1000 under-1 year infant counts 73, equivalent to that one

out of 13 infants would die before their first birthday. Though causes of high infant mortality are not mentioned in the statistical publications of the Union, it is thought that water-borne diseases and malnutrition etc. give negative impact (Health in Myanmar, 2006, Ministry of Health).



Mortality of under-1 year infant gives deep impact on average life expectancies. Of course, life is also affected by diseases and accidents even infants survive beyond 5 years old, but in Asian region where HIV doesn't prevail much, there is a strong tendency that the value of under-1 year infant mortality straightforwardly influences the length of average life (in the areas where impact of HIV is high, mortality of sexually active generations, that is to say, that of generations ranging from economically active youth to quasi-aged stratum is elevated which in turn shortens average length of life). Figure 2.8.9 shows average life by gender in ASEAN countries, where it is observed that that of the Union is the second shortest after Laos. Estimated average life as of 2006 in the Union was 58 for male and 64 for female.



Number of adult patients infected by HIV older than 15 years old per 1000 population in ASEAN countries is estimated based on the morbidity under HIV by country as of 2005²⁰. The result is given in Figure 2.8.10, where the largest number is recorded in Cambodia at 15 out of 1000, followed by 11 in Thailand, and then 10 in the Union follows. The Union was kept under substantial confined social system until 1988 and even now immigration of foreigners into the Union is very much limited. It is therefore considered that development of sex industries is not much as compared with that of neighbor countries. 3rd ranked HIV positive rate among ASEAN countries may imply possibility of being infected by HIV on the occasion of illegal employment and staying in neighboring countries.

²⁰ USAIDS and WHO reports, posted in their homepages

2.8.5 Water Supply and Hygiene in ASEAN Countries

Figure 2.8.11 gives rate of hygienic access to water in rural areas of ASEAN countries where data are available²¹. The rate of hygienic access to water in rural areas of the Union as of 2004 is estimated at 77% and it is better than Cambodia with 35%, Laos with 43% and Indonesia with 69%. Also, Figure 2.8.11 gives the rate of access in 1990 along with that in 2004, suggesting that the Union improved to the significant extent hygienic access to water in the rural areas since 1990.

Figure 2.8.12 shows access to sanitary facility (latrine) in rural areas of the ASEAN countries. In concrete, the access is approximated by the rate of households established with latrine in rural areas, where the cases of jointly utilizing latrine of the neighbors are possibly included (though not mentioned in the UNDP Human Development Report 2006). Households facing difficulty in erecting latrines due to poverty are also found, but generally in many cases in the Union new houses are built side by side with those of relatives/ kindred (brothers) and parents, postponing the construction of latrines (result of the observation in the villages of the Central Dry Zone).



According to this figure, it is found that the rate of access to latrine in the Union is not only evidently higher than that in Cambodia and Laos, but also even higher than that in Indonesia, Vietnam and the Philippines. Though concern on data accuracy remains to some extent, it can be at least said that indices on water supply/ hygiene in the rural areas in the Union are more favorable than other indices.

2.8.6 Education Indices in ASEAN Nations

Figure 2.8.13 shows the mean adult literacy rate (elder than 15 years old) in ASEAN nations during the period 2000 - 2004. Southeast Asian countries tend to have high literacy rates, where that in 7 of them inclusive of the Union exceeds 90% as total literacy rate of male and female. Literacy rate in the Union standing at 90% (86% for female and 94% for male) is comparable to that in Indonesia and Vietnam, and a little better than that in Malaysia.



Literacy rates in Cambodia and Laos is in lower level than that in other ASEAN nations as shown in Figure 2.8.13. In other words, the Union has achieved comparable level to other ASEAN members as far as literacy rate is concerned though the Union, Cambodia and Laos are always ranked at lower level in per capita economy scale or per capita health indices. According to UNDP Human

²¹ UNDP Human Development Report 2006, WHO Database, UNICEF Database & Country Profile

Development Report 2006, literacy rate of the Union is ranked at 58th out of 128 countries in the world. Also, literacy rate of youth (15 - 24 years old) as of 2004 is estimated at 95%.

Figure 2.8.14 shows rate of primary school net enrollment (giving only 6 countries where data is available²²), in which primary school net enrollment of the Union is 81.6% for girls, 80.8% for boys and 81% for the mean of the total (as of 2002). This rate remains lower by 10% than that of Cambodia and lower by 2% than that of Laos. However, it may be noteworthy that girl's enrollment in the Union is slightly higher than that of boys. In Cambodia and Laos, on the contrary, primary school enrollment of girls is lower than that of boys by around 6 - 7%. It is very much interesting that girl's enrollment rate is inversed in the Union as compared with neighbors, though the difference by sex is meager 1%.

Above all, the status of women in a Bamar race's family is positioned fairly high. This situation must contribute to serving as the background of girl's higher school enrollment but another plausible cause in the Union is that boys in many cases enter into priesthood in their younger ages. At this occasion they commute to monastic schools belonging to temples. For this reason, boys with lower primary school enrollment rate are not necessarily fail access to education including reading and writing. Also, because of



this opportunity of monastic learning, literacy rate (in particular boy's literacy) is believed greatly enhanced in spite of not so higher primary school enrollment.

2.9 Achievement in Millennium Development Goals

Myanmar has been implementing the National Development Plan aiming to accelerate growth, achieve equitable and balanced development and reduce socio-economic development gap between rural and the urban areas in the Country. The major aspects of the Millennium Development Goals (MDGs) are thus covered in the National Development Plan. With the implementation of the National Development Plan, it is reported that certain progress has been achieved in various sectors, such as health, education, infrastructure and agriculture though more efforts be required to attain some of the MDG targets by the year 2015. Table 2.9.1 is the excerpt from Myanmar Millennium Development Goals Report 2005, and following are the points to note:

- 1) For the poverty reduction quoted in Goal No.l, no specific statement is done in the Myanmar Millennium Development Goals Report 2005. Therefore, it is unknown to what extend the poverty in Myanmar exists and how the trend of the poverty reduction has been. This is due to non-availability of poverty profile in Myanmar as at 2005. However, a nationwide Poverty Profile was published by UNDP in June 2007, making it possible in future to follow up the reduction of poverty.
- 2) Another target under the Goal No.1 is to reduce the extreme hunger. In connection to the hunger, the Myanmar MDG Report cited the under-nutrition-rate and under-weight rate for children. A declining trend is seen for the both indicator, suggesting Myanmar would achieve the target by 2015 though there may be argument what the extreme hunger means all about.
- 3) For the universal primary education cited in Goal No.2, there may be a difficulty to achieve the target saying "boys and girls will be able to complete a full course of primary schooling by 2015"

²² UNDP Human Development Report 2006, and UNESCO' homepage

by judging from the present net enrollment ratio of 84.5% in 2005. However, the tendency of increase from 65.7% in 1990 to 84.5% in 2005 is a good sign towards achieving the goal.

- 4) For the Goal No.3 that is gender equality and women empowerment, no specific statement is made in the Report in terms of enrollment of school. However, literacy ratio between male and female was cited and almost no difference is seen. Since Bamar race, the majority in Myanmar, enjoys high women's status in comparison to some neighboring countries in its western side, one may see not much difficulty to achieve this goal.
- 5) On Goal No.4 referring to child mortality, both infant and under-5 year child mortalities are on a declining trend; 130 in year 1990 to 67 in year 2003 and 98 in year 1990 to 50 in year 2003 respectively per 1,000 live births. The targets are 39 and 28 respectively by 2015, and with utmost effort Myanmar may achieve them.

Goal	Target	Excerpt from Myanmar MDG Report 2005
1. Eradicate extreme	Halve, between 1990 and 2015, the	NA
poverty and hunger	proportion of people whose income	
	is less than one dollar a day.	
	Halve, between 1990 and 2015, the	Myanmar has declining figures in under-nutrition-rate
	proportion of who suffer from	among under-3 children from 42 % in 1988 to 31 % in 1994
	extreme hunger.	and the rate of under-weight among under-5 children also
		declined from 38.6 % in 1997 to 31.8 % in 2003.
2. Achieve universal	Ensure that by 2015, children	Net enrolment rate in primary education stood at 65.7 % in
primary education	everywhere, boys and girls, will be	1990 and has increased to 84.5 % in 2005. Likewise,
	able to complete a full course of	youth (15-24 years old) literacy rate increased to 96.5 %
0. Deservation and the second little	primary schooling.	from 80.9 % in 1990.
3. Promote gender equality	Eliminate gender disparity in primary	Literacy rates in the country were 91.4% of the population
and empower women	and secondary education preferably	In 2001, while males were slightly better (91.7%) compared
	no later than 2015	
4 Reduce child mortality	Reduce by two-thirds between 1990	Under-5 mortality rate is on the descending trend –
	and 2015, the under five mortality	declining from 130 per 1,000 live births in 1990 to 66.6 in
	rate.	2003, and the target is 38.5 in 2015 to reach the MDG.
		With regard to infant mortality rate, it was 98 per 1.000 live
		births in 1990 but reduced to 49.7 in 2003 with the aim of
		reaching 28.3 by 2015.
5. Improve maternal health	Reduce by three-quarters, between	NA
-	1990 and 2015, the maternal	
	mortality ratio.	
6. Combat HIV/AIDS and	Have halted by 2015, and begun to	Under the National Health Plan, health programmes are
other diseases	reverse the spread of HIV/AIDS.	being implemented to promote the health status of the
	Have halted by 2015, and begun to	entire nation.
	reverse the incidence of malaria and	
	other major diseases.	
7. Ensure environmental	Integrate the principles of	Myanmar Agenda 21 was adapted in 1997. Also, Myanmar
sustainability	sustainable development into	signed the UN Framework Convention on Climate Change
	of opvironmontal resources	Protocol was accorded in 2003 A pation wide tree
	of environmental resources.	planting programme has been launched since 1003 and
		millions of seedlings are being planted annually.
	Halve, by 2015, the proportion of	Access to safe drinking water shows an increased
	people without sustainable access to	percentage- from 32 % in 1990 to 72 % in 2000.
	safe drinking water.	Proportion of people with access to improved sanitation
		has also increased from 36 % in 1990 to 83 % in 2000.
	Have achieved, by 2020, significant	NA
	improvement in the lives of at least	
	100 million slum dwellers.	
8. Develop global		New lending from the multilateral financial institutions has
partnership for		been suspended since 1988-89 and has few bilateral
development		ODAs to Myanmar in the wake of the economic sanctions.

Table 2.9.1 Achievement of MDGs in Myanmar

Source: Myanmar Millennium Development Goals Report 2005
CHAPTER 3 THE STUDY AREA

This chapter states outline of the Study Area covering physiography, topography, population, agriculture as mainstay as well as livestock and small-scale industries that supplement farm-based livelihood under unstable climate. In addition, livelihood of rural inhabitants is summarized based on the results of interviews to key-informants in the target villages of the Pilot Project conducted during May - August 2007 and also on the baseline survey etc. As various statistical data exist at divisional level, but are not available at the level of townships and districts, the overall examination on agriculture and livestock is based on the data at divisional level, covering Divisions of Mandalay, Sagaing and Magway that encompass the whole Study Area (the land area of the Study Area accounts for 43% of that of the related three divisions and the population thereof occupies 54%).

3.1 Physiography and Topography of the Study Area

Topography of the Union can roughly be divided into 3 blocks, namely, western mountainous zone sharing border with India and Bangladesh, Shan State highland zone extending along the eastern borders of China, Laos and Thailand and the central plain zone sandwiched by these two zones. The CDZ where the Study Area is located extends in the central plain zone. The central plain zone is composed of deposit layers with relatively recent geological era. Two large streams – Ayeyarwady River and Sittang River – flow through the plain to the south. These

two streams flow down at the western side and the eastern side of the CDZ, out of which Ayeyarwady River flowing in the west is a large stream with larger annual discharge than that of Mekong River (See the right box).

The topography of the CDZ composed of relatively recent geologic era can be briefed in a way that deposits zone developing along these two rivers is very flat, while in between these layers Bago Hills - a gentle hill zone composed of soft sandstone layers - runs from north to south in parallel with the rivers with the shape like a convex cone coming out of the plain. The southern end of Bago Hills emerges from the outskirt of Yangon, gradually increasing the altitude as it runs to the north until it reaches the summit of Mount Popa situated in the southeastward at about 40 km distant from Pagan where ruins of Pagan Dynasty established in 11th century are located.

The elevation of Mount Popa is measured at 1,518m from which mountainous topography develops though it looks not so widely extending. Thus, overall relief of Bago Hills shows a gently inclined topography - a plateau with gentle slope like a rolling hill. Bago Hills

Comparison in the size of 3 Rivers: Dimension of Ayeyarwady River

Annual Discharge : 524BCM (UNESCAP) Total River Length : 2,170km (Wikipedia) Catchment Area : 411,000km² (Wikipedia) **Dimension of Sittang River** Annual Discharge : 81BCM (UNESCAP) Total River Length : 420km (Scale 1:1,500,000) Catchment Area : 48,000km² (UNESCAP) **Dimension of Mekong River** Annual Discharge : 493BCM (UNESCAP) Total River Length : 4,123km (Wikipedia) Catchment Area : 810,000km² (Wikipedia)



range further extends beyond Ayeyarwady River its part of plateau north-westward, and the soils developed over the plateau are futile sandy soils derived from the weathered sandstones.

As such, the overall relief of the CDZ can be classified into river basin with fertile diluvial soils and fluvial deposits derived soils, alluvial plain extending along these rivers, and then plateau zone with infertile soils over Bago Hills situated in between two streams. From land area point of view plain occupies by far large portion, and an intensive farming is practiced making use of fertile soils along the grand Ayeyarwady River but the farming is subject to flood damages. As the topography shifts away from the streams to the alluvial plain, agricultural activities tends to become extensive, but when it is compared with rain-fed upland farming engaged over the plateau it may still be bestowed with favorable conditions. In the plateau area, goats that are quite resistant to arid conditions are more raised as supplemental means of offsetting erratic farming.

3.2 Land Area, Population and Population Density

The Study Area is located within 3 divisions - Mandalay, Sagaing, Magway - that consist of the CDZ. Table 3.2.1 shows the land area and population of these 3 divisions and the Study Area in contrast with the Union. These three divisions account for 26% of the total area of the Union and 34% of the national population. The Study Area within these 3 divisions accounts for 43% as to land area and 54% as to population, while its share to the Union is 11% of the land area and 18% of the population:

	anu Area, Fopu	liation and Fop	Table 3.2.1 Land Area, 1 optilation and 1 optilation Density of the Study Area and 5 Divisions					
Division/ State	Area, sq.km	Area ag/ Union, %	Population '000 in 2003	Pop. Ag/ Union, %	Pop. Density per sq.km	Remarks		
Sagaing Division	94,582	14	5,777	11	61			
Mandalay Division	37,008	5	7,407	14	200			
Magway Division	44,801	7	4,976	9	111			
Total of Above 3 Divisions	176,391	26	18,160	34	103			
Kachin State	89,003	13	1,393	3	16			
Kayah State	11,728	2	301	1	26			
Kayin State	30,370	4	1,607	3	53			
Chin State	36,004	5	502	1	14			
Tanintharyi Division	43,328	6	1,490	3	34			
Bago Division	39,387	6	5,420	10	138			
Mon State	12,292	2	2,735	5	223			
Rakhine State	36,762	5	2,968	6	81			
Yangon Division	10,167	2	6,188	12	609			
Shan State	155,734	23	5,142	10	33			
Ayeyarwady Division	35,123	5	7,318	14	208			
Union	676,288	100	53,224	100	79			
Study Area only								
Sagaing Division	21,352	3	3,071	6	144			
Mandalay Division	17,398	3	2,882	5	166			
Magway Division	36,419	5	3,889	7	107			
Total of Study Area	75,169	11	9,842	18	131			
Ratio b/t SA and 3 Divisions								
Sagaing, %	2	3	53		2.35			
Mandalay, %	4	7	39		0.83			
Magway, %	8	1	78		0.96			
Whole Study Area, %	4	3	54		1.27			

Table 3.2.1 Land Area, Population and Population Density of the Study Area and 3 Divisions

Source: Myanmar Agricultural Statistics, 2006, Statistical Yearbook, 2004

From these figures it is found that both 3 divisions and the Study Area have larger share of population rather than share of land area against whole Union. Hence it can be said that the concerned 3 divisions and the Study Area belong to an area of higher population density in the Union. As shown in Figure 3.2.1, population density of the Study Area stands at 131 persons/km² as compared to that of the whole Union; 79



persons/km², also in comparison with the concerned entire 3 divisions of 103 person/km². One of the reasons of relatively high population density may lie in the favorable living environment of the Study Area with larger portion of flat alluvial zone as compared to western, northern and eastern areas that accompany with mountainous areas. Besides, the density of the Study Area, 131 person/km² is found to be extremely high among so-called dry zones in the world. For instance, average population density of 47 Sub-Saharan countries in Africa with vast area of semi-arid zone is only about 31 persons/km² (http://ddp-ext.worldbank.org/ext/DDPQQ). Also, population density of Mongol with dry highland zone is as low as 2 persons/km² (from Data-book of the World 2006).

From these facts, even though it is called Central "Dry" Zone, the Study Area should be interpreted as a drier area in its comparison with other areas in the Union where monsoon type climate predominates. Of course, at the very end of lingering dry season during November - next May, soils are dried up and wind erosion severely takes place. In this period typical scenery in so-called semi-arid zone appears in the Study Area, but in contrast, in the rainy season falling in the period of June - October, paddy cropping, typical activity under monsoon climate, has repeatedly been practiced since prehistoric era in climatically favorable areas within the Study Area.

3.3 Characteristics of Climate and Rainfall in the Study Area

In the Union, two climatic periods exist, namely rainy season and dry season, by rough classification. On the other hand, one year is classified into 3 periods from daily life point of view. Namely, dry season is further divided into two sub-periods, in which part of dry season beginning soon after the end of rainfall is called winter period because atmospheric temperature is low, and later part thereof that lasts until the onset of the next rainy season is called summer period because the highest atmospheric temperature is experienced in this period. The following explain climate in the Study Area and characteristic of rainfall in the CDZ.

3.3.1 Rainfall and Atmospheric Temperature in the Study Area

Figure 3.3.1 shows monthly rainfall measured at major townships within the CDZ where rainy season ranges from late May to October. One of the characteristics of the rainfall pattern in the CDZ is intermediate decline in July in the course of the rainy season. Dry season covers the duration except late May to October and it is classified into two periods. One of them, namely summer with high atmospheric temperatures just before the onset of next rainy season (refer to Figure 3.3.2) is called pre-monsoon period in the term of cropping calendar.

Thus, climate of the CDZ is divided into summer or pre-monsoon period during March - first half of May, and winter period during November - next February that is to follow monsoon period of late May -October. Namely, the period of November - next May including winter and summer is equivalent to dry season. In farming area with irrigation facilities, paddy can be cropped even in pre-monsoon period or summer in addition to monsoon period.



Onset of rainy season is attributable to southwesterly monsoon blowing from Bengal Bay. This monsoon wind blows towards mountain ranges of Rakhine and Tanintharyi extending western edge of the Union, consequently bringing about heavy precipitation over Rakhine region and Tanintharyi region. Whereas, because the monsoon wind is intercepted by these mountain ranges, a hinterland of these mountain ranges - the CDZ - receives much less rainfall, entailing to occurrence of a semi-arid zone. As mountainous zone running along the western edge of the territory of the Union elevates its altitude as it orients to the north, the less rainfall is received by the hinterland area of the mountain range the further to the north it is located.

Reduction of rainfall is significant at the area of further north from Magway Township, thus an aridest area forms amongst the CDZ, reaching Shwebo Township area within the areas around and near Bagan, Mandalay and Sagaing (refer to Figure 3.3.3). Annual rainfall in this area ranges only 800 mm or so. In this connection, since steep mountainous zone again appears in the north of Shwebo Township, air stream blowing through the CDZ from south to north and ascending along the rocky wall of this mountainous zone, gets rapidly cooled during its rise, bringing about heavy shower over the slope. Chindwinn River, one of the largest tributary of the great Ayeyarwady River, flows in that watershed. Heavy rainfall received by this tributary and by the uppermost watershed of the mainstream of Ayeyarwady River most significantly contributes to the recharge to the annual discharge of Ayeyarwady River outweighing even that of Mekong River.

During the period of November - next May northeasterly monsoon, blowing the opposite direction to southwesterly one during rainy season, blows deep away from the Continent. Since northeasterly monsoon is so dry that almost all part of the territory of the Union uniformly receives scanty rainfall during this period. In the CDZ that



receives less rainfall during rainy season and dominated by sandy soils, desiccation of soil moisture proceeds on as dry season proceeds until soil dust is stirring in the air. Looking down from the mountainous ranges positioned in both eastern and western sides, főhn phenomena takes place by dry wind blown from the mountains to the basin, namely the CDZ, making atmospheric temperatures higher, living conditions severer.

3.3.2 Characteristics of Rainfall in the Study Area - a Semi-arid Zone

Rainfall pattern in semi-arid zone like the Study Area is characterized by firstly low annual precipitation and also instable distribution pattern with capricious or erratic occurrence. From a different view, because rainfall amount is basically scarce, such rainfall variability consequently gives detrimental effect on crop production, even if amplitude of variance were smaller than that of normal monsoon area. Such instability can hardly be visible from the averaged annual rainfall amount, yet as shown in Figure 3.3.4, drought years consecutively occurred twice in 1997 and 1998 during the

period 1996 - 2005 (data were collected from the observatories located in each township). A marked decline of rainfall amount can be identified from the collected records even in the period from 1999 to 2001 except Meikhtila Township.

Instability of rainfall is especially outstanding at the onset of rainy Initial date of rainy season. season varies from year to year, and as an example Figure 3.3.5 shows monthly precipitation in May, the starting month of rainy season. As to two average years, 1996 and 2005, recorded with normal annual rainfall (see Figure 3.3.4), monthly rainfall of less than 50mm recorded in May identified at the level of only 1/5-1/6 as against around 300mm recorded in earlier/ later 2000. Amplitude of the variance by more than 2 times as much as the mean is also found in annual rainfall ranging around 400 - 1,000mm, but the monthly one in May is identified as 5 - 6 times as much as the mean monthly rainfall.



In this way, climatic character of arid and semi-arid areas lies not only in the scarcity of rainfall but its pattern is also highly variable with sites in an area giving serious impact on spot crop yields. Figure 3.3.6 indicates an old data of about a century ago referring to 1901 - 1921 as to cropping indicator of paddy, sesame, sorghum and cotton in Monywa area (located facing to Magyi Village, a

target village of Pilot Project in the opposite side of Ayeyarwady River)¹. During the period from 1901 to 1911, periodical 3-year cycles of bumper, ordinary and crop failure were repeated. Harvest indices at that time varied with a range of around 50 - 150 when the average year was taken as 100. That is to say, minimum and maximum harvests with around 3-year cycle accompanied with the amplitude of variable of 3 times from the lowest to highest harvests.



¹ Referred to a figure posted in Page 60 of "Myanmar wanted to know more", Tuneo AYABE, Yoneo ISHII, which original data from BGLCDB

Though the amplitude of variable became less in the period 1915 - 1921, the indices lowered as low as 50 in some years. Thus the range of variable is still identified as around 2 times from the lowest to highest harvests.

Villagers feel that rainfall pattern has recently become more erratic year after year, or particularly instable onset of monsoon has been becoming further erratic (according to the result of the interview by the Study Team). For instance, it has been reported that sesame sown at the onset of monsoon was harvested null in 2006 in Ar La Ka Pa Village, a target village of the Pilot Project. Similarly, damage on nursery paddy seedlings took place for the preparation of rain-fed transplanting since rainfall amount had been less than expected during July 2007 in Magyi Village, one of the target villages of the Pilot Project (refer to photo).

Instability of rainfall is not confined on time sequence but it occurs on horizontal space. Despite that scarce rainfall has caused large



yield decrease in an area, timely rainfall was received resulting in ordinary crop harvest in its neighboring township areas or districts in the same year. As far as such cases actually happen, occurrence of crop failure in a village is not readily visible in the statistical data covering broader areas. Figure 3.3.7 indicates the trend of sesame harvest by division.

In this figure, production quantities in the Divisions of Mandalay, Sagaing and Magway located in the CDZ are given in 3 columns at the bottom, where it can be identified that the yields in 1997 with annual rainfall less than half of that of ordinary years are not particularly different from the previous yield levels. Following 1998 was also a drought year, but the yield level did not show a big drop as compared to those recorded before 1993/94 even though some yield decline evidently took place. Later, since 2000/01, significant yield increase has been fulfilled except for 2001/02 and 2005/06 although the statistical data in this period may lack credibility.

In brief, the fact that rainfall irregularity takes place not only along time-scale but also on the space leads to a state that even if certain areas suffered from poor harvests they tend not to definitely appear in the production quantities in wider term, for example at divisional level. Such irregularity may serve as a radical cause of making policy makers and others commit a mistake of uniformly applying the same development strategies as those applied to the



stable monsoon areas in a lump to the dry areas under instable rainfall conditions.

Thus, the character of semi-arid area lies in instable rainfall pattern that randomly evolves both in terms of time and space. The fact that annual precipitation is not stable is interpreted as that farming has a dimension of uncertainty or a kind of gamble. Likewise, the fact that uncertain rainfall at the beginning of rainy season leads to requirement of enhancing capacity of rightly predicting rainfall and this requirement would lead to a conclusion that agriculture as a livelihood means needs an instinctive

sense like a sense of hunting or gambling.

3.4 Administrative Hierarchy and Coverage in the Study Area

3.4.1 Administrative Hierarchy and Information / Communication of Decisions

State Law and Order Restoration Council (SLORC) was established in the Union of Myanmar in September 1988. Later, SLORC has been reformed into State Peace and Development Council (SPDC) in November 1997. This reform has intention to expand role of military administrative power from keeping public order to develop nation. At the occasion of this reform innovation of personnel was simultaneously executed reshuffling 15 veteran cadres out of 19 members of SLORC. SPDC is a council at the Union level but Peace and Development Councils (PDC) have been established at the level of division, state, district, township (TS), and village tract (VT).

SPDC at the Union level consist of military personnel. Chairpersons of PDC at divisional and state level are Area Commanders, and their members comprise personnel of the Ministry of Home Affairs (MOHA) and the Ministry of National Planning and Economic Development (NPED) who take charge of divisions and states. Under these divisional and state levels, similar PDC have also been established at district, township, and village tract that is the smallest administrative unit in the Union. The table below shows the composition of PDC including chairperson, secretary and members etc in the PDC below division and state level:

Administrative Level	Chairperson	Secretary	Member		
Division/ State	Area Commander	General Administration	Planning officer under NPED, Police officer		
		staff under MOHA	under MOHA		
District	General Administration	Planning officer under	Police officer under MOHA		
	staff under MOHA	MOPND			
TS and	General Administration	Planning officer under	Police officer under MOHA		
Township	staff under MOHA	MOPND			
Village Tract	Nominated from village	MOHA personnel as clerk	A few of village leaders consist of the member		
Min. administ'	leaders by PDC at TS	(usually employed from			
unit in the Union	level	the area concerned)			
Village			Leaders are from representative of 10		
(=natural village)	DDC not optablished		households each within a village, or		
	PDC not established	-	representative of 100 households each within a		
			village		

Table 3.4.1 Composition of PDC Established at Each Administrative Level

Source: interview result by the Study Team

As evident from the table above, a PDC up to the TS level consists of staff of ministries who should play important roles on keeping public order and development. No technical administrative staff has been appointed in the PDCs, for example staff of the Ministry of Agriculture and Irrigation, or that of the Ministry of Livestock and Fisheries, or that of the Ministry of Cooperative. Though they are not members of PDC, they are responsible for attending regular meeting held in each level of PDC once a month as a rule.

Similarly, attendance of VT chairman under TS is also ordered to the meeting of PDC held once a month at TS level. Target of cropping area and of production quantities of the current year, for example, are informed to the VT chairmen in this meeting. Later the decisions at the central level are step-wise informed through the message delivery from VT chairman to villages through village leaders selected at the village level as 10 HHs leader and also 100 HHs leader.

3.4.2 Coverage of Each Administrative Unit in the Study Area

As stated above, administrative unit of the Union consists of division, state, district, TS, and VT. In order to identify physical coverage of the administrative unit, scale of each hierarchy and population are briefed in the table below. The Study Area covers 11 districts in total, the size of which is the

smallest in Nyaung-U district with 1,485km², and the largest in Shwebo District with 12,202km², thus a wide range is observed in their size (in which Nyaung-U District is composed by single TS). Government related offices including extension offices of MAS are established up to TS level only, and the TS has land area of about 800km² - 2,000km², on average around 1,500km² (physical size is equivalent to about 38×38 km).

TS is further classified into rural area and township areas, the former consists of village tracts (VTs), and a VT is composed of villages where people get together to live naturally. In total, 3,209 VTs and 10,358 villages exist in the Study Area. A TS of average size has 203 villages and 63 VTs. Ratio of urban and rural population stands at 16% : 84% as of 2003, and mean population in a village, the quotient of rural population divided by the number of villages, is 801. Though number of households as of 2003 in the Study Area is not known², if the mean number of family members in rural areas in the Union as of 2001, 5.39 persons/ family (Statistical Yearbook 2004), is employed, the average number of households is estimated at 149.

Table 3.4.2 Physical Coverage of District, TS, VT and Village Population in the Study Area

		District/		TS	TR	Number of Adm	h03384,200		Ratio		1	Population, 2003	3	Dural	Estimated
Division	District	Division sq.km	Nr. of TS	Average sq.km	KmxKm	VT	Village	Vilage/VT	Village/TS	VT/TS	Urban	Rural	Total	Pop/Village	HH/ Village
	Sagaing	2,477	3	826	29	185	364	2.0	121	62	59,284	454,473	513,757	1,249	232
Canairan	Monywa	6,674	7	953	31	322	1,154	3.6	165	46	202,514	951,559	1,154,073	825	153
Sagaing	Shwebo	12,202	7	1,743	42	466	1,468	3.2	210	67	193,756	1,209,562	1,403,318	824	153
	Total	21,352	17	1,256	35	973	2,986	3.1	176	57	455,554	2,615,594	3,071,148	876	163
	Kyaukse	3,707	3	1,236	35	238	578	2.4	193	79	103,731	457,388	561,119	791	147
Mandalay	Myingyan	6,419	5	1,284	36	360	1,113	3.1	223	72	153,203	988,739	1,141,942	888	165
	Meikhtila	5,787	4	1,447	38	227	1,094	4.8	274	57	207,080	720,486	927,566	659	122
	Nyaung- U	1,485	1	1,485	39	76	218	2.9	218	76	27,141	223,931	251,072	1,027	191
	Total	17,398	13	1,338	37	901	3,003	3.3	231	69	491,155	2,390,544	2,881,699	796	148
	Pakokku	8,300	5	1,660	41	334	1,198	3.6	240	67	178,094	920,244	1,098,338	768	143
	Magway	9,624	6	1,604	40	358	1,302	3.6	217	60	234,060	1,139,961	1,374,021	876	162
Magway	Minbu	6,504	4	1,626	40	257	869	3.4	217	64	47,781	559,671	607,452	644	119
. ,	Thayet	11,991	6	1,999	45	386	1,000	2.6	167	64	141,777	667,185	808,962	667	124
	Total	36,419	21	1,734	42	1,335	4,369	3.3	208	64	601,712	3,287,061	3,888,773	752	140
Study Area	11	75,169	51	1,474	38	3,209	10,358	3.2	203	63	1,548,421 16	8,293,199 84	9,841,620	801	149

Source: Various Materials at TS level, Statistical Year Book 2004

 $^{^2}$ No. of households in the Study Area in 2004/05 is 1,840,907 according to data collected at TS PDC office. However No. of HHs in 2003 which is the base year for population in this report is not known to us.

3.5 Agriculture in the Study Area

The mainstay of the inhabitants in the Study Area is agriculture. Though in many cases goats/ sheep are raised in the areas, such livestock rearing is placed as complementary means to the mainstay, cropping activities. Agriculture in the Study Area is roughly divided into two categories if overviewed from the aspect of natural conditions. One of them is an extensive upland farming mostly seen in Bago Hills. Here, relatively drought resistant crops such as pigeon pea, sesame, sunflower, groundnut etc are cropped on infertile sandy soils developing over gently undulating, or rolling hill relief. The Study Area is almost flat except the part of Bago Hills. In this area, different types of agriculture can be observed ranging from intensive farming developed on fertile soils distributed along Ayeyarwady River to extensive one engaged around Bago Hills.

3.5.1 Crop Production in 3 Divisions as against that in the Union

Although the Study Area is called "dry zone", it has already created its position as a key upland agricultural production area of the Union. As it is difficult to obtain specific data confined to the Study Area for crop production, share of crop production between the total of 3 divisions including Mandalay, Sagaing as well as Magway and that of the Union are summarized as shown in Figure 3.5.1 based on Myanmar Agricultural Statistics, 2006.

The total population in these 3 divisions accounts for 34% of



national total. From this Figure 3.5.1, it is evident that such crops as oil palm, black gram, coffee, tea, jute, rubber, coconut have inferior production share to the population ratio on account of climatic conditions, but many other crops show by far higher share as compared with demographic ratio. Also, it is really amazing that paddy production in terms of total of rainy season crop and dry season crop in this area has share of 22%, and that in terms of only dry season crop (irrigated one) has share of 29% on the national total. In addition, this area is known as a production area of oil-crops and pulses, where production share reaches 70 - 90% in the case of oil-crops and around 40 to over 90% in terms of pulses except black gram that is produced in the delta.

"Dry area" as it may be called, a lot of paddy parcels can be observed in swampy lands and along streams in the Study Area. Paddy tracts equipped with irrigation facilities also widely develop along the tributaries that are flown into Ayeyarwady River, where intensive paddy farming is practiced. Further, such cash crops as pulses, oil-crops, onions (94% share), and cotton (95% share) as one of important industry crops, that are not physiologically apt to humid climate are widely cultivated in the CDZ. As such, the CDZ forms a large agricultural zone in the Union. The following give a detailed profile of major crops in the CDZ or in the 3 divisions.

3.5.2 Rice Produced in the Study Area

The top-priority in national agricultural development is attached to rice production/ promotion (this policy implication is not confined to agricultural field but also applicable to the activities of the entire

Union). Figure 3.5.2 indicates trend of paddy production in 3 Divisions in contrast with the rest of the Union (data are given as the total crop in both rainy and dry seasons). Paddy production that recorded some decline at the end of 1990s has later recovered with favorable rising trend. In addition, rising trend in paddy output is also identified in 3 Divisions where the Study Area is located keeping its share to the national total at over 20% as a whole though share of Sagaing Division is larger than other two divisions.



As regards paddy produced within the Study Area, data of 2005/06 could be collected from MAS at TS level. Based thereon, the amount of production equivalent to milled rice per capita in the Study Area is calculated to compare with those in other divisions/ states where 60% is employed as the conversion rate from paddy to rice on weight basis. Population of the Study Area in 2005/06 is estimated from that reported in 2003 assuming annual increment rate at 2%. Likewise, as available up-dated data of paddy production for other divisions and states is that in 2004/05, the estimation for these areas is also based on the population reported in 2003 and to obtain 2004/05, 2% for annual increase rate is applied, thus rice production per capita is calculated.

Figure 3.5.3 is the result of the estimation, showing that rice production per capita is low in Mandalay and Magway, while that in Sagaing Division is exceedingly high. Also, in terms of the average in the whole Study Area, it shows that the area has achieved fairly production though high the production per capita is by far inferior to that in such granary areas as Bago and Ayeyarwady Divisions. Here, annual per capita consumption of milled rice in the Union is supposedly around 150 -180kg though differed by data sources (for example, a survey in



2001 by CSO gives 148kg and according to the World Bank data it is 180kg). When this amount of consumption is superimposed onto Figure 3.5.3, about a half of the level of self-sufficiency in Mandalay, around 70% in Magway and more than two times as much as the self-supplying level in Sagaing are annually produced, respectively.

As a vast paddy tract develops from its center, Shwebo, to the area of Sagaing Division that is equipped with irrigation facilities constructed in the dynasty era, it has the third rank of per capita rice production in the Country after Ayeyarwady Division and Bago Division. It is likely that from this Division rice marketing to Mandalay has been evolved. Magway is also a rice deficit area, and it is said that rice transported from the delta offsets the shortage of rice in Magway in addition to rice delivered from Sagaing Division. With such variation by area, the Study Area as a whole is anyhow

producing rice nearly at the level of self-sufficiency. The fact that such an amount of rice is produced in what is called a dry area is very much noteworthy though data of 1999 and onward may have concern of credibility (see box).

Figure 3.5.4 and Figure 3.5.5 present per capita rice production on milled rice basis by TS within the Study Area and the rate between paddy land and upland field by TS. Priority is always given to

Statistics on Rice Production and Consumption:

Per capita annual production of milled rice shown in Fig. 3.6.3 stands at 269kg for the nation. However, the whole amount, 269kg is not appropriated for national consumption only due to procurement of seed paddy for coming seasons and post-harvest losses. In Myanmar Agricultural Statistics, 3% of the total production is counted for seed paddy and 4% of that is counted as loss. Other than these, how much rice is consumed for cakes or noodles is not known. Assuming that 10% of the total rice production is appropriated for these manufacturing disposable annual milled rice production comes to 223 kg, or subtracting 17% equivalent to 269kg on the basis without any rice export.

Rice export has been put under the government control, and recent annual export amount is nominal, for example that in 2004/05 is equivalent to only 3.4kg per capita. That is to say, about 220kg or the difference deducting 3.4 kg from 223 kg is estimated for disposable milled rice quantity per capita.

How strong preference for rice people of the Union may have, it is not likely that they annually consume over 180 kg of rice per capita where breast-fed infants are included. It follows that 220-180=40kg annually disappears from the statistics. This difference, 40 kg is equivalent to 15% of 269 kg. If this amount is not illegally traded in the border transactions, it is in fact not conformity with the statistics. In a similar way, on the assumption that 150 kg is taken as the minimum line of annual per capita rice consumption, 220-150=70kg per capita is missing from the statistics. This amount is equivalent to 26% of the above calculated 269kg.

paddy in farmland of the Union that is classified into lowland, but it is not necessarily cropped with paddy every year on account of floods, not enough water, etc. Therefore, paddy land shown in the Figure 3.5.4 means lowland area where paddy cropping is possible but doesn't mean that all the area of lowland is always cultivated under paddy. Thus, the term "lowland" is used in contrast to upland.



TSs falling within Sagaing Division, above all those located near the outskirt of Shwebo, have higher rice production with some TSs famous for their production level of over 1,000 kg on the basis of per capita production of milled rice. Whereas, overall rice production in Mandalay Division remains at a low level except for Kyaukse and Myittha TSs where irrigated paddy has been practiced from ancient times. Paddy cultivation is popular also in Magway Division that is centered in Pwintbyu area where Legaing Village, one of the target villages of the Pilot Project is located. As for rate of between paddy land area and upland field area, many TSs in Sagaing and Magway Divisions are observed where area under paddy (area of lowland where paddy cropping is possible) is larger than upland area.

3.5.3 Pulses Produced in the Study Area

The second priority in the agricultural sector production in the Union is placed on pulses. The reason of high priority may reside in intake of protein from these pulses, but more convincing reason exists in the significance of earning foreign currency with their major export destination targeted to India. The Union of Myanmar has oriented its policy into market-oriented economy since 1989, and in the meantime India has also driven its policy toward economic liberalization in 1991 a few years after the

policy change in the Union. Pulses produced in the Union with cheap labor cost have stronger international competitiveness, and most of them are exported with the principal destination to India. MAS has promoted pulse production by means of the provision of high quality seeds of green gram and chick pea for distribution among farmer producers oriented to the exports during the period 1990s - early 2000s.

New varieties of pulses have shorter cropping duration (however, susceptible to drought because of their earlier maturity). For example, new varieties can be harvested in 90 - 110 days comparing with hitherto chickpea varieties that require maturity period of around 125 days from sowing to harvest. Also in the case of green gram, as against traditional varieties with growing period of 120 days, newly exploited ones are harvestable in only 75 days. In the case of chickpea, since it has hitherto been cropped during winter season as catch crop in paddy land, emergence of export markets is considered to be the maximal driving force to expand production. However, the decisive reason that enabled the introduction of green gram into pre-monsoon season that comes just before main paddy crop in rainy season was the success in breeding of new varieties with shorter growing period. Namely, it is notable that expanded production of these pulses was enabled not by the expansion of cultivated area but by the intensive cultivation.

As to pigeon pea, new variety has not yet exploited. By this reason, traditional varieties that require as long as about 7 months from sowing to harvest are still cultivated. In other words, the fact that growing period of pigeon pea is very long - occupying plots for longer period - makes it difficult to be chosen as cultivated crop lists in very developing developed countries where intensive farming is practiced. Nevertheless, this serves as a background of why the Union of Myanmar has viable international competitiveness on pigeon Later, since 2000 MAS has eagerly pea. recommended farmers to practice mixed cropping of pigeon pea with groundnut/ sesame Also, sorghum with marginal cost etc. effectiveness is sometimes replaced by pigeon pea, but in the case also increased production has been achieved in similar way to the case of other pulses without any expansion of cropping acreage.

Figures 3.5.6 to 3.5.8 shows trend in the production of chickpea, green gram and pigeon pea by division and state, arranged with the beginning year of 1972/73 where 3 colored portion of each column at the bottom give the production in the 3 Divisions - Mandalay, Sagaing and Magway - in which the Study Area is located. As evident from the figures, annual production of chickpea remained at the level of 60 - 100 thousand MT up till 2000/01, but it



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recorded a sharp rise since 2001/02. As to exports of pulses, Figure 3.5.9 provides trends in the exports of total pulses since 1980/81 and Figure 3.5.10 gives exports of chickpea, pigeon pea and green gram that are mainly produced in the CDZ during the limited period since 1999/00.



As evident in the figures, chickpea was not probably exported much before 2000. However, it is likely that addition of chickpea to the export list would have led to rapid expansion in its production since 2001/02 as shown in Figure 3.5.6. Likewise, once recording augmentation of production in 1990s, the production of pigeon pea has again rapidly been expanded simultaneously with the sharp increase in exports since 2001/02. Similar pattern is also observed in the case of green gram, but character of green gram is found in its consistent growth in its production since 1990s (this trend is the same as the black gram produced in the delta).

In brief, the production of green gram has grown in sensitive response to Indian market emerged suddenly in early 1990s. Later, pigeon pea was added to green gram, further chickpea was added to the export-oriented commodities since 2000s. Farmers have thus rapidly expanded their production in quick response to the international market by intensively utilizing their land through the introduction of new varieties with short growing period also with the practice of mixed cropping.

Fast increase in pulse production in the Union of Myanmar, centered in the CDZ, could be a case without example throughout the world even if it were attributable to an exogenous factor, namely absurd emergence of the mass export destination. Besides, the fact that production of pulses least suffered from such detrimental impact as compulsory delivery to the government also has brought a good luck (see the box). Of course, the export market has instable side as well, such as contraband

Government Intervention and Promotion in the Development of Pulse Production:

According to "Liberalization of agro-product marketing and farm economy - from an example of green gram - by Okamoto, 2003, the government introduced a system of compulsory delivery of export-oriented pulses, but failed delivery collection. After all, this institution was eventually abandoned after 2 years' test application.

The result of interview in target villages of the Pilot Project reveals that there found a lot of farmers who did not know the actual application of compulsory delivery system for pulses. Anyway, the fact that such compulsory delivery quota system was tried (in the case of rice, farmers were responsible to deliver their quota at the price of only 1/4-1/2 of market prices), but failed may be considered as a fortunate outcome for farmers and marketing agents.

MAS of the Ministry of Agriculture and Irrigation has played a key role in diffusing seeds of such export-oriented pulses as chickpea and green gram. Of course, similar to paddy, seed recycling is possible at farm level, hence seed business on the basis of private enterprises does not emerge. It is also true that for this reason there is no other means than extending seeds among producers by the government initiatives.

The Union therefore imported pulse seeds from ICRISAT, and then they are put under trial in research centers under the Ministry of Agriculture and Irrigation so that seeds of the varieties adaptable for the climates/soils in the Union can be multiplied for extension. Thereafter, the improved seeds for export oriented pulses were distributed to the farmers from MAS.

measures that were taken by the government of India against purchase of a part of brokers just recently in 2007/8 inside India. Nevertheless, it is no doubt that India serves as a huge export market for the

Union both at present and in future, and pulses are in an important position as cash crops for the farmers in the CDZ where they are much cropped and produced, also as a precious source of foreign currency earnings for the Union itself.

3.5.4 Oil-crops Produced in the Study Area

Oil-crops have the third priority in the agriculture of the Union. As it is often referred to that the nation of Myanmar consume large amount of edible oils, oil-seeds are considered as one of the most important crops (By the way, it is said that cerebral infarction and hypertension are representative lethal causes of the nation of the Union, and this may have a bearing to excessive intake of edible oil). Traditional edible oils consumed in the Union mainly consist of sesame oil and groundnut oil, to which sunflower oil may be added. Sesame production in 3 Divisions in the CDZ accounts for 89% of the total production in the Union, groundnut production does 69% and sunflower production has share of 70% (as of 2004/05, Myanmar Agricultural Statistics, 2006).

Production quantities of sesame, groundnut and sunflower by division and state are given in Figures 3.5.11 to 3.5.13. Almost no increase in production has been observed except sesame during the

900

period from 1980 to end 1990s. In contrast, they have shown sharp rise since 2000. Because the Union has imported large amount of edible oil (palm oil), such an increase in production quantities is not attributable to export driving force as observed in the case of pulses. As an illustration, quantities of sesame exports by destination in 2004/05 given in Figure 3.5.14 show that the exports have been barely 10 thousand MT or so, and this is a negligible size as compared with the output of sesame in



Figure 3.5.15 Trend in Import Quantities of Palm Oil into the Union

80

700

600

400

300

200

12,00

10.000

8,00 ⋝

2,000

108

Quantity 6,000

Expor 4 000 6.06

2.078

Figure 3.5.14 Export Quantities of Sesame by Destination, 2004/05

369

00000 500

Production

2004/05, around 500 thousand MT. In this connection, imports of palm oil, representing imported edible oils, since 1999/00 has annually amounted from 80 thousand MT to 160 thousand MT as shown in Figure 3.5.15.

About 40% on weight basis of crude edible oil can be extracted from sesame seed (utilization data of sesame in 2002/2003 are referred to from Myanmar Agricultural Statistics, 2006). The equivalent of sesame seed quantity estimated by applying this extraction rate required for the import substitution of 160 thousand MT is about 400 thousand MT of domestic production. Production of sesame seed has been at most around 500 thousand MT even in the record crop in 2004/05. This is to say that if imported palm oil of 160 thousand MT is to be substituted by domestic production drive, it is required to raise the output of sesame seed nearly double. This implies how large amount of palm oil is imported by the Union.

Palm oil, imported in large quantity, is cheaper than domestically produced sesame oil, groundnut oils and sunflower oil. For instance, the retail price of sesame oil and groundnut oil per 1viss (1.65kg) in Yangon City in 2003 were 1,751Kyats and 1,821Kyats respectively, whereas that of palm oil was sold at only 1,356Kyats (0.77 times as much as sesame oil). Above all, inhabitants of the CDZ are said to prefer sesame oil because of its favor, but as far as the prices are concerned, no comparative advantage is found among oil-crops produced in the Union, among others those produced in the CDZ.

So far as food constitutes a culture, it is hardly possible to change people's preference in short time by the grade of prices only. By this reason, poor strata likely covert their edible oil consumption into inexpensive palm oil, but medium - well-off strata have higher possibility of continuously utilizing sesame oil. Though the landless poor is inclined to purchase cheap palm oil and mixed oil also in the target villages of the Pilot Project, farm households usually use expensive sesame oil. However, under the current situation where palm oil has enormously been imported, little growth potential remains to expand production of costly edible oil domestically.

Even under such circumstances substantial growth of oil-crop production took place particularly since 2000. Official instruction seems to have been issued from the government through MAS to expand domestic production of oil-seeds aiming at curtailing imports of edible oil (palm oil), in other words saving foreign currency. However, since sesame and groundnut, typical species of oil-crops, have traditionally been cropped, it is uncertain if the augmented output as shown in the figures has been fulfilled on the real ground. In any case, though oil-crops no doubt constitute representative crop commodities in the CDZ, its future prospect would not be rosy judging from their comparative advantages.

3.5.5 Vegetables Produced in the Study Area (Onions as an Example)

The Study Area produces a few vegetable species (In this context, onions and garlic are called vegetables in the Union. What foreigners define as vegetables is called "green leaves" in the Union). Onion is a representative vegetable, and the Study Area accounted for 94% of onions produced in the Union. According to the result of interview in the target villages in the Study Area, many farmers are found who desire to crop onions as cash crop in the villages in Mandalay Division and Sagaing Division that are located near Mandalay City.

Figure 3.5.16 gives trend in the production of onion since 1992/93 by division and state showing fast increase since 1998/99, or earlier by 1-2 years than the increase of oilseeds shown above (Referred to Myanmar Agricultural Statistics 2006, Yangon). Since paddy, pulses and oil-crops are priority crops specified by the Union, they have been incorporated into current extension program, for example "High Yield Promotion Programme". Under this programme, target areas for extension are delineated in which extension wing pays such efforts towards production drive as preference

distribution of fertilizers and seeds in especially for paddy within the target areas.

However, there is so far no information on the priority promotion measures for onions by the government though they are traded in more or less small-scaled markets. In the list of export quantities in 1999/00 and later the annual export amounts of onions have been limited ranging only 1,000 MT (2003/04 and 2004/05) and at maximum around 5,800 MT in 2000/01). This amount is negligible in terms of annual production of 800 thousand MT in 2004/05. Onion is an excellent cash crop suitable to sandy soils and has high priority for the farmers in the CDZ, however, same concern on the incremental rate appears as far as data are concerned.



3.6 Livestock in the Study Area

The Study Area has been known as livestock production area in the Union. Draft cattle, indigenous cows, hybrid dairy cows, sheep and goats suitable for dry zone climate, and also some fowls are reared in the CDZ. The following mentions current status of livestock activities in the Study Area.

3.6.1 Livestock Holding Rate of 3 Divisions against that of Union

In the Study Area, indigenous cows for producing regenerated draft cattle, hybrid dairy cows for milking are also fed in addition to draft (castrated) cattle. Besides, as minor species, pigs, fowls, chicken, ducks and quails for producing meat and eggs are also observed. Figure 3.6.1 shows the percentage of livestock in the 3 divisions against those of the Union. Population in the 3 divisions consists of 34% of the total population of the Union. Those livestock more than the percentage of the population are cattle, and sheep



and goats while pigs and poultries are more or less same as the percentage of the population.

Cattle rate in the CDZ is 49 % that is more the population composition of 34%. This is mainly because draft cattle are prerequisite for tillage and transport in upland as well as in paddy land for those who do agriculture as their mainstay because in this Country little farm mechanization has taken place so far. Sheep and goats are much more existing in the CDZ as posed at 77 % against the population percentage of 34. This is simply because of their nature adjustable to dry land climate.

3.6.2 Economic Status of Livestock in the Study Area

Following Table 3.6.1 shows the composition of GRDP (Gross Regional Domestic Products) by economic activities. Viewing rate composition of livestock sub-sector by division, Mandalay Division gives the highest rate, 5.2% in the related 3 divisions, followed by Sagaing Division representing 4.5%, and Magway Division shows the lowest, 1.6% only. In so far as the composition rate of GRDP is concerned, share of livestock in it is not at all significant. It accounts for only 3.3% in the whole Study Area as compared with agriculture repesenting 50.1%, manufacturing giving 19.8% and construction sub-sector accounting for 14.9%.

Above status is comparable to the fact that livestock share in total national GDP remains in a few percent (5% as the total of livestock and fisheries in 2003/04). Notwithstanding, cattle is indispensable animal in farming, while goat plays a pivotal role of complemental income source for livelihood sustenence of smallholders and the landless households. Taking these into consideration, it can be deduced that livestock plays a role more than its appearance in the regional GDP economy in the Study Area.

Table 3.6.1 RGDP Composition Rate by Economic Sub-Sector in 3 Divisions in the Study Area (2006), Unit: %

Division	Agriculture	Livestock	Manufacturing	Construction	Service	Others	Total
Sagaing	58.0	4.5	15.6	1.9	5.3	14.7	100
Mandalay	43.5	5.2	31.5	4.1	9.2	6.5	100
Magway	52.9	1.6	13.1	25.2	1.3	5.9	100
Total	50.1	3.3	19.8	14.9	4.6	7.3	100

Source: Department of National Planning, Data collected by JICA Study Team

3.6.3 Livestock Holders and Sizes of Herds

Livestock species kept in the Study Area ranges draft cattle necessary for tillage, indigenous cows, hybrid dairy cows, goats, pigs and fowls. Draft cattle are used for cultivation in a pair, both of them are castrated cattle (see photo right). Usually, calves of the age 3 -4 years are utilized for draught after taming them with necessary training. Farm households keep them for cultivation, but some smallholders cannot aford to keep them since a large amount of sorghum harvested from 3 acre would be required for feeding a pair of draft cattle for a year.



On the contrary, even some of the landless keep them for the purpose of lease on rental basis though the number of herds is quite limited. As slaughtering of cattle under the age of 16 years is banned, it doesn't bring any cash income before reaching culling age (despite, cash earning is possible by rental lease and sale). It is not until the cattle reaches culling age that it can be used as the source of beef. Live weight of a draft cattle reaches as much as 500 kg though it varies by region.

Indigenous cows are kept for the purpose of delivering draft cattle for regeneration. However, since it produces milk after the delivery, a part of milk is processed into condensed milk. Other than farm households, some landless households also own them. Also, slaughtering of cows before they reach 16 years is banned. Live weight reaches 400 kg though this has regional variance. Lactation for indigenous cows amounts to 1.5-2 viss/day (2.5-3.3 litre/day).

For milking purpose, hybrid dairy cows are also fed, particularly in Mandalay Division that serves as a center of dairy production where number of farm households living in the outskirts and selling milk has rapidly been increased as market-oriented economy developed since 1988. In such sub-urban villages, milking industry with hybrid cows such as those crossed with Friesian strains (Horstein) are run as almost exclusively full-time enterprise. Since hybrid cows are traded with higher market price, their owning is confined to large landholder farmers and better-off off-farm households. No restriction has been set on the slaughtering age of hybrid cows. Their live weight ranges 450 - 500kg. The amount of lactation is higher than that of indigenous cows, reaching 4-5 viss/day (6.5-8.2 litre/day).

The CDZ is renowned as the producing area of goats. As known to all, goats, above all goats, are resistant to dry climate. They also don't need much tending for feeding and they are easily multiplied by extensive grazing only if the land for grazing is available. Live weight of goats observed in the CDZ stands at about 25kg for female and around 40 kg for male. Twin bearing rate of goats is approximately 40% (according to an interview at LBVD).

Major herd keepers for the goats are relatively poor



strata consisting of smallholders and the landless and the herds are rearing by gazing. Though varieties of goats are variable with area within the CDZ, major purpose of rearing is meat production and no custom of drinking goat milk has been observed. Wool is utilized in processing carpets, but middlemen hardly visit remote area for collecting it. In some cases, it has been wasted in the areas without wool processing unit (according to an interview at LBVD).

Piggery is also run in the Study Area. A part of the piggery is of commercial scale or specialized in stock-breeding production, but it is mostly kept by relatively poor strata who raise 1 - 2 heads for fattening in their homestead. Most of them do not have barn keeping pigs loosely in yards without any concern on quarantine. Some villages have been advised from monks to refrain from keeping pigs by religious reason. However, there is not so rigorous prohibition as ruled in Islamic definition. Even in the villages where people refrain from keeping pigs observing the instruction by priests, there observed many villagers who eat pork meat.

For fowls, chicken and ducks are commonly raised and quails for egg production are partly kept. Chicken are freely kept in homestead yards in every village. They are kept for home consumption except for partial poultry of commercial scale. Distribution of ducks is limited to wetland along creeks etc in the CDZ, where they are kept mainly for meat and egg production. In the areas with year-round water surface, even those who do not have paddy land can raise ducks. Duck rearing is several times as profitable as chicken, leading to a sizable income source. Quails are also raised for egg production, but the scale of their production is small and the production area is also confined. Lately, some villages suffered from damages of bird-influenza where some farm household withdrew its feeding completely.

Following Table 3.6.2 summarizes population of sheep, goats, cattle, pigs and chicken in the Study Area by division. Heads of goats are less in Sagaing Division where annual rainfall is comparatively abundant, vice versa, those of cattle are more observed. Buffaloes have been kept in Shwebo area under Sagaing Division with irrigated paddy land where annual rainfall totals at 1,000 - 1,500mm. Goats are preponderantly kept in Magway Division because of extreme dryness prevailing over the Bago Hills range in the east side of Ayeyarwady River. Oppositely, paddy is commonly cropped in the mountain foot of the mountain range in the west side thereof owing to heavy precipitation where cattle are commmonly kept. The CDZ is well known for higher share of goats and of milk cows on national basis, among others characterized by predomonance of goats amidst the area called "heart of dry zone" in Mandalay and Magway Divisions where dry area vastly extends.

Division	Sheep/Goats	Cattle	Cattle Pig Chicken HHs (head) (head) (birds)		Average Number per HH				
DIVISION	(head)	(head)			11115	Sheep/Goat	Cattle	Pig	Chicken
Sagaing	340,543	1,334,503	263,616	3,531,485	564,582	0.60	2.36	0.47	6.26
Mandalay	616,745	1,169,314	193,061	2,655,410	606,844	1.02	1.93	0.32	4.38
Magway	579,607	1,782,645	467,443	6,427,592	669,481	0.87	2.66	0.70	9.60
Total	1,536,895	4,286,462	924,120	12,614,487	1,840,907	0.83	2.33	0.50	6.85

Table 3.6.2 Livestock Herds in 3 Divisions in the Study Area (2005)

Source: Livestock Breeding and Veterinary Department, Data collected by JICA Study Team

3.6.4 Relationship among Farming Type, Landholding Size and Livestock Composition

As a rule, goat herds are predominant in the areas with leading share of upland, whereas cattle tend to be major species where paddy land area accounts for about 30% or more. The main reason of this general tendency may stem from higher needs for draft cattle in paddy areas to do timely farmig practices such as ploughing where intensive farming with double cropping or even triple cropping in irrigated perimeter is practiced.

Likewise, farm households in paddy area is as a whole better-off than those in upland areas and this entails in higher rate of the households that can afford to keep draft cattle. In contrast to this richer area, land use intensity is lower in the upland areas in the CDZ where most commonly observed rain-fed farming is practiced. Even if cattle were used for tillage in this upland, goats characterized with suitability to cash earning tend to be kept for the purpose of supplementing short income.

Large tracts of irrigated paddy land accompanied by rain-fed paddy land are observed in Shwebo TS

in Sagaing Division, Minbu TS in Magway Division and Kyaukse TS in Mandalay Division located around the CDZ areas with annual rainfall ranging 1,000 - 1,500mm. Draft cattle keeping has served as major livestock activities in these areas in contrast to other dry areas. Further, power tillers are utilized in such leading paddy producing areas as Pwintbyu TS and Minbu TS in Magway Division under the favorable livelihood of farmers because farm production with irrigated paddy as major component has been stable.

In those advanced paddy producing areas, there tends to find less farmers who have to sustain their life with supplemental income from goats rearing and this is quite different from the areas where upland farming, a reprentative form of unstable agriculture, predominantly prevails. Also, agricultural land has for the most part been exploited in these intensive paddy areas, and consequent less room for grazing small ruminants may serve as a reason of less goats herds kept there.

Following Table 3.6.3 below roughly summarizes interrelation between livelihood means of households and livestock holding observed in the CDZ. Viewing this table, while cases of keeping draft cattle for tillage purpose and in addition feeding cows for delivering regenerating draft cattle are observed in large - medium scale farmers, many other cases without draft cattle but with sheep, goats, piggery and poultry for meeting insufficient farm income are also observed in smallholders with 5 acre (2ha) or less.

Household Category	Landholding	Means of Livelihood	Livestock Species
Large-scale farmer	Above 10 ac	Full-time farming or farming + subsidiary (rice milling, retail)	Draft cattle (indigenous/ hybrid cows)
Middle-scale farmers	5 to 10 ac	Farming+Livestock rearing	Draft cattle, (Goats)
Small-scale farmer	Less than 5 ac	Farming+Livestock rearing+Farm labor service	(Draft cattle), Goats, pigs & fowls
Landless	None	Farm labor service, General labor, Livestock	(Goats and fowls)

|--|

Sources: As observed by the Study Team, Note: Brackets in the right-most culumn indicates presense of not holding cases

In other words, livestock feeding is placed in a position as measures coping with low income for the farmers belonging to smallholding strata. Likewise, the landless are most frequently constituting the poorest stratum in rural areas, sustaining their livelihood by wage earning from farming labor services and working in the employed small-scale industries, and in some cases they keep goats as means of risk hedge against ephemeral livelihood.

In the CDZ, especially in upland susceptible to drought spells and short rains, even if a household had held farmland it is difficult to sustain livelihood of a household by only cropping unless it has 8 - 10 acre (3 - 4ha) at least. It follows that it is difficult to hold draft cattle that require 3 acre per pair according to a simple estimation of feeeding them by only self-supplied sorghum. In such a case, alternative means are practiced with lease tillage instead of holding draft cattle by himself. Many examples of resorting to lease draft cattle because of lack of feeding a pair of draft cattle are observed in Myingyan TS in Mandalay Division and Pakokku TS in Magway Division in the Study Area where smallholders with 5 acre or less are dominant. In this context, charge of draft cattle leasing costs around 1,500kyat - 2,000 kyat/ half-day as of 2006.

Since livestock feeding is an important income source for landless households engaged in farm labor that constitute the poorest stratum, cases are observed in which goats are raised, either by herd management contract or by owning herds himself to earn household income. Similarly, in addition to goats herds, some households keep pigs and chicken for a risk-hedging to guarantee livelihood sustenence, and this is another form of poverty coping measures the poor strata themselves can apply. In this regard there might exist many households that cannot buy stocks due to lack of fund, and the result of a PRA survey with 170 sample households conducted in 2006 confirmed that only 17% of the landless held small ruminants.

Income

3.6.5 Positioning of Livestock in Livelihood

Agricultural productivity as major means of livelihood is always unstable in the CDZ with scarce and unreliable rainfall. By this reason domestic animals serve literally as "live bank (=livestock)" that can quickly be cashed whenever need arises. As a farm household needs a pair of draft cattle for such farm practices as ploughing, many of middle to large-scale farmers hold them. However, these draft cattle are sold once crop income becomes null or greatly reduced on acount of droughts to tide over the pressing need. Draft cattle are not necessarily owned by all farmers but those without draft cattle (usually small-scale farmers with 5 acre or less) plough their land by borrowing draft cattle from those who own them. Here, the draft cattle can bring cash income in the form of rental cattle to their owners.

Milk production with indigenous cows/ hybrid ones enables holders to earn constant daily cash (400kyat/viss as of September 2007) for about 250 days though the amount of lactation is quite limited, leading to many households who wish to hold them. According to an interview by the Study Team, villagers give a rank of middle to the status of livelihood of households that hold dairy cattle. Whereas, livestock held by the landless is mostly goats, but those who hold goats are ranked below those who hold cattle, and villagers often deem them on the whole "worse-off". A type of contracted management of goat herds by herd holders exists. Entrustees are mostly the landless, who can get 50% of offspring born during his/her entrusted management, and can multiply the herds and in some cases they become owners of a large herd.

Table 3.6.4 below processes the result of a questionaire survey on household balance of 170 sample households conducted in 2006 into the dependency on livestock income by livelihood type form. Comparing the farmers of different farming type, upland farmers have the highest dependency on livestock income (mostly goats), evidently higher than upland + paddy farmers representing 11% or than farmers specialized in paddy with 9%, implying that supplementing rain-fed instability with livestock. On the other hand, viewing the landless, their income from livestock constitutes 34% of all income, suggesting their heavy dependency on livestock.

	Gross Household Income (kyat/HH/year)									
Items	Agriculture		Livestock		Others(wage etc)		Total			
	Amount	%	Amount	%	Amount	%	Amount	%		
Upland only	216,902	50.5	74,903	17.4	137,871	32.1	429,676	100		
Upland + paddy field	572,100	75.6	82,038	10.8	102,200	13.5	756,338	100		
Paddy field only	1,170,600	82.2	124,480	8.7	129,200	9.1	1,424,280	100		
Landless	0	0.0	122,957	34.3	235,978	65.7	358,935	100		

Table 3.6.	4 Status of Live	estock Income	in Major	Livelihood	Means

Sources: questionnaire survey in 2006, sample of total 170 households in 17 villages by the JICA Study Team

3.6.6 Actual Holding of Draft Cattle and Utilization Thereof

Table 3.6.5 below summarizes the result of 90 sampled households holding draft cattle extracted from the questionnaire survey to the villagers conducted by the Study Team in 2006. By this result the following general outlined can be extracted: 1) All the farm households with 10 acre or more own draft cattle, where average cattleholding is calculated at around 8 (4 pairs), 2) About 3/4 (accounting for 73% of the total sample) of middle-sized ones hold them where mean herd comes to about 6 (3 pairs), 3) About half of smallholders with less than 5 acre hold them with their mean, 3.5 head, 4) even small portion of the landless hold draft cattle (about 9%).

	No. of HHs Interviewed		HHs owning	Draft Cattle		HHs without Draft Cattle					
Farm Size		No. of HHs	%	Number (head)	Average (head/HH)	No. of HHs	%				
Above 10 ac	25	25	100	203	8.1	0	0				
5ac<, =<10ac	11	8	73	47	5.9	3	27				
below 5 ac	31	15	48	52	3.5	16	52				
Landless	23	2	9	17	8.5	21	91				
Total	90	50	56	319	6.4	40	44				

Table 3.6.5	Status of Draft	Cattle Holding I	by Scale of	I andholding
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Source: questionnaire survey by the JICA Study Team in 2006

It is found that the average number of draft cattle by a farm household is 8.1 head for large farm, 5.9 for middle farm, 3.5 for small farm, indicating decrease of cattle heads in parallel with land holding size. From the viewpoint of farm households without draft cattle, even 27% of middle farm households or around 1 out of 4, and 52% of smallholder farm households or about 1 out of 2 do not have them and cultivate field by rental draft. In this connection, 2 households of the landless hold draft cattle for the purpose of rental service out of 23 where the mean heads per household stands at as many as 8.5 almost equal to that held by large-scale farmers with 10 acre.

The table right shows input of draft cattle to representative cropping. Working hours of draft cattle in a day is at maximum 3 - 4 hours in cool morning hours, while the unit used here terms drafting practice during 7 AM to 11 AM as 1 shin. As the input to sorghum production for a feeding material of cattle does not bring any cash income, it is only 2 shin/acre the lowest and the most extensive of all. Whereas, that to the staple paddy comes to 8 - 9 shin/acre, and

Table	3.6.6	Input	of	Draft	Labor

Crop	Draft Cattle (shin/ac)
Paddy	8-9
Chili	3-8
Sesame	3-6
Sorghum	2
Onion	14

Source: interview survey by the JICA Study Team in 2006

that to profitable chili ranges 3 - 8 shin/acre though highly variable. The input of draft cattle to sesame also varies from 3 - 6 shin/acre and the variance is considered attributable to the difference in crop management intensity including weeding with site by site variation depending upon topographic conditions and farmers' intensity of farming.

3.7 Small-Scale Industries in the Study Area

3.7.1 Historical Background in the Development of Small-Scale Industries

Bamar race is said to have immigrated from inland part of China to the south around 7th Century and have settled in Kyaukse region located at about 40km south of Mandalay City. Kyaukse region is situated within the CDZ, and there irrigated paddy cropping is told to have been practiced from ancient times since the region has alluvial fans and terraces ascending up to Shan Plateau.

Later, Bamar race is said to have left Kyaukse region as population pressure had risen immigrating towards down-stream through Ayeyarwady River. Thus, Bamar race maintained and expanded a united organization composed of localities under in reign of each chieftain, developing until it formed the united Pagan Dynasty in the middle of 11th Century. Bamar Kingdom that established a united dynasty in Pagan continued its expansion policies until the beginning of 19th Century.

In the meantime, industries including handloom weaving for paying tribute to dynasty court had developed. In addition to this weaving, some villages held such vocational groups of plasterers and carpenters. These traditional industries can be observed almost all villages in the CDZ even nowadays, but among others they have been popular in the villages along the route from Mandalay to Bagan. In short, such historic evolution suggests us that the traditional cottage industries have been developed in line with the developing process of the dynasty.

The Pilot Project is under-way in 6 villages in 2007, and all these villages are engaged in small-scale industries that are so-called cottage industry. They range from handloom weaving with a consistent process starting from manual cotton ginning (a work to separate cotton yarn from its seed) through thread spinning to final weaving, to stonework providing stoneware that was originated more than 100 years ago (see the photo above), making us sense of historical time-span of local small-scale industries. Observing manual spinning, thread is spun with pure cotton lint (therefore susceptible to get cut away) that is not



Figure 3.7.1 Establishment of Dynasty and the Route of Transfer of Traditional Industries



Manufacturing of Mortars Using Quarried-out Sandstone



woven along leading thread (industrial thread), implying that the process needs fairly skilled/ refined expertise (see the photo below). The thread is dyed with pigment (nowadays using in many cases with industrial dye) and finally woven into longyi (a kind of waistcloth) and shoulder-bags, etc. Their markets are located in the villages and outskirts of nearby townships.

3.7.2 Recent Development of Small-Scale Industries

In these years, machinery and various indusrial materials have been flown into the Country particularly from China, fostering the growth of such small-scale industries that require purchased materials as sewing and hardware processing in addition to old-fashioned handloom weaving from ancient times at least in the villages around Mandalay City.

Besides, a lot of small-scale industries developed have been including woodcarving, masonry carving, wooden furniture processing, ratan furniture processing, bamboo products processing, basket weaving with palm leaves, copperware processing, porcelain pottery ceramics, jaggery production, lacquer ware processing etc, according to the result of interviews in the office of Department of Small Industry under the Ministry of Cooperative located in Mandalay City. As an example, situations of small-scale industries in

Small-scale Industries in Mon Yway Kyee Mon Village in Monywa TS:

- Scissor making by grinding waste reinforced iron: Out of the visited two households, a household is engaged in scissor making and selling where father and his son make 12 scissors a day and sell them at 1,700Kyats per pair. Net gain is 300Kyats per pair. In the other household, 4 people are engaged in scissor making producing 30 pairs a day earning net profit of 2,000Kyats a day.
- 2) Twisted yarn making with fragment cloth: twisted thread made of cotton and polyster yarn is processed by buying fragment cloth at the cost of 350Kyats per 1viss (1.64kg) and arranging colored thread. Net gain per month amounts to 100 150 thousand Kyats.
- 3) Blanket processing with cotton refuse: The visited factory employs 100 villagers. It pays 900Kyats for male and 500Kyatsto female worker per day.
- 4) Slipper making with used tire: 4 people provide slippers by purchasing used tire paying 3,000Kyats per tire and making 100 pairs of slipper per day from 5 used tires. Net profit of 500 1,000Kyats per tire is gained, amounting to 150 thousand Kyats per month.
- 5) Fried broad bean: 20 laborers fry broad bean harvested in their village. They earn net profit of 5,000-10,000 Kyats per day where rice husk, groundnut husk and tyres are utilized for cooking fuel.
- 6) Manufacturing mattresses made of cotton and pillows: 5 family members and 15 employers are engaged in the manufacturing in the visited factory. During peak production period falling in March and April, they treat 10,000-15,000viss of cotton. Annual net profit comes to 1 1.5 million Kyats. Initial investment to the factory amounted to 500 thousand Kyats. According to the factory keeper, 10 families are engaged in the same industry in the village.

Mon Yway Kyee Mon Village in Monywa TS are summarized in the right box, from which it is understood that routine devices such as recycling of waste materials are conveniently applied to their small-scale industries.

As small-scale industries related to agriculture, rice mills have been developed in the villages. Compulsory delivery quota of rice was mitigated in 1989, then it was completely abolished in 2003. This must have fostered the evolution of surplus gained from paddy farming. At present, small-scale private rice millers that are in many cases run by well-off farmers have emerged in the villages specialized in paddy production. Rice milling had long been under the monopoly of state enterprises in the Union, but now many private rice millers participate in the milling activities.

Table 3.7.1 below indicates numbers and milling capacity of both state-run rice millers and registered private rice millers where the total milling capacity of private millers exceeds that of state-run rice millers by more than twice. In this concern, number of registered private millers as of 2000/01 was counted at 462 enterprises in the Union (122 enterprises in total 3 Divisions). It means that around more than one small-scale rice millers exist per village specialized in paddy farming. Judging from this number the table below likely includes only larger-scale registered millers. In any case, rice milling is run as a small-scale industry in paddy producing areas.

Division	State owned Privately owned		Total			
	No.	Capacity	No.	No. Capacity		Capacity
Sagaing	6	120	68	1,610	74	1,730
Mandalay	-	-	39	590	39	590
Magway	2	40	15	270	17	310
Whole Country	68	5,308	462	12,347	530	17,655

Table 3 7 1	Rice Millers Owned by	MAPT and Private Riv	no Millors (as of 2000/01)

Note: Capacity= tons/8hr, Source: MAPT (Myanmar Agricultural Produce Trading)

Small-scale industries are also found in livestock sector. Most commonly found industry in the CDZ is condensed milk processing, ranging from family-run small-scaled ones to large-scaled ones run by private enterprises. Most frequently observed one is condensed milk processing run by a family where hybrid cows, crossed indigenous cow specie with Friesian, are milked and then milk is gently boiled for many hours to produce condensed milk (see photo right). Condensed milk is used mixing with tea for routine drinks.

In addition, cream separated by means of churning equipment is processed into butter. In some villages small-scale sausage processing from pork/ poultry meat is run. Dried mutton / beef are also included in the repertory of small-scale livestock product



of ceramic bath tub (using stalks of post-harvest pigeon pea residue)

processing in the CDZ, but from hygienic aspect slaughtering is allowed only for the licensed butchers except for poultry.

Enterprise-based small-scale industries run in township and large villages have been registered in the office of Cottage Industries Department under the Ministry of Cooperative. Though they are registered as "small industries", they have in fact larger scaled operations in the aspect of output/ number of employees in comparison with small-scale industries run as cottage industies in villages. According to Promotion of Cottage Industries Law, enacted in October 1991, small-scale industry is defined as "production, repair, maintenance and service business carried out jointly and in a small size by family members and employed laborers". It is in more detail termed as 1) minor scale industry with mechanical power not exceeding 3 horse-power or with manual labor not exceeding 9 employees, or 2) handicraft business (no limitation as concern number of laborers).

Small-scale industries run in the CDZ are summarized below, and as mentioned above, they are confined to registered enterprises; that is to say, small-scale industries run in townships and comparatively in large villages, however those like cottage industries in small villages are likely excluded from the list

	Business Category	Sagaing Division	Mandalay Division	Magway Division
1.	Aliment & Potable Water	20	115	13
2.	Textile and Garment	34	173	16
3.	Construction / Architectural Materials	0	17	0
4.	Personal Utility	5	40	12
5.	Family Appliances	0	3	2
6.	Printing /Publishing	1	17	1
7.	Industrial Materials	1	14	22
8.	Metal Ores & Petrol	25	9	4
9.	Agriculture	2	4	0
10.	Processing Machinery and Equipment	4	21	0
11.	Transport and Vehicles	6	39	8
12.	Electric Appliances	3	15	0
13.	General Industrial Produce	225	852	68
	Total	326	1,319	146

Table 3.7.2 Registered Enterprises to the Department of Small Industries in 3 Divisions (as of March 2006)

Source: Department of Small Industry, Upper Myanmar Office, Mandalay

Summarizing small-scale industries in the CDZ, it can be mentioned that small-scaled industries of cottage industrial type, with their markets targeted within villages or nearby townships such as weaving oriented more to self-supply or sewing by the use of few sewing machines are run in almost all villages in the CDZ. They include wide variety of business activities such as manual weaving with its historic background origin of dynasty era, stoneware, lacquer ware and jaggery. Expansion of scale in these industries is taking place in the outskirt of larger townships – for example nearby Mandalay City – where access to materials is easier. As an example, mechanical weaving making use of engines has shown up.



Some villagers try to establish new type of small-scale industries like rice milling by investing the surplus gained in agricultural activities, or others try to enlarge the scale of existing industries that has so far been confined in the scale of cottage industry. Also, it is known that the rate of landless farmers is higher in the rural areas of the Union including the CDZ, and small-scale industries offer hiring opportunities to these poor villagers.

3.8 Rural Society in the Study Area

This sub-chapter discusses the rural society in the Central Dry Zone from available references, published document, and also a baseline survey. This Study carried out a baseline survey in 6 target villages for the pilot project implemented in 2007/08. A total of 419 households were covered by the baseline survey, divided in the 6 villages. A prescribed questionnaire asking household structure, income & expenditure, debt situation, frequency of eating meat/ fish, etc. was administered in 2007/08. 'Chapter 3.8.1' presents the result of the baseline survey.

3.8.1 State of Villages in the Study Area

Village Tract is the smallest administrative unit in the Union, as stated above, and usually includes about 3 villages as average. Rural people usually inhabit in densely aggregated way though in some cases a hamlet with few houses are found isolated from normal villages on Bago Hills, probably because the inhabitants have to cater for isolated farmland. Villages are normally located in somewhat higher elevation where the entire village site is surrounded with fences in the same way as each homestead is bordered with fences. Village fences are made from live shrubs and split bamboo. Some fences of village borders have gates.

The overall shape of a community area can be overviewed whenever we move from Yangon City to Mandalay City by air, and many of them have round shape near a circle. Passage networks within a village are well structured in checked alignment where houses are neatly aligned along the roads. Normally, inhabitants who live in semi-arid area, among others those who hold livestock herds tend to limit the size of a natural village within several ten households per village in order to procure certain area of grazing space. That is to say, they are apt to form the smallest administrative community composing of a few small-scale, sparsely distributed natural villages. In any case, however, the habitation form observed in the Study Area is not the same one found in the semi-arid areas but undoubtedly identified as a densely flocked community typically found in farming ethnic groups in Asian monsoon zone.

At the outside of a community, monasteries are located surrounded by separate fences that are in many cases made of bricks and it can be said that the most magnificent building in a community is unexceptionally monastery. Besides, almost no exception, a couple of pagodas have been established in a village. It is well known that people in the Union are religious. Even poor families are strong in faith by offering alms of rice, vegetables and others in reply to monk's mendicancy as routine practice. While outsiders are surprised with their strength in faith, at the same time they are also amazed by higher carrying capacity as the whole village in the context of development potential.

As an illustration, there exist 18 temples in Legaing Village, a target village of the Pilot Project in 2007/08 where 40 monks and 3 nuns are getting along (as of July 2007). Legaing Village is a relatively large community where about 770 households are found. The village is situated in favorable conditions where paddy can be cropped twice a year, simultaneously where 18 households support one monk as average. This situation can be found in almost all the villages in the CDZ, as exampled in other target villages of the Pilot Project in 2007/08 e.g.; in Ar La Ka Pa village, every 15 households support one monk in case of minimum amongst the 6 pilot villages while Khaungkawe village 24 households do a monk in case of maximum.

In addition, it was clarified through the baseline survey conducted in the target villages of the Pilot Project that the item "donation & ceremonials" is included in the expenditure items of the villagers, in which 30,000Kyats (equivalent to about 22\$ at market exchange rate as of September 2007) - 50,000Kyats (equivalent to about 37\$) are expensed by majority of the villagers. It was also found that a villager annually contributed to alms by spending at maximum 300,000Kyats (equivalent to

about 220\$). Though livelihood in the areas of adverse conditions like the CDZ must be very rigorous, the CDZ still has potential enough to keep carrying capacity that enables inhabitants to support their religious belief (in this connection, the share of charity & ceremonials on the total annual household expenditure at the Union level is shown in the box right).

As regards the structure of a village, a leader of a group of 10 households exists taking care of the 10 households. The leader is ordinarily selected out under an agreement of the related households without any election because they have a solid society. Then, a leader of a group of 100 households also exists among the relevant households where the 100 HHs leader is not from the 10 HHs leaders, but different personnel. Since 770 households are counted in the above referred Legaing Village, 77 leaders for groups of 10 households and 8

Charity & Ceremonials of Myanma:

Central Statistics Organization conducted "Household Expenditure and Income Survey" in 2001 selecting 75 TSs located in 14 divisions and states throughout the Union as samples of the survey.

According to the result of this survey, the item "charity and ceremonials" accounts for the following share out of the total household expenditure:

The whole sample :4.4%Of which, townships :5.3%Of which rural areas :3.9%

In this regard, expenses of rice, vegetables etc offered as alms to mendicant monks are not included above expenditure, but separately counted in the cost of aliment.

leaders for groups of 100 households have been elected. Most leaders in the target villages of the Pilot Project are farmers, probably categorized into medium-scaled to lead-farmers judging from their costumes and countenances. Some of them understand English language at the level of greetings and some extent of daily conversation.

Village chairmen are appointed by the superior agency, PDC at TS level among leaders. Current political power introduced a qualification since 2006 that village chairmen should be graduates of universities (this information was obtained through interviews at the villages but not yet identified on documents). By this reason, all the village chairmen except one whom the Study Team is allowed to visit have been chosen from younger generations (if there is no university graduate in the village, chairman can be selected from hitherto aged leaders). In many cases, leaders of groups of 10 households and those of groups of 100 households are aged ones, and these aged leaders are main respondents during interviews but in many cases young village chairmen abstain from getting involved in the interview sitting only in the rear seats. It seems that the attitude of paying respect toward the aged prevails among young generations that is very often observed in Asian society.

PDC established at the Village Tract level consists of the village chairman and a few leaders, and their role is similar to that of PDC at the Union level, that is keeping public order and developing activities in their village. The major role of groups of 10 households and those of 100 households linked with PDC is to inform and deliver messages from VT chairman attended to the meeting that is held once a month at PDC at TS level to the related village households.

Besides, they play leading roles in various events in their village. Principal events held in the village relate to religious activities. They lead and mobilize related households into such activities as repairs and new building of temples and pagodas and act as promoters of collecting contributions. In addition, they act as voluntary arbitrators of strife – difficulty in debt repayment, divorce, quarrels etc – though these are not their formal duties as leaders. Such mediation has another dimension, rather voluntary private contributions since they are recognized as cadres or care takers in village society.

Not only in the Study Area, but also in most villages there do not exist any organizations or groups engaged in routine development activities and this is a typical and common character found in the communities of the Union. A host of donors addresses to poverty reduction through MDG initiative in LLDCs wherein they often adopt grouping as means of approach to the target inhabitants. As a result, many donor-oriented groups - in essence supply-driven groups since grouping is arranged

assuming input is brought about - have been established.

Within the Study Area, women group established in the course of the activities by a part of donors including UNDP etc and the group managing micro-finance already exist. However, except for these small groups, no example of established group is so far observed in most villages where a group is formally registered participating in development activities, and is sustaining its routine activities except Women's Affairs Association.

Women's Affairs Association is a nation-wide organization (where the First Lady takes the chair) and in the case of Legaing Village 300 women have membership of this association (accounting for about 40% of the total village households). It is explained that the association is engaged in development activities in the villages, for example campaign for preventive vaccination towards children and expected mothers in which health stations play leading role, dispatch of proxy for teachers in case of shortage of teachers in primary schools to which village children commute (villagers who graduated from university are proxy for teachers), persuasive efforts towards the families with non-enrolled children, collection of contributions as need arises etc.

Judging from these above services, the functions of the association closely resembles those of Women Associations often found in rural areas in Japan. Other than the association, no particular group engaged in development activities exist. Once need arises to develop the village - the term "construction works" is considered appropriate - ad hoc grouping would be made among village chairman, leaders of 10 households or 100 households so that the group take initiative for implementing villagers' collective works.

3.8.2 Household Baseline in Selected Villages (for the 6 Pilot Project Villages)

A baseline survey was carried out from mid August to October 2007, covering 6 villages where pilot projects in 2007/08 had been implemented. The objective of the survey is to grasp baselines for the villagers including income and expenditure. JICA Study Team prepared questionnaire for the survey, which had been administered by local staff to village chairmen, village leaders who are regarded as key informants, sampled villagers, etc.

Questions asked are population, farm land, farm household number, off-farm household number, cultivation area, farm land by acreage, crops cultivated in the village, cottage industry in the village, electrification, diseases prevalent in the village, etc. For those who own landholdings thereby regarded as farm household, such items were questioned as farm area by crop, yield by crop and by harvest index, farm management issues, income and expenditure, etc. For those who are deemed as non-farm household, their income source was mainly asked together with expenditure.

Sample numbers are 228 for farm household and 191 for non-farm household, totaling to 419 households. Out of the 191 non-farm households, daily wage farm labors are 67, those who mainly earn from livestock are 11, and those who are mainly engaged in cottage industry are 16 for employed and 69 for self-running, and then others such as government officers, teachers, etc. are 28 households. Sample by village and by the main income source is listed in the Table 3.8.1. Sampling was randomly done.

	Farm	Non Farm Household (Landless)						
Village	Farm	Casual	Livesteck	Livesteek	Cottage Industry		Othere	Total
	Householu	Farm Labor	LIVESIOCK	Employed	Self-running	Others		
Mingan	11	0	0	2	8	1	22	
Magyi	41	2	2	0	5	-	50	
Khaungkawe	29	1	2	5	9	2	48	
Ar La Ka Pa	76	17	4	6	23	13	139	
Ma Gyi Sauk	31	9	1	1	5	6	53	
Legaing	40	38	2	2	19	6	107	
Total	228	67	11	16	69	28	419	
% b/t FHH & Non FHH	E A	46					100	
% b/t FHH & Non FHH	- 54	16	3	4	16	7	100	
% among Non FHH	0	35	6	8	36	15	100	

Table 3.8.1 Summary of the Samples Surveyed

Source: JICA Base Line Survey 2007

1) Family Structure, Age Cohort and Education

As seen from Table 3.8.2, average family member per household ranges from 4.9 at Legaing Village to 5.6 at Ma Gyi Sauk Village with overall average of 5.1 for the 6 villages. Average age of husbands is 49.0 years old while that of wife is 47.0 years old. Average number of children for boy is 1.2 and that of girl is 1.3, which gives 2.5 as average number of children per family. As seen from the table, they run nuclear family as does Bamar race commonly.

Figure 3.8.1 and Figure 3.8.2 show the age cohort for male and female of the sampled household members respectively. As shown in the figures, there may be two points to mention; 1) reduction of age groups of 40 - 49 and 30 - 39 for male, and 2) big reduction of the number for children's age group,

0 - 9 year age. The former may be attributable to off-house working which is common in rural areas of CDZ, while the latter to reduction of the children's number per family which may have been supported by family planning though the extent is not exactly known.

Figure 3.8.3 shows the final education level by husband and by wife, namely by gender. As one may see, the lower level of education the more wife finished, while the higher level of

Table 3.8.2 Family Structure of the Samples Surveyed

Village	Persons/	s/ Age Av		Average of the children's number by household		
	пп	Husband	Wife	Male	Female	Total
Mingan	5.2	49.3	48.9	1.1	1.4	2.5
Magyi	5.5	52.1	49.4	1.4	1.4	2.9
Khaungkawe	5.4	47.0	44.2	1.2	1.3	2.5
Ma Gyi Sauk	5.6	50.1	47.8	1.5	1.4	2.9
Ar La Ka Pa	4.9	48.8	46.9	1.0	1.3	2.3
Legaing	4.9	47.9	46.5	1.1	1.4	2.5
6 Villages	5.1	49.0	47.0	1.2	1.3	2.5

Source: JICA Base Line Survey 2007





education the more husband finished. Also 9 wives out of total 382 sampled wives have not received any education though no such case can be found in case of husband. Nowadays, it is said that there is little gender imbalance between boy and girl education, however as far as parents age cohort is concerned, we can see gender gap in education level.

2) Income by Social Stratum

Figures 3.8.4 shows average annual household income by farm HHs and non-farm HHs for each village. Figure 3.8.5 further elaborates the annul household income by their main income source as such that farm labor, for example, means the biggest share of his/her income comes from farm casual labor engagement, livestock means the biggest share of his/her income comes from livestock raising, so on so forth. Figure 3.8.5 clearly shows that farm household income is bigger than that of non-farm household in any of the villages, with an average of 1.56 million Kyats per household per annum for farm household as against 964,000 Kyats for non-farm household. Figure 3.8.5 implies that the poorest villagers may be in the stratum for those who are engaged in farm casual labor works. In most of the cases, farm labors' income is smaller than the others.

Table 3.8.3 shows their household income in relation to the education level of husband. Of the total valid reply of 384, 221 (58%) respondents finished their final education in primary or in monastery, while 163 (42%) respondents finished in higher standard than primary level. There is not always clear relationship between the two indicators. However one thing clear is that as far as average is concerned those who had attended only primary or monastery school earn less than those who have attended more than



Figure 3.8.4 Annual HH Average Income by FHH & Non-FHH



2.9.2 Huchand Education vo. Family Inc

Education for Husband	Av. of Family Income (Kyats/year/HH)
145	1,295,574
0	-
0	-
13	751,088
63	1,024,668
221	Average 1,227,008
19	1,202,132
11	1,834,673
24	1,070,527
23	1,956,950
15	1,312,043
28	1,719,113
43	1,645,051
163	Average 1,656,301
384	Average 1,441,165
	Education for Husband 145 0 0 13 63 221 19 11 24 23 15 28 43 163 384

primary school. The average income for the former is 1.2 million Kyats while that of latter is 1.6 million Kyats per household.

3) Income by Household Member

Bamar race establishes a nuclear family when they get married. Hence, husband, wife and children are principal household members, besides, their parents also consist of the member in some cases and even their relatives abide under the same livelihood in a few cases. Livelihood in a household is roughly divided into the income (with its sources) and the expenditure. Here, the breakdown of the latter, expenditure into each member is not very significant since expense for food covers 63% (in the case of farm households) - 71% (of non-farm households) of the total household expenditure

according to the baseline survey. On the contrary, it is often possible to obtain the breakdown of household income by its members. In this context, it would be relevant to interpret income from farming, animal husbandry and remittance as that derived from the members as a whole rather than specifying their sources into particular individual members.

Figure 3.8.6 shows the annual household income by its members/ activities in an average farm household (222 samples were referred to). The database of this figure stems from the result of the baseline survey in 2007/08. The farming income is dealt as an income earned by the members as a whole. The figure reveals that income from non-farming origins contributes very little portion in a farm household income. There is an income for the husband from small-scale industry he



himself runs (see 2nd bar chart from the left), and all other incomes than this, earned by other household members are in fact negligible. In this figure, income of the wife remains lower level than that of her daughter. However, the wife's contribution may have been recorded as a part of that of the cottage run by the husband.

Figure 3.8.7 shows the annual household income by its members/ activities in a standard non-farm household (190 samples were referred to). It indicates outstanding share of the husband's income, in particular that from a small-scale industry he engages in contributes much. Income of the wife follows that of the husband, but its share is only about a fourth thereof. Here also, the same reason as stated above for the farm household income is



conceivable in its background. In other words, both husband and wife run their small-scale home-industry in very many cases though the income is generally reported as the income of the husband.

Figure 3.8.8 presents income and its sources by household member in a typical farm laborer's family (67 samples were referred to, and here, the farm laborer's household is termed as that in which wage earning by farm labor has the largest share in its livelihood. Also, samples classified as non-farm household include those of farm laborers.) As shown in the figure, the income by the husband has the



largest share, followed by that of the daughter and the wife. In this concern, labor wage per diem for a male laborer is around 1,000 Kyats, while that for a female one is only 700 - 800 Kyats, or $70 \sim 80\%$ of that of a male laborer.

Namely, as far as the income from farm labor wage is concerned, that earned by the husband (or father) amounts the highest, while the daughter is engaged in farm labor services for almost the same or somewhat less days only as that engaged by her father if the days are estimated based on the above cited rate of labor wage per diem (where the rate of earned amount by wage is 67% for daughter's wage income). Since weeding and harvest are of delicate practices, employers tends to prefer female laborers to male, and this tendency possibly reflects in the annual working days of daughter's farm labor that is comparable to her father's.

Income from animal husbandry and remittance are dealt as the income as the whole household member in any of the above 3 figures. It is non-farm households where the income from livestock has the largest share in their annual livelihood (amounting to 90,000 Kyats/HH), followed by farm household (65,000Kyats/HH), while that of farm laborer's households remains in the lowest share (72,000Kyats/HH). The reason why share of remittance is larger in non-farm households than in farm household might be interpreted as the children in the former household do not have farmland (leasehold right) for their farming and as a result they cannot help leaving households seeking for casual labor earning in and out of their village.

4) Trend of Income and Expenditure through a Year

Figures 3.8.9 – 3.8.11 show the trend of income and expenditure by such social stratum as 1) farm casual labor household, 2) paddy farmer household, and 3) upland farmer household respectively. Figure 3.8.9 shows that typical farm casual labor household can earn more in 2 times a year as farm preparation period and harvesting time. The former takes place in June – August, corresponding to the beginning of rainy season, and the latter is in November and December. Their expenditure pattern shows 2 peaks such as in April and November. There is New Year cerebration in Myanmar in April, spending some items including cloth for the cerebration. Expenditure in November is corresponding to some ceremony, including donation, associated with harvest.

According to Figure 3.8.10, the typical paddy farmer household spends much in June and July for the preparation of rainy season paddy. As we can see, expenditure on labor and farm input becomes very

high in June and July while in December expenditure only on labor becomes high since winter crop, mostly chick pea, does not require chemical fertilizer. Their income starts appearing in December corresponding to the harvest of rainy season paddy, then continues till next year probably April to March depending on how long he can keep the paddy and also how much he can produce winter crop following the rainy paddy. Their debt usually starts in the season of rainy paddy preparation, and continues until harvest.

Figure 3.8.11 shows even income than paddy farmer because most of upland farmers cultivate 2-3 crops by mixed cropping, e.g. groundnut/ sesame with pigeon pea, and also by relay cropping. Thanks to that system, their income



becomes slightly even throughout year than paddy farmer household. The expenditure pattern is very much affected by preparation of rainy season crop and winter crop, similar to paddy farmer household. Their debt may start as early as in April, corresponding to New Year cerebration, and keep a constant level probably until July/ August. In August, harvest of early upland crop, like sesame, can be started thereby reducing the debt amount.



5) Crop Production by Village

Figure 3.8.12 shows sesame production by village and by harvests indexes such as 'almost nothing', 'worse', 'average', and 'better' according to the farmers' perception. Looking at the harvest that the

respondents replied as average, one may recognizes that the harvests for such three villages as Mingan, Magvi, and Khaungkawe are much lower as 3.2 to 3.7 baskets per acre than the ones in other 3 villages. Harvest in Ar La Ka Pa Village is 6.5, 5.7 in Ma Gyi Sauk, and 6.6 baskets per acre in Legaing Village. It may be noteworthy that there is nearly about times production difference two between the former villages and latter villages though all these villages are located in CDZ.

Likewise, Figure 3.8.13 shows paddy harvest by village and by harvests indexes such as again 'almost nothing', 'worse', 'average', and 'better' (in Khaungkawe and Mingan Villages, no paddy data available because of its tiny cultivation area). Paddy harvest in Legaing Village, which is located in



favorable agricultural condition, is the highest thanks to the irrigation, reaching to 70 baskets per acre as average and over 80 baskets per acre in case of 'better'. Paddy harvests in Magyi village is the lowest because all the paddy cultivation is practiced under rainfed, while that of Ar La Ka Pa is in Kaing/Kyun area of Ayeyarwady River and paddy field in Ma Gyi Sauk is partly irrigated by a pumping station operated by Irrigation Department.

6) **Debt in Villagers**

Unable to make ends meet leads to borrowing money. Borrowing money is very common phenomena in almost all villages in CDZ. Commonly applied interest per month is 5% with collateral, and without collateral it is around 10% and in few cases it goes to as high as 20%. In general, the interest for government loan is the lowest, which 2.6 % per month (see Table 3.8.4).

Table 3.8.4 Interest per Month						
Lender Interest (%)						
With Collateral	5.3					
Without Collateral	10.0					
From Government	2.6					

Source: JICA Questionnaire

Borrowing money is practiced for many villagers 300.000 Debt Amount, Kyats/household regardless of him being farmer or being non-farm 250.000 household. Figure 3.8.14 summarizes the 200,000 situation of debt, in that we can see the average 150,000 debt amount for the 6 villages at about 230,000 100,000 Kyats. The highest debt amount can be seen in farm households (about 270,000 Kyats) while the

lowest debt amount in casual farm labor

necessarily mean that the casual farm labors are

in little debt but rather it implies that they cannot

households (120,000 Kyats).

access to enough loans.

50,000 Average 0 Farm HH Non Casual Livestock Cottage Others 6 Villages Farm HH Farm Labo Figure 3.8.14 Average Debt Amount by Occupation

Figure 3.8.15 shows the percentage of debtors for farm household by village while Figure 3.8.16 depicts that of non-farm household. Average ratio for farm household debtors is 64% while that of non-farm household debtors is 58%, not much different between the 2 groups. The figures also show debtors by occasionally or regularly. One thing notified is there are less regular debtors in farm household than in non-farm household. This means that non-farm household cannot help borrowing money in most of the times.

This does not



Figure 3.8.17 and Figure 3.8.18 show the loan sources for farm household and for non-farm household respectively; namely, from whom they borrow money. They borrow money from colleague villagers being the most, followed by relatives, by outside lenders away from their village. Difference in 2 groups can be seen in the share of government as lender. Government as loan provider shares 13%

for farm household while it shares only 3% for the non-farm household. One may see how difficult for the non-farm household to access government loan.



Figures 3.8.19 and 3.8.20 explain for what purposes they had to borrow money. Figure 3.8.19 shows the purposes for farm household and Figure 3.8.20 for non-farm household. For farm household, what comes first is for agriculture input, followed by food. For non-farm household, agriculture purpose, of course, does not exist and food comes first for the reason why they had to borrow money. Borrowing money for education and medical purposes occupies considerable shares; 14% and 10% for farm household, and 14% and 14% for non-farm household.



7) Meat and Fish Consumption

Non-farm households are usually placed in poorer stratum than farm household as aforementioned. Of the non-farm households, those engaged in casual farm labor constitutes of the poorest of the poor. As an example of how they are poor, Table 3.8.5 shows the occasion that they consume meat. The table firstly shows by the categories of farm household and non-farm household, and out of the latter casual farm labor alone is listed at the bottom row. As

Table 3.8.5 Occasion of Consuming Meat
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Category	No. of	times/month				
	Samples	Now	10 yrs ago	20 yrs ago		
Farm Household	199	6.4	6.4	6.3		
Non-Farm Household	162	5.0	5.7	6.3		
Casual Farm Labor	55	3.7	4.4	4.1		

Source: JICA Baseline Survey 2007

Table 3.8	.6	Occasi	on o	f Co	nsum	ing	Fisl	1

Category	No. of	times/month				
	Samples	Now	10 yrs ago 20 yrs a			
Farm Household	217	8.8	9.0	9.0		
Non-Farm Household	179	7.3	7.2	7.5		
Casual Farm Labor	63	7.9	7.8	7.7		
Source: JICA Baseline Survey 2007						

seen from the table, casual farm labors responded that on average they consume meat about 3 - 4 times per month which is rarer as compared to farm households, about 7 times.

Table 3.8.6 shows the occasion of consuming fish in a same way as meat consumption. Though the
difference amongst the strata is not much big like meat consumption, it can be said that fish consumption in farm household is more frequent than that of non-farm households and casual farm labors. Here, comparison between non-farm labor and casual farm labor shows that the latter, the casual farm labors, consumes fish a little more frequently than the former. This, however, does not necessarily mean that they buy fish more frequently because many of them just go to streams and catch fish themselves as found out from interviews by the Team.

8) Property Possession by Social Stratum

Figure 3.8.21 shows major properties owned by different category of the respondents as to what major income source they have such as farming, casual farm laboring, livestock raising, cottage, etc. As easily understood, casual farm labors do have very little property as compared to other households categorized by the major income source. They rarely have radio and TV, and bicycle to some extent say 36% as compared to over 60% for other categories' household, and no casual farm labor household has motorcycle. It may be noteworthy that farm households own those



properties more than the others in most cases while casual farm labors have those the least.

9) Best Moment in Life

Figure 3.8.22 and Figure 3.8.23 summarize the responses to what was your best moment in your life for farm households and non-farm households respectively. What comes first for farm households is the novitiation for their son, followed by their own marriage, donation, 'not yet experienced', passing of university admission, etc. For non-farm households, on the other hand, 'not yet experienced' and their own marriage shared the top position, then followed by novitiation, the time when they had children, passing of university admission, donation, at bachelor age, etc. A difference between the farm household and non-farm household may be seen in 'novitiation' and 'not yet experienced'. Though novitiation came first for farm households, it was positioned at 3rd place. 'Not yet experienced' for farm household was placed in 4th position while that of non-farm households in the top position.



3.9 Existence of the Landless in the Study Area

Farmland in Myanmar is owned by the Union based on the "Land Nationalization Act" enacted in 1953. By the Act, farmers only hold landholding right for cultivation but proprietorship of farmland is not allowed. Although no agricultural land shall be mortgaged, sold or otherwise transferred or divided (by paragraph 4 of the Land Nationalization Act, 1953), land holder right is granted till to next generations especially for those who work in the farmlands as their main living and the lands are utilized in accordance with their parents. When the parents are getting old and unable to work well, then the descendants have the right to manage and continue working for the farm business. Moreover re-concentration of farmlands in the hands of a few rich households is controlled.

After independence from British colony, newly formed Myanmar government enacted the Land Nationalization Act (1948 and 1953) as a regard of looking after poor landless citizens through land reforms. Nevertheless, the farmland reallocation was not finished to cover all over the Country owing to conditions and situation of the Country at that time of post-independence. Therefore landless may have more occurred in the regions than ever before where farmland reallocation was not accomplished. There are still landless people in rural area as of now, and some best reasons that explain the existence of landless and increasing number of rural landless might be interest of people in farming work, increasing population in limited land resources, people's livelihood in off-farm work and better job opportunities other than farming in the rural areas.

3.9.1 History of Land Reform in the Union and Existence of the Landless

Although the Land Nationalization Acts had great advantages for most of poor rural landless during the post-independence era of Myanmar, the land reallocation through the reformation of land policy could not cover all the whole Country. Nowadays, the Government of the Union of Myanmar is encouraging to upgrade agriculture sector as well as livelihood of rural people, by implementing market-oriented economy. On the other hand, the Government is creating job opportunities for those rural landless to absorb in other industry sectors. In this connection, according to the result of interview surveys in 6 villages of the Pilot Project conducted in 2006/07, no one reported to have become complete landless in nowadays situation. That is to say that those people who are degenerated from ordinary farmers to the newly appeared landless would be quite rare. Thus, it can be said that the major reason why the landless actually exists in rural area would be imputed to the aforementioned reasons.

Though the landless farmers have not their own, they can make money by working as one-season hired or casual labour to peasant farmers, which shall support part of income for their livelihood. The landless also have works such as cutting wood, bamboo as sources of income. They can get money by charcoal making and selling bamboo-based materials (e.g. baskets), mats, and other home utilities. So they have several sources of income even during off-season. These materials are commonly in need of all households in the villages as well as in towns. To produce these, sources for raw materials and skillful labour can be available in villages only.

The enactment of "Land Nationalization Act in 1948" by the Union was coincided with its independence in January 1948. The Act aimed at expelling absentee landlord, and distribution of landholding right to tenants. As for land ownership, however, it was not given to farmers and the Union held it in order to liberalize farmlands formerly owned by the absentee landlords and to prevent their revival in the future. Under the Act, the tillage right was made valid for only one generation, thus probably intending to prepare for future land holding by farmer group as was the case in China. Therefore, the tillage right given may be deemed as "the loosely-bound landholding right".

The enactment of this land reform in 1948 was interrupted in the following year. The reason of the

interruption had been attributed to not only furious resistance by such land lent collectors as landowners, money lenders and merchants but also opposition by peasant farmers to the abolishment of private land ownership. The target of this land reform covered only parts of Myanmar such as lower Myanmar excluding ethnic minority regions and upper Myanmar including the CDZ.

Of them, in lower Myanmar Indian money-lending cast owned as much as half of the farmlands without any interest on agriculture, whereas in upper Myanmar where Bamar race predominated in ethnic composition, farmer owned 7,125,710 acre (2,850,284 ha) equivalent to 87% of the total farmland of 8,203,498 acre (3,280,000 ha). Particularly in upper Myanmar, opposition to the abolishment of private land ownership by the same ethnic Bamar race may have been one of the reasons that made the then independence regime withdraw Land Nationalization Act in 1948.

Later in 1953, "Land Nationalization Act" was promulgated with a nominal objective of supervising agriculture but actually in such a form as acknowledging continuance of absentee landlords. In this Act, private transfer of farmland was strictly limited, but division, exchange and inherited holding were admitted for both farm households exempted from farmland expropriation and those allocated with farmland. In other words, the Act allowed farmers not only to have right of farmland use but also to have disposal right in broad range. Moreover, it was stipulated that both exempted and allocated farm households were allowed to have landholding right. Namely, the Act was based on land ownership or "tightly-bound landholding right".

Nevertheless, Land Nationalization Act in 1953 was not thoroughly put into effect from the standpoint of farmland transfer from landlords to tenants and to peasant laborers. Farm acreage under non-farming farmers (i.e., major absentee landlords) accounted for 33.4% of the total farmland area as of 1947, while that in 1958, after 5 years when the application of Land Nationalization Act in 1953 was substantially interrupted still remained about 27% (Pati yeiya dhadinsin, No.3 Mar. 1965). This means that only 6% of the total farmland was offered as the target of expropriation - reallocation - during the time the Act had been effective. The most plausible reason why the Act was interrupted only after 5 years since the enactment is said to be insecurity under civil administration at that time. The area securely governed by the then central government at this period had been only Yangon and its outskirts, whilst administratively difficult land reform could not be enforced unless mighty power governed over the target areas.

After all, land reform made only little progress by Land Nationalization Act in 1948 with the opposition by farmers. Either with Land Nationalization Act in 1953, even under a policy of partially admitting "land ownership", land reform again did little in the targeted form of disintegration of absentee landlords and allocation of farmland to tenants. This is due to then instable administration by civil power though peasants and tenants supported the reform. Another major reason may be due to failure of establishing official organization covering village level with enough competency to perform land reform. Under such instable circumstances, no measures were as a matter of course taken for farm laborers who constituted the landless in villages.

Later, a revolutionary council took the administrative power in March 1962, and the resulted revolution power took a policy with regard to land reform orienting again towards "the loosely-bound landholding right" once prevailed in 1948. The power intended to guard tenant's leasehold right through Tenancy Act in 1963 as well as Act of Protection of Farmers' Rights and also to prevent the degradation of owner-farmers to tenants or to the landless owing to mortgaged farmland. Through these efforts of bringing all the farmland under nationally owned property, the Government tried to allocate farmland to those who needed land including the landless. However, it considered this plan of nationalizing and allocating existing farmland inapplicable any more in March 1964 by the reason of insufficient farmland area against needy agricultural population. At that time of land reform

implemented, it was impossible to estimate around how much farmland area was required to allocate piece of land to peasant laborers because no data was available for estimating then-landless population engaged in farm labor.

However, since the revolution power aspired joint ownership of farmland by group, there could be an assumption that it envisaged strongly enforcing national control of farmland to form group farming where it intended to accommodate the landless¹. Surely, there was a movement that farm laborers were organized into farming groups in alluvium lands and group farming was intensified so that all the farm laborers could be absorbed in these groups. However, in real life grouping was too sluggish entailing in current issue of the landless (farm laborers) living within villages.

3.9.2 Farm Household, Off-farm Household and Agricultural Laborers

Around three quarters of the national population live in rural areas in the Union. However, all of them are not farmers. This situation is the same in the CDZ. They are divided into farm households to which landholding right is vested by the Union and off-farm ones without landholding right. In other words, the only difference between them is that whether a household has farmland with landholding right or not. The landless is categorized into the latter. Off-farm households are further classified into "households engaged in farm labor" and "those engaged in off-farm labor.

Households engaged in farm labor are referred to as those which have income through working as a laborer hired by farm households, while households engaged in off-farm labor are composed of carpenters, official staff, venders, teaching staff, those engaged in cottage industry, livestock rearing villager, etc. Part of non-farmers is considered consisting of households engaged in farm labor, however, no formal statistics are available as to their number. These households engaged in farm labor relying their major income on wages from farm labor constitute the poorest strata in villages. As there exists no explicit definition on farm labor households, here it is defined as "households earning 50% or more of their income from agricultural labor", the same as defined by Fujita² et al.

1) Off-farm Households / The Landless at Country Level

No statistical data has so far been published with regard to the landless. Notwithstanding, farm households with landholding right have been registered at PDC offices under each TS in so far as all the land has been nationalized but only the right of tillage have been vested to farmers. Therefore, the number of so-called "the landless" can be estimated from the difference between the number of total households and that of the registered farm households (with landholding right). UNDP/FAO have provided the number of farm households by land size and the landless households in 17 divisions/ states as a summarized table: Distribution of Different Types of Households in Myanmar (2003) in Agricultural Sector Review and Investment Strategy, 2004 (refer to Table 3.9.1).

According to Table 3.9.1, the total households in the Union stood at about 8.06 million, of which farm households was counted at 4.82 million and the rate of farm households was 59.9% as of year 2003. It follows that landless households, equivalent to farm households subtracted from the total ones, comes to 3.23 million accounting for 40.1% of the total households. This table also lists up rural population, rural households and the landless where an assumption was made that the rate of the landless in rural areas is equal to that between the total landless and the total households. Hence, the rate of the landless in only the rural areas cannot precisely be estimated. However, taking that three quarters of the total population live in rural into account, it can be assumed that the rate of the landless in the rural area is not significantly different from the overall rate of the landless: that is about 40%.

¹ Leadership and organizations of rural development in Southeast Asia, IDE, JETRO, Noriyoshi KANO, Jan. 1991 (Japanese version)

² Change in Myanmar's Transitional Economy, IDE, JETRO, Koichi FUJITA, Oct. 2005 (Japanese version)

Table 3.9.1 I	Number of fa	rm househ	olds by lan	d size and t	he landles	s househol	ds by divisi	on/ state in l	Myanmar, o	f the landless	s and the rat	te of the landle	ss to the total
				Number of	Households	by Land Siz	e		Landlaga	% of		No. of Rural	No. of Rural
Division/State	No. of HHs				10000110100				Landless	Landless	% of Rural	NO. OF RUIAL	Landless
Division/ State		<5ac	5-10 ac	10-20 ac	20-50 ac	50-100 ac	>100 ac	lotal	11113	HHs	Population	11113	HHs
	1							2	3=1-2	(4=3/(1*100		5	6
Mandalay	1,197,334	320,665	177,138	69,022	18,851	113	7	585,796	611 529	51.1	72.5	880.040	449,480
%	100	26.8	14.8	5.8	1.6	0.0	0.0	48.9	011,556	51.1	73.5	880,040	18.40
Sagaing	787,081	276,320	167,902	80,076	24,294	596	0	549,188	227 002	20.2	96.1	677.677	204,826
%	100	35.1	21.3	10.2	3.1	0.1	0.0	69.8	237,093	30.2	00.1	077,077	8.39
Magway	586,156	380,241	121,906	49,935	10,353	139	4	562,578	22 579	4.0	04.0	407.060	19,994
%	100	64.9	20.8	8.5	1.8	0.0	0.0	96.0	23,576	4.0	04.0	497,000	0.82
Kayah	36,183	20,832	9,548	830	89	1	0	31,300	4 000	40.5	70.0	00 700	3,604
%	100	57.6	26.4	2.3	0.2	0.0	0.0	86.5	4,883	13.5	73.8	26,703	0.15
Kayin	191,990	121,004	31,538	10,884	2,270	38	13	165,747	26.242	49.7	72.0	141 690	19,367
%	100	63.0	16.4	5.7	1.2	0.0	0.0	86.3	20,243	13.7	13.0	141,009	0.79
Chin	78,855	56,753	5,571	263	11	0	0	62,598	16 257	20.6	85.4	67 342	13,883
%	100	72.0	7.1	0.3	0.0	0.0	0.0	79.4	10,237	20.0	00.4	07,342	0.57
Tanintharyi	187,309	104,154	26,674	6,419	1,707	233	90	139,277	48 032	25.6	76.4	143 104	36,696
%	100	55.6	14.2	3.4	0.9	0.1	0.0	74.4	40,002	20.0	10.4	140,104	1.50
Mon	335,584	137,468	48,585	24,289	5,334	106	41	215,823	119.761	35.7	71.8	240,949	85,988
%	100	41.0	14.5	7.2	1.6	0.0	0.0	64.3				,	3.52
Rakhine	463,590	222,336	49,948	12,013	3,598	139	4	288,038	175.552	37.9	85.1	394.515	149,395
%	100	48.0	10.8	2.6	0.8	0.0	0.0	62.1				,	6.12
Ayeyarwaddy	1,108,770	415,070	209,356	101,184	21,106	626	183	747,525	361,245	32.6	85.1	943,563	307,419
% D (())	100	37.4	18.9	9.1	1.9	0.1	0.0	67.4					12.59
Bago(east)	512,928	136,818	96,635	43,303	6,121	227	132	283,236	229,692	44.8	80.5	412,907	184,902
% Dama (walat)	100	20.7	18.8	8.4	1.2	0.0	0.0	55.2					7.57
Bago(west)	5/9,6//	161,648	85,765	21,957	1,317	11	10	270,708	308,969	53.3	80.5	466,640	248,720
70 Vangon	1 002 996	27.9	14.0	3.0	10.000	254	102	170 40.7		-			202 242
nangon %	1,092,000	70,013	45,000	44,240	10,009	354	192	170,424	922,462	84.4	31.8	347,538	293,343
Shan(south)	338 667	167 869	44 418	12 877	3 379	31	0.0	228 582					86.637
%	100	49.6	13.1	3.8	1.0	0.0	0.0	67.5	110,085	32.5	78.7	266,531	3 55
Shan(north)	297.685	198.272	51.392	10.786	2.425	50	69	262,994					27.302
%	100	66.6	17.3	3.6	0.8	0.0	0.0	88.3	34,691	11.7	78.7	234,278	1.12
Shan(east)	121.525	117.257	3.820	380	39	8	11	121.515	40		70.7	05.040	8
%	100	96.5	3.1	0.3	0.0	0.0	0.0	100.0	10	0.0	/8./	95,640	0.00
Kachin	143,526	107,198	24,588	6,457	763	26	54	139,086	4 4 4 0	2.4	77.0	111 007	3,459
%	100	74.7	17.1	4.5	0.5	0.0	0.0	<u>9</u> 6.9	4,440	ə .1	11.9	111,807	0.14
Total	8,059,746	3,013,920	1,200,390	494,923	111,666	2,698	818	4,824,415	2 225 224	40.1	75.5	6 095 109	2,442,675
%	100	37.4	14.9	6.1	1.4	0.03	0.01	59.9	3,235,331	40.1	13.5	0,005,100	100.00
Source. Myanm	ar Agricultural	Sector Revie	ew and Invest	stment Strat	egy, UNDP/	FAO 2004. C	Driginal data	from DAP					

CDZ Agriculture and Rural Development for Poverty Reduction

Viewing 3 divisions, namely Mandalay, Sagaing, Magway where the Study Area is located, the rate of the landless in Mandalay Division where the Mandalay City is included shows the highest of 51.1%, followed by that in Sagaing Division standing at 30.2%. The rate of the landless in Magway is listed as only 4%, but this figure is evidently a result of underestimation, seemingly statistical error or misprinting of order. As stated earlier, as number of the farm households exists as a statistical data, it may be reasonable that such an error in statistics or in order was made at the number of farm households in Magway Division.

2) Off-farm Households / The Landless in 51 TS Within the Study Area

The Study Team has collected various kinds of socio-economic information in 2006 as basic data to provide poverty profiles of 51 TSs in the Study Area. With these data the rates of off-farm households / farm households by TS were calculated and summarized in Figure 3.9.1. Viewing the figure the rates of off-farm households are found in a range of about 20 - 60% though considerable difference is observed among TSs. The lowest rate of off-farm households is found in Ayadaw TS

(5%) in Sagaing Division, whereas the highest is recorded in Pakokku TS (80%) in Magway Division.

The large difference in the rate of farm/ off-farm households by TS is said to have bearing on whether land reform has been executed in the past or not (according to verbal communication with elder cadres and those who have related with MAS). This fact suggests that though the land reform was not perfectly reinforced as a whole, a general



tendency of lower rate in terms of off-farm households was quite probable in TSs where land reform had been carried out.

Table 3.9.2 summarizes number of farm households, off-farm ones and the breakdown of off-farm ones in 51 TSs. Viewing this table, Magway Division has the highest rate of off-farm households, 49%, followed by Mandalay Division with 43%, and Sagaing Division has the lowest rate at 33%. Then, the rate of off-farm households in terms of the whole Study Area (or landless ratio) stands at 42%. The data presented in the table are collected from PDC offices in the districts where off-farm households are in more detail broken into the landless and others including official employees etc and the former are further sub-divided into non-farm and casual labor.

Here, it is interpreted that non-farm includes the households that raise off-farm income, namely with major livelihood means in small-scale industries, plasterers, carpenters etc, while casual labor does those who are engaged in construction labor works in common and also in farm labor. However, this division is not necessarily definite because no statistics exist as to livelihood and income sources at TS level. Further, since the landless are apt to be in general engaged in several kinds of labor works in order to sustain their life, it is difficult to definitely categorize them by their major income sources without any household survey on the income.

Division	Farm	Non Farm	Land	lless	Othora	Total	
Study Area only	Households	Household	Non-Farm	Casual Labor	Others	TOLAT	
Sagaing	375,710	188,872	67,623	65,168	56,081	564,582	
%	67	33	12	12	10	100	
Mandalay	344,751	262,093	110,737	49,928	101,428	606,844	
%	57	43	18	8	17	100	
Magway	342,511	326,970	110,062	127,410	89,498	669,481	
%	51	49	16	19	13	100	
Total	1,062,972	777,935	288,422	242,506	247,007	1,840,907	
%	58	42	16	13	13	100	

Table 3.9.2 No. of FHHs, Off-farm HHs and the Rate of FHHs / Off-Farm HHs in 3 Divisions in 2005

Source: PDC Offices of the Districts

In anyway, the rate of off-farm households (number of the landless), 42%, can be approximated to the national average of 40%. In addition, it can be said that those who consist of the poorest of the poor are the farm labors owing to its explicit seasonally and they may consist of 30 % at maximum as a sum of non-farm landless (16%) and casual labor (13%) as shown in the above table.

3) Off-farm Households / The Landless in the Sampled Villages

The Study Team has conducted a PRA survey in 17 villages in 2006, where number of farm/ off-farm households were inquired. Further, the same inquiry was made in the target 6 villages of the Pilot Project implemented in 2007/08. Table 3.9.3 shows the colleted results on the total number of households, that of farm households and that of off-farm ones in these 17 villages and 6 villages.

Currieve	Division	те	Village	Tatal III la	Farm H	ouseholds	Non-Farm	Households
Survey	Division	15	village		No.	%	No.	%
		Myinmu	Garu	196	141	71.9	55	28.1
		Chaung U	Kyauk Sit Kan	144	100	69.4	44	30.6
2006	Sogoing	Ayadaw	Ywar Shay	82	15	18.3	67	81.7
	Sayaing	Pale	Letpakan	303	229	75.6	74	24.4
		Khin U	Myay Ni Sho	132	83	62.9	49	37.1
i.		S	ubtotal	857	568	66.3	289	33.7
ъ		Yesagyo	Myay Phyu	101	23	22.8	78	77.2
II V6		Chauk	Chaung Pike	112	82	73.2	30	26.8
SL		Magway	Si Pin Tha	115	21	18.3	94	81.7
RA	Magway	Myothit	Magyicho	142	87	61.3	55	38.7
₫		Pwintbyu	Ywar Thit	89	43	48.3	46	51.7
		Thayet	San Aite	227	157	69.2	70	30.8
		S	ubtotal	786	413	52.5	373	47.5
	Mandalay	Taungtha	Chaung Nar	250	71	28.4	179	71.6

Table 3.9.3 Total No. of Households, That of Farm Households and of Off-farm One in Sampled Villages in 2006 & 2007

		Ngazun	Zalokema	210	45	21.4	165	78.6
		Meikhtila	Let Pan Kaung	158	83	52.5	75	47.5
		Thazi	Pyun Kan	240	202	84.2	38	15.8
		Wundwin	Leik Tet	98	40	40.8	58	59.2
		Nyaung U	Ku Ywar	92	23	25.0	69	75.0
		S	ubtotal	1,048	464	44.3	584	55.7
		Above Tot	al	2,691	1,445	53.7	1,246	46.3
_	Segging	Myinmu	Ar La Ka Pa	1,152	640	55.6	512	44.4
Li	Sayang	Ayadaw	Ma Gyi Sauk	260	100	38.5	160	61.5
age (08	Mandalay	Tada U	Khaungkawe	242	144	59.5	98	40.5
/ills/	wanualay	Ngazun	Magyi	245	200	81.6	45	18.4
20 J	Magway	Chauk	Mingan	110	56	50.9	54	49.1
Pile	wayway	Pwintbyu	Legaing	776	326	42.0	450	58.0
		Above Tot	al	2,785	1,466	52.6	1,319	47.4
		Grand Total		5,476	2,911	106	2,565	46.8

CDZ Agriculture and Rural Development for Poverty Reduction

Source: interviewed result of PRA Survey conducted in 2006, interview by the Study Team in the target villages of the Pilot Project in 2007

With an overview of 17 villages for the PRA survey in 2006, the highest rate of no-farm household was found in Ywar Shay Village in Sagaing Division standing at 82%, while the lowest one was identified in Letpakan in the same division at 24%. Then, as to 6 target villages of the Pilot Project in 2007/08, the highest rate of off-farm households is recorded at 62% in Ma Gyi Sauk Village and the lowest at 18% in Magyi Village.

The average rate of off-farm households among 17 villages targeted by PRA survey is 46%, while that among 6 villages targeted by the Pilot Project in 2007/08 is 47%. A wide variation in the rate is seen from village to village and the reason is considered similar to what is mentioned on Figure 3.9.1 as to wide difference in the rates of farm/ off-farm households. This rate of off-farm households, 47%, is approximately comparable to the national average at 40% and the calculated mean of 42% on related TS basis though the level referred to is somewhat higher than these.

3.9.3 Livelihood Means of the Landless

From what is mentioned above, it is identified that around 40% of off-farm strata exists in the Union although partial inconformity among various sources of statistical data is observed. Also, it was recognized that the rate of off-farm households stands at 42% at the level of TSs within the Study Area, and it is estimated at 47% from the result of village level survey though number of samples are limited. These results will lead to a conclusion that villagers who do not hold any land - termed as off-farm households/ the landless - are estimated at around 40 - 50% (at the rate of 1 household out of 2) in the rural part of the Study Area. Off-farm households/ the landless generally have plural sources of income in additions to farm labor, and the following states their representative means of livelihood/ cash income sources.

1) Engagement in Farm Labor

The commonest income source of landless households constitutes of farm labor. Even if farm laborers are indispensable in terms of farming, the hiring opportunities are not guaranteed throughout the year because off-season accompanies with highly seasonal farming practices. The periods with high rate of hired labor in terms of paddy cultivation fall on seedling preparation and transplanting, and on the harvesting works in case of upland farming. During these periods many laborers share the given hiring opportunities.

Work division is observed in such a way that male tends to work for seedling preparations and female does for transplanting but both male and female are engaged in harvesting and threshing. According to interview results held at 6 target villages of the Pilot Project in 2007/08, the working duration under farm labor ranges from the longest 7 months (in the area with irrigated paddy land) and the shortest around 1.5 months only or so.

Some laborers seek for hiring opportunities in other villages than their native ones in the case of the villages with short labor duration. Moreover, a few cases are observed where competition will arise because the number of landless households exceeds that of farm ones, leading to narrower chances of hired labor earning among the landless. Such cases are not only identified in Ma Gyi Sauk Village in Monywa TS in Sagaing Division but also in Chaung Paik Village in Chauk TS that the Study Team visited in the occasion of examining the target candidate villages for the Pilot Project.

2) Small-scale Industrial Labor

There are some cases where hiring opportunities in small-scale industries play a pivotal role in securing income for the landless rather than farm labor accompanying with off-season. A typical example is found in Khaungkawe Village in Tada U TS in Mandalay Division, one of the target villages under the Pilot Project implemented in 2007, where employment by local small-sized industries offers a precious income sources for the landless. A lot of landless people who are not at all engaged in farm labor are found in this village, though the mainstream of the village's economy is still agriculture.

Somewhat different character from above example it may have, major chances the landless are as well hired lie in off-farm small-scale industries in the case where mainstream of village economy has been founded on small size industrial activities. In such cases, agricultural economy is positioned at subsidiary role, as observed in Mingan Village in Chauk TS in Magway Division where about 80 % of the villagers are engaged in sandstone ware processing industry³. Khaungkawe Village, bestowed with favorable marketing conditions supported by sustainable demand, may bring about more sustainable employment to the landless than Mingan Village can do. However, in both cases small industries offer precious opportunities to the landless.

3) Livestock Raising

Some of laborer's households hold livestock to supplement their labor wage income. The PRA survey conducted in 2006 in 17 villages revealed that 69 out of 170 were landless households, out of these 12 households (17%) held livestock. They consisted of 6 households raising goats, one with sheep, 4 with cattle and one with pigs. Annual livestock income of these 12 households with goats as major livestock species accounted for 22% of the total annual household income.

Other than self-owned livestock, some households have made year-round livestock rearing contracts with other livestock owners undertaking feeding of the owner's herds. In this case, the contracts are concluded on that 50% of the delivered offspring can be transferred to the contracted undertakers. Some of such undertakers have become livestock owners by multiplying received offspring.

In addition, hiring opportunities for the landless include undertaking of grazing herds of indigenous cattle and goats on the daily wage basis (e.g. 500 Kyats/day as of September 2007) and sceneries with grazing boys/ girls and youths are common everywhere. Grazing areas are found in woodlands, grasslands, harvested farmland and roadsides etc. Means for laborers' households to acquire livestock include savings of part of wages, transfer of offspring as mentioned above, saving of income from side-business etc. It can be said that livelihood status of laborers' households is better off than those without livestock. In this way, income disparity perceives even among the landless.

4) Off-village Piecework

The CDZ is thought to be a source of supplying labor for construction works in the metropolitan Nay

³ There are only 3 places in Myanmar where *Tanaka* grinder made of sandstone can be produced. One of the villages is the Mingan Village referred here, wherein almost 80% or more people are engaged in sandstone processing in form of either producer or trader.

Pyi Taw where construction is under way. Though it is hard to identify number of laborers by their addresses, a village in Magway Division is reported that villagers of hundred order are constantly leaving their villages for a duration of 1 - 3 months for the capital Nay Pyi Taw and some other urban areas to do casual work. HIES (Household Income and Expenditure Survey) in 1997 revealed that Magway Division was placed at the lowest income level among related 3 divisions, and this fact implies that the income level is in conformity with the rate of villagers engaged in off-village piecework.

5) **Income Sources of the Landless**

Sixty nine out of the sampled 170 households (41%) during PRA survey done in 2006 were found as off-farm households. About half of them may be considered as those engaged in farm labor, and the result on their household budget along with that of farm households is summarized in Table 3.9.4. The table shows that annual budget of off-farm households keeps a positive balance, but as far as the rate of indebted households, they have higher rate, 58% as against that of farm households, 44%.

Some of off-farm households raise livestock, mostly goats, but the rate of keeping livestock is as low as 17% of 69 sampled ones. This is likely attributable to lack of fund to purchase stock animal, or to their inability of saving such fund, judging from the fact that Source. PRA Survey by JICA Study Team 2006 rearing goat does not generally

Table3.9.4 Comparison of HH Expenses between Farm and Off-farm HHs											
Items	Farm Hous	eholds	Non-Farm Households								
	Amount	%	Amount	%							
No. of sampled HHs	101	-	69	-							
Average annual income	1,483,044	100	623,167	100							
of which, agricultural income	1,209,904	81.6	0	0.0							
livestock income	153,656	10.4	53,352	8.6							
non-farm income	119,484	8.1	569,815	91.4							
Average annual expenses	986,233	(100)	552,761	(100)							
of which, average food cost	570,745	58	373,052	67							
HHs with deficit (%)		44		58							

require any particular skills except for the epizootic prevention/control although some possibility remains in their ignorance of raising skills. Similarly, food expenditure on their household budgets shows higher ratio, 67% as compared to that of farm households, 58%, where most of this expenditure seems to be appropriated for purchase of rice.

Mean per-diem wage of male stands at 1,000 Kyats as of 2007, by which he can buy 1.25 pyi (2.55kg) of rice per day assuming that the market price of standard grade polished rice is 800 Kyat/pyi. It follows that 970kg of polished rice is annually required to feed a family with an average number of family member, 5.39 persons, assuming that 180kg thereof is annually consumed per member. Likewise, the family has to earn wages equivalent to the amount of 1,940kg (924 pyi) of rice supposing annual expense for buying rice accounts for a maximum of 50% of the total household expenditure. This is equivalent to 739,200 Kyat (924x800), whereas the mean annual income per laborer's household is 623,167 Kyats/year/HH, or only 84% of the required income level.

Under such circumstances, farm laborers' households are forced to have other income sources, and get along with such an impoverished life as borrowing from others, asking for advanced wage payment or dispensing subsidiary foods or other livelihood components. The interview to the villagers who rely mainly on farm labor has revealed that they buy edible oils in addition to rice however, some of them seldom buy vegetables, consume meats only a few times in a year, or some of them in an extremely poor state don't eat meat except for the occasion of religious events.

3.9.4 Involvement in Farm Labor of the Landless

As mentioned above, "the households engaged in farm labor" that are mainly dependent on agricultural labor wages form the worse-off class in village communities. The households engaged in farm labor often have plural cash-income sources in addition to the engagement in farm labor because of seasonality in farm employment. As to the scale of existing households engaged in farm labor, an estimation was tried in the household income survey carried out in the selected 8 villages included in the Pilot Project by the Government of Myanmar that was implemented in 41 TSs throughout the Country in 2001, as referred to in "Changes in Myanmar's Transitional Economy" (refer to Table 3.9.5).

In this household income survey, 2 villages belonging to a TS in Magway Division and one village in a TS in Mandalay Division were included. According to the said survey, off-farm households without landholding right accounted for 43% as a mean of surveyed 8 villages. Out of this, farm labor households that rely more than 50% of their household income on income from farm labor wages accounted for 59% on average, equivalent to 25% of the total number of households in these villages.

Summarizing what is mentioned above, the rate of off-farm households in the Study Area ranges about 40 - 50%, out of which 60% or equivalent to 20 - 30% of the total village households are estimated to earn more than half of their income from farm labor wages. That is to say, one out of about 2 households is off-farm household without landholding right, and one out of 3 - 5 households can be estimated as ones earning more than half of the household income from farm labor among the landless. Likewise, the fact that the ratio between farm and off-farm households greatly varies by village or by TS can be deemed as a typical character observed both in the Study Area and throughout the Country.

Division	Townships	Total Households ①	of which, FHHs ②	of which Non-FHHs ③	Ratio of Non- Farm Households ③/(1)	No. of Sample Non-FHHs ④	of which, Tenants	of which, Farm Labors ⑤	of which, Non-Farm Labors	Ratio of Farm Labors 6=5/4	Ratio of Farm Labor HHs ④x⑥
Tanintharyi	Myeik	515	232	283	55.0	33	1	17	15	51.5	28.3
Bago	Waw	456	213	243	53.3	40	0	30	10	75.0	40.0
	Magway	219	118	101	46.1	37	6	18	13	48.6	22.4
Magway	Taundwingyi	662	326	336	50.8	16	0	12	4	75.0	38.1
	Subtotal	881	444	437	49.6	53	6	30	17	56.6	28.1
Mandalay	Kyaukse	510	334	176	34.5	16	2	12	2	75.0	25.9
Southern	Nyaungshwe	842	544	298	35.4	12	0	9	3	75.0	26.5
Shan	Kalaw	497	622	75	15.1	6	0	2	4	33.3	5.0
Ayeyarwaddy	Myaungmya	1,167	647	520	44.6	20	5	7	8	35.0	15.6
To	otal	5,749	3,480	2,469	42.9	233	20	137	76	58.8	25.3

Table 3.9.5 Rate of No. of Farm HHs, Off-farm HHs and Farm Laborers in Sample villages by Fujita et al (2001)

Source : Market Oriented Economy and farm Labor in Myanmar, Japanese Version, Fujita Koichi

3.9.5 Relationship Between Landless Farm Laborers and Farmers

Farm labor households earn their income through being employed by farm households, while farm households hire them to weed and to harvest in upland farming and to carry and transplant seedlings, to weed, to harvest and to thresh in paddy cropping, thus interrelationship between them is observed. This is because only self-supplied family labor cannot meet timely cultivation and timely harvesting. Seemingly that family labor can cover these requirements in small-scale farm households, possibility can hardly be denied that an income insuring principle exerts to provide chances of employment for the landless. Table 3.9.6 and Table 3.9.7 give cases of employing laborers surveyed by Takahashi⁴.

Table 3.9.6	Pre-monsoon Padd	in Tin Daung	Gvi Villago	(Kyaukso TS	Mandalay		unit: Kvat/ac
Table 5.5.0	The-monsoon radu	y in thi Daung	Oyl village	(Nyaukse 15	, Manualay	DIVISION	unit. Kyavac

Labor Type	Below 6ac	6 to 12 ac	12 to 18 ac	18 to 24 ac	Above 24 ac
Family labor	384	320	151	221	0
Hired labor	2,918	3,034	3,126	3,176	3,447

Source: "Rural Economy in Contemporary Myanmar" Akio Takahashi, 2000

Table 3.9.7 Upland Crops in Kan Tha Lay Village(Magway TS, Magway Division) unit: Kyat/ac

Labor Type	Groundnut	Sesame	Green gram	Sorghum
Family labor	79	127	125	276
Hired labor	763	905	808	504

Source "Rural Economy in Contemporary Myanmar" Akio Takahashi, 2000

⁴ Rural Economy in Contemporary Myanmar, Akio TAKAHASHI, 2000, Tokyo University Publication (Japanese version)

Table 3.9.6 shows paddy cropping, where farm laborers are always hired regardless of farming scale in terms of work per acre. Viewing this, it is understood that except farmers with over 24 acre/household, there found little difference among hired labor wages regardless of acreage per farm household, though hiring wage payment is somewhat lower in those with less than 6 acre/household. Likewise, Table 3.9.7 indicates relationship between family labor (already reflected in the conversion into labor wage) and hired labor wages in upland farming where labor hiring is also identified.

While hiring of farm labor is indispensable in the CDZ where agriculture has not yet been much mechanized, interdependency mutual is observed in a way that farm households offer opportunity of wage labor for the landless, as seen in the above example of paddy cropping where even petty-sized farmers are greatly hired labor. dependant on Therefore, the relationship



between the farm and non-farm household may be illustrated as in Figure 3.9.2.

3.9.6 Extent of the Landless in the Central Dry Zone

Summarizing aforementioned discussions, it is concluded that non-farm households consist of 42 $\%^5$ of the total rural households in the Central Dry Zone, say about one household out of every two in rural areas of CDZ does not have farm land (in precisely, land tillage right). One of the characteristics of the landless in the CDZ is the wide variation in their existence from township to township and also by village. An example is that the lowest rate of non-farm households is only 5 % found in Ayadaw TS in Sagaing Division, whereas the highest rate is 80 % recorded in Pakokku TS (80%) in Magway Division.

The landless people are engaged in several occupations such as employment in small cottage industry, rearing of livestock, casual construction work, farm casual labor, etc. The poorest of the poor among the landless people can be found in farm casual labor. Due to the nature of the seasonality in farming activities, farm casual labor are not dependent totally on farm laboring but are trying to engage in any kind of income activities.





In simplicity, assuming that farm casual labor are the ones whose more than half income comes from farm laboring, they are estimated at about 20 to 30 % according to a sample field survey by Fujita. It is, therefore, that one household out of every 3 to 5 households in rural area of CDZ are farm casual labors.

⁵ According to information from District PDC Office in Mandalay, Sagaing, and Magway Divisions.

CHAPTER 4 DEVELOPMENT PLAN FORMULATION: PLANNING

This chapter deals with the formulation of development plan for the Study Area. Prior to the plan formulation, development potentials and development constraints intervening in the Study Area are identified, and then planning is elaborated referring to this identification. In planning, future development vision of the Study Area is presented, and development approach and strategies to be applied to realize the vision, as well as projects and programmes as concrete development activities are proposed. Since the Study Area has vast area extending over 75,169km², it is categorized into some types, and priority projects to be implemented in each of development types are proposed and linkage between types and the proposed programmes is also presented.

4.1 Development Potential in the Study Area

A host of development potential can be identified in the Study Area. These include "development strengthening" possessed by communities, and available resources or "development opportunities". Here, as available potentials in promoting development of the CDZ, 1) farming system and animal husbandry in conformity with environmental characteristics in the CDZ, 2) high status of women and high social indicators and 3) cottage industries with high technical level are taken up for examination.

4.1.1 Farming System and Livestock Fit in the Environmental Characteristics of the CDZ

The CDZ within the Study Area is located in the east of Rakhine Hills Range, the situation of which is the shadow area of southwestern monsoon. Lower atmospheric humidity prevails in this shadow area, and by this reason rainfall is less. Such a geographic condition leads to a dry zone exceedingly peculiar in subtropical monsoon area. Under such environmental situation, a strength is identified in the Study Area, that is well adapted farming/ cropping system to the environmental characteristics prevailed in the CDZ.

That farming/ cropping system has been established during the long, historical efforts of acclimatization. In addition to crop cultivation, goats tolerable to dry land have been raised, and these coupled with adaptable farming/ cropping system to ambient characters have contributed to the stabilization of inhabitants life. Of course some room for further technical improvement is found, already established foundation in terms of environmentally adaptable farming and livestock nurtured in the stream of historical development process can serve as strong resort in developing the Study Area.

Farmland is called Le, Ya, Kaing and Kyun in Burmese language. Le means paddy land, Ya is upland, Kaing means farmland reclaimed over flood plain appearing as flood recedes in Ayeyarwady River at the beginning of dry season and Kyun is alluvial sand banks in the stream bed. Le extends not only alongside of Ayeyarwady River and its tributaries, but is also found in lowland with rain-fed cultivation.

Kaing and Kyun lands are developed along the basin of Ayeyarwady River where annual water-level fluctuation reach 6 - 7m, and also inside the riverbed of the River. Its shape varies from year to year depending on the discharge of Ayeyarwady River. By this reason, farmers are not so willingly invest on Kaing and Kyun lands as they do on permanent farmland, however, the land productivity on this is awfully high because fertile silt deposits thereon every year transported in water from upstream.

Various cropping systems are observed in the CDZ. Paddy is cropped on Le while Ya produces partly paddy, partly oil-crops like sesame, and pulses. Onions as well as chili etc. are cropped in Kaing and Kyun. Land use in the CDZ is briefed in the following way; Le has the highest farming potential where paddy is cultivated and even double cropping of paddy is practiced within the perimeter of irrigation facility.

In the case of double cropping of paddy, farmers crop pre-monsoon paddy during April - July followed by rainy season paddy during July - October. Wherever irrigation water is not sufficient or paddy cultivation is difficult due to sandy soil, they crop alternative crops in place of paddy, such as green gram that can be grown within a short duration. As relay crop after rainy season paddy, pulses, usually chickpea that is cultivable even during cool winter, are cultivated. Therefore, considerably intensive farming has been established in Le bestowed with favorable cropping conditions.

In lowland, staple rice is planted whenever rainfall is enough to allow it, but if it's not enough maybe sorghum, chickpea etc are grown. Over Ya, farmers usually crop oil-crops like sesame, sunflower, groundnut etc, sorghum and pulses if soils are relatively water retentive. In the CDZ, exportable pulses has been much produced since early 1990s, increasing these cropping in a form without expanding cultivated acreage, in such a way that drought resistant pigeon pea has been intercropped with sesame and groundnut. Green gram is cropped in the similar way, in pre-monsoon period as catch crop prior to rainy season paddy, or intercropped with sesame over Ya. Thus farmers have intensified their cropping for increasing acreage under these crops without expanding farmland area.

Oil-crops, sorghum and pulses are cultivated in the tracts with relatively favorable soil conditions within Ya, while cotton is grown over futile sandy or gravelly soils. Production of cotton has been declined as international market prices fall. Growing on fertile and water retentive soils makes cotton plant undesirable vegetative growth, in which only vegetative shoots are vigorously thriving with poor bud formation and boll maturing is delayed.

That is to say, cotton can be cropped on the land where sesame, green gram, etc. can hardly be grown. Since cotton cultivation tends to be extended into devastated land, it seldom competes with other existing crop cultivation and this is considered a merit of cotton production. At present, cotton is barely utilized in cottage weaving industries run by family members, but it is useful to disperse risks of poor harvest, because even though other crops are poorly harvested due to poor rainfall, cotton can inversely bring a bumper crop.

The CDZ does not provide favorable environment to guarantee farm production owing to short rainfall and irregular rainfall patterns. Yet, as mentioned above, farmers have flexibly managed farming by combining crops and land use harmoniously. The reason why civilization has been blossoming as long as 20 centuries time since Pyu tribe founded its chiefdom in Upper Myanmar may lie in this farmer's wisdom even if the land is not at all suitable for crop production except for paddy areas along Ayeyarwady River and its tributaries.

Particularly, in the extension of pulses mainly exported to India, MAS has succeeded in raising their cropping intensity without expanding farmland area by introducing green gram with short growing period or by promoting pigeon pea intercropped with sesame. Though there found still some room for improving crop yields, the fact that farming systems well adapted to environmental characteristics have already been established serves as a reliable strength in formulating development plan for the CDZ.

4.1.2 Status of Women and the State of Social Indicators

It is already mentioned elsewhere that women of Bamar race dominant in the CDZ have a high social status. High social status of women results in generally lower rate of occurrence of under-weighed infants or mal-nutrition infants, since mothers tend to have more room for regarding their children's health (see box as an example in India). Also, it will lead to longer life expectancy because such care allows to lower infant mortality and mortality of child younger than five years old regardless of infant's sex. So it can be deduced that where women's status is high favorable environment has been developed in which subjective participation of women can readily be realized particularly in

promotion of social development oriented activities, e.g. in the fields of education and health. This will help develop the Study Area.

Figure 4.1.1 shows the ratio of mal-nutritive infants (rate of weight against height) collected at TS level in 3 Divisions in the Study Area as compared to the national average in Myanmar. Here, the equivalent figure for national average is taken from the data of 2003 in Statistical Yearbook 2004, while those in 3 Divisions in the Study Area were as of 2004/05. Although the years referred to differ, the ratio of mal-nutrition infants in the Study Area is judged slightly lower than the mean ratio of national level.

Figure 4.1.2 compares rates of infant mortality and that of under-5 year old child collected at TS level within 3 Divisions in the Study Area with that of the average in Myanmar (the rate is presented as per 1000 live births). The data by UNICEF in 2004 as well as those in 2003 by the Statistical Yearbook 2004 are taken for the average in Myanmar and 2004/05 data are used for mortalities in the Study Area. Though the years of data collection differ, it is found from this comparison that the rates of infant and child mortality in the Study Area are by far lower than the national averages. For example, while the rate of child mortality under-5 is averaged at 106 per thousand live births for a national average (value reported by UNICEF) or 72 per 1000 live (value reported in Myanmar births Yearbook 2004), those in 3 Divisions in the Study Area range 31 - 44 only, with the mean 38 per 1000 live births.

The rate of infant's under nutrition mentioned above gives slightly lower

Kerala Province where Woman's Status is High:

A. Sen and Martha C. Nussbaum often refer to high educational or health indicators of women whenever they argue potential capacity building approach. India is a country where demographic rate of women has never exceeded 1 ever since statistics were initiated in early 20^{th} century, also where discrimination of girls and ladies is said to be serious.

However, amongst such discrimination, Kerala State has higher female ratio and achieved favorable social indicators for women. Here in Kerala State, since medieval age a tradition of matriarchal inheritance has rooted because male laborers seasonally leave their villages. Until 17th century, polygamy with many husbands had at times been practiced. Thus, women's status in this State was traditionally high and this has fairly fostered the achievement of high social indicators

Development as Freedom, A Sen, 2003, Women and Human Development, M.C. Nussbaum, 2000



value for the Study Area as compared with the national average, but the mortalities of infant and under-5 year child show by far lower level for the Study Area than that of the national average. Conceivable reasons for this difference may lie in well-managed care for infant health including immunization reflecting higher status of women, as well in a favorable environmental condition of dry area for health management.

The rate of access to immunization in the Study Area is even higher among the areas of Myanmar where political importance has been attached to health care for mother and children. Viewing, for instance, the rate of immunization in 2007 by the Rural Health Centres covering 6 target villages of the Pilot Project in 2007, they show high value of over 80 - 100%. Besides the preventive

vaccinations, endemic and epidemic diseases and those contagious sicknesses are less prevalent in dry areas where hygienic conditions are naturally better prevailing than high humid areas. These background conditions are interpreted as major factors that lower infant & child mortality rates in the Study Area.

N (11	D:	Population	Immunization by Type								
village	Division	Covered	BCG	DPT	OPT	HP.B	Measles	Tetanus			
Khaungkawe	Mandalay	6,347	80	99	100	100	54	98			
Magyi	Mandalay	19,254	100	100	100	100	100	100			
Ma Gyi Sauk	Consing	28,112	94	91	91	91	93	91			
Ar La Ka Pa	Sagaing	37,757	104	108	104	104	100	103			
Mingan	Magway	27,662	99	97	97	97	97	99			
Legaing	wagway	24,349	85	87	87	89	91	79			

Table 4.1.1 Rate of Immunization in Rural Health Centers covering the Target Villages of the Pilot Project in 2007

Source : collected data by the Study Team directly from the health centers covering the target villages of the Pilot Project (value in 2006)

As generally observed throughout Myanmar, educational indices of particular Bamar race are high in addition to health parameters. Gender difference of these rates is also not much. Under such circumstances, participation of women in development programme related to health / hygiene and education may relatively readily be secured although male tends to be major target of development intervention oriented to livelihood improvement (at least as far as entry point of outsider's contact is concerned). It can anyway be said that favorable social environment exists where the fruit from social development is readily brought about. In other words, high women's status can serve as influential development potential in promoting development in the Study Area, among others social development.

4.1.3 High-Tech Cottage Industry, Inexpensive High-Quality Labor Force

Hand weaving and other traditional industries have been developed in the Study Area. Lately, imports of cheap raw materials from China enabled people in the Study Area to promote various manufacturing industries such as tinsmith, sewing, embroidering. Some small-scale cottage industries have also been run in the six target villages of the Pilot Project being implemented in 2007. The scale of these cottage industries is variable, some relying only on family labor and other weaving

enterprise hiring at maximum 20 handloom operators.

Those who are engaged in these industries are very often part-time working with agriculture or livestock. Villagers employed in these small-scale industries are often observed to have refined workmanship and high working spirit. As an instance of technical level, some handloom operators are making device to automatically pass shuttle that leads filling through warp making use of rebounding force of loom while others are endeavoring delicate devices (see photo).



Many industrious people engaged in cottage industries toil, in some cases from 7 o'clock in the morning till after sunset, or even after sunset until around 9 o'clock in the evening with candle light in the target villages of the Pilot Project. Such labor force is of quality and what's more it is characterized with cheap wage not merely in the CDZ but also in the entire Country. Though this cheap but quality laborforce currently has limited opportunity to make use due to economic blockage imposed by Euro-American countries, such villager's potential labor force in the CDZ will provide a great driving force in future for promoting small-scale, export-oriented industries and processing

industries in the rural agro-economy.

Agriculture earns 45% of national GDP in Myanmar, while manufacturing sector contributes only 9.8% (as of 2003/04). On the other hand, viewing GRDP of the Study Area, agricultural sector counts 50% and manufacturing does 19%, or about the double to GDP^1 . The larger contribution of manufacturing sector in the Study Area seems partly attributable to active, traditional small-scale industries developed therein.

Moreover, it is well known that in an embryonic period of industrialization in the process of economic development manufacturing industries tend to emerge first, among others debut of sewing industry that needs relatively small initial investment. Evidently, it does not mean traditional handloom weaving generally observed in the CDZ, but it is CMP (Cutting, Making, and Packing). That is to say the most popular form of CMP is entrusted processing in a

Trends of Trade in Garment in Myanmar:

The share of garment in export composition of Myanmar stood at only 2.5% in 1990. However, the share indicated a rapid rise every year reaching 28% in 1999 and 30% at its peak in 2001. This is owing to many foreign investors mainly from ASEAN countries because of cheap and quality labor force. Thereafter, garment (sewing) industry has shrunken its export share to 8% in 2005 on account of various conditions including initiation of regular export of natural gas to Thailand in 2002 and influence by the U.S. economic sanction since July 2003. Nevertheless, it still remains in an important industry from employment capacity of rural labor point of view, and still preserves potential of restoration once a drastic change takes place in political situation. In this connection, an interview survey targeted on sewing workers in 2005 (by T. Kudo) revealed that

sewing workers in 2005 (by T. Kudo) revealed that 21% of the respondents were eligible for schooling in the universities and another 27% were in the level of high school students. Even though employment opportunities were limited, it is an outstanding feature that highly educated women are found in those who are hired in sewing industry.

factory where such imported free-of-charge raw materials like texture and accessories like buttons are cut, sewn and packaged for re-export, but at any rate skilled and cheap labor always attracts the investors (see the box).

Comparing Myanmar's labor market with that of other ASEAN countries, the largest comparative advantage of the former is found in its inexpensive and high quality labor force. Viewing labor wages by major Asian cities as of 2003, monthly wage level of skilled labor in Yangon was $20 - 48^2$ and this is lower than that in Dacca in Bangladesh standing at 29 - 60. At that time it was 78 - 143 in Hanoi in Viet-Nam and even as high as 109 - 218 in Shanghai in China.

From the above comparison, thus, low wage level was outstanding in Myanmar. In this context, it is worth referring to the controlled price level of rice in Myanmar. Under the circumstance of state controlling the entire rice exports, domestic rice market has in principle been isolated from international one. Price levels of Myanmar's rice have been equivalent to around 30 - 60% of those of globally marketed rice, thereby cheap levels of employees' wages have successfully been sustained.

Cheap wage levels and high quality labor force serve as competitive advantage in labor markets for Myanmar, above all for the inhabitants in the CDZ where health indices and education standards are higher than those in other areas. Quality of labor force is not directly tangible all right, but as far as literacy rate is concerned, Myanmar's level is considerably higher as compared with that in such ASEAN countries as Cambodia, Laos, Bangladesh and India.

Also, in connection with comparative advantage, one of the typical features in Myanmar, among others in the CDZ where Bamar race predominates, lies in the negligible disparity in literacy rate between male and female. In shifting to highly industrialized status, availability of high quality and inexpensive labor force and by-far higher female literacy rate than that of neighboring countries that is chiefly welcomed by sewing industry etc can positively contribute to higher industrial competitiveness.

¹ Data from Planning Department, Ministry of Planning and Economic Development

² JETRO, 2003

4.2 Development Constraints in the Study Area

Major development constraints in the Study Area are discussed here, including the state of stationing agricultural extension staff and livestock extension staff belonging to TS who contact with villagers at the frontline, fruit-figure-the principle of fulfilling norm for norm sake, and the level of agricultural techniques mastered by agricultural extension staff and recognition of livestock by livestock extension staff in this context.

4.2.1 Stationing of Agricultural / Livestock Extension Staff

Taking a look of manning state in regional offices of Ministry of Agriculture and Irrigation, as well as Ministry of Livestock and Fisheries, offices have been located at the level of division, district, township (TS) of which the frontline is TS office. Cottage Industries Department under Ministry of Cooperatives is also a directly related office to this Study, however the office within the Study Area is only located in Mandalay City that covers the entire Upper Myanmar. It means that the Cottage Industries Department doesn't currently have extension activity directly targeting and developing cottage industries distributed in rural area.

51 TSs are situated in the Study Area, the mean area of which is 1,474km² per TS calculating from the entire area of the Study Area, 75,169km², that is equivalent to a square area of approximately 38km x 38km. Administratively, under the TS with an area of 38km x 38km, village tracts are placed, and under a village tract villages are placed, but at these levels no government staff has been in charge except those health centres belonging to Ministry of Health. That is to say, such government staff as agricultural/ livestock extension staff is working in the offices located in township, or the center of TS. It means that they have to reach their villages by bike individual staff have or by public autobus called "line bus" (small - medium sized bus).

As to number of these staff, Table 4.2.1 shows number of agricultural extension staff and livestock extension staff working at TS offices in the Study Area (only technical staff are shown here). The table indicates the number of agricultural extension staff (MAS staff) per office ranges 8 - 22 though varying with TS on average 12 staff working in an office. Estimating average village coverage per extension staff, it comes to 8 - 25 villages by Division, on average 12 villages, and on household basis in the villages it ranges 1,300 - 3,500 households per staff, or on average 1,850 households. About 3 villages consist of a village tract in the Study Area, and about 50% of the total village households hold landholders right, namely farm household. It follows that an extension staff should cover 4 village tracts or about 900 farm households considering from VT level or target farm household level.

Number of livestock extension staff in the Study Area is about 1/4 of that of agricultural staff, or 213 staff as against 832 staff of agriculture. Consequently, very few staff, 4 - 5 workers under a TS. A livestock extension staff must cover 49 villages (equivalent to around 16 village tracts) accommodating about 7,200 households. Number of livestock holding households is not available, but it can be estimated at maximum the same number of farm households taking account of the fact that current livestock extension activities target at draft cattle. Since the number of farm households in the Study Area is almost equivalent to about 50% of the total households, the number of households to be catered by a livestock extension staff is at maximum 3,600.

Division in the	No. of	No. of	Rural		MAS Staff at TS Level LBVD Staff at TS Level								
Study Area	Township	Village	Household	Total in Division	Average per TS	Village per Staff	HH per Staff	Total in Division	Average per TS	Village per Staff	HH per Staff		
Sagaing	17	2,986	485,268	373	17	8	1,302	84	5	36	5,777		
Mandalay	13	3,003	443,515	285	22	11	1,556	52	4	58	8,529		
Magway	21	4,369	609,844	174	8	25	3,505	77	4	57	7,920		
Total/ Average	51	10.358	1 538 627	832	16	12	1 850	213	4	49	7 224		

Table 4.2.1 State of MAS and LBVD staff Stationing at TS Offices

Source : Interview to Division Office concerned, as of July 2007

It is considered from what's mentioned above that both agricultural and livestock extension staff stationed in the frontline have too many villages and households to take care of. Further, they have to use motorbikes or public transport means to visit their jurisdiction because they station at their offices in the centre of townships.

Recurrent budget available to TS offices are directly delivered from the headquarters to each office based on the approved budgetary frame, though about 80% of the budget consists of salaries. Concerning actually available budget for extension activities, it is difficult to estimate exactly (see box in the right). However, as an example, a result of the interview with extension staff in TS offices supervising the

Budgetary Provision of MAS in Myanmar:

Budget of MAS in Myanmar is directly allocated from Headquarters to division, district and township. Budget items include 1) Administration, 2) Extension, 3) Procurement and 4) Account in which salaries/ allowances are included. Salaries for office directors (ex. Divisional manager, District manager, TS manager) are exclusively included in the item of administration, those for ordinary extension staff are included in the item of extension, and those for clerks are in the items of accounting. By this reason actual cost for extension activities must be estimated by subtracting amounts of salaries from actual quarterly disbursement for item of extension, thus making it difficult to know the budget only available for extension activities.

target villages of the Pilot Project implemented in 2007 has revealed that the disposable budget to a staff is mostly 2,000 - 3,000Kyats/ month (equivalent to 2 - 3 only) and as an office it is about 1.0 - 1.5 million Kyats per year only. While fuel cost as of September 2007 stands at 1,100Kyats/liter (around 1), this budget level hardly allows them to engage in extension.

It may be concluded from this estimation that agricultural extension activities are fairly difficult except targeting at paddy cropping that has topmost priority in Myanmar. Moreover, the activities may be confined to paddy demonstration plots or around them that have been established not so far from extension offices. In upland areas, extension staff visits the areas located near their offices where such priority crops as oilseeds and pulses are much produced, but they cannot actually visit remote villages for extension purpose. The situation is more or less the same for livestock extension and where the daily extension services have hardly been provided and they are confined to emergency measures at the occasion of endemic outbreak, and preventive vaccination to livestock in response to the request of villagers. In fact, interviews revealed that extension budget actually disposable is only about 100,000 – 150,000 Kyats per annum per TS office, much lower than that of TS MAS office.

In brief, agricultural/ livestock extension workers who should support agriculture and livestock as the mainstay of inhabitant's livelihood in the CDZ cannot extend their services except around their offices due to too vast service area to cover, also due to limited number of staff. Besides, budget allocation to meet necessary extension activities is confined, limiting them to visit remote villages – where poverty rate possibly is higher. Current status of manning of extension staff and logistics provided for them are badly insufficient as government public service for improving livelihood of those who are living in rural areas.

4.2.2 Fruit–Figure–Principle of Fulfilling Norm for Norm Sake of Agriculture Staff

Several researchers have repeatedly pointed out that the agricultural extension in Myanmar has been based on by the principle of fulfilling norm for norm sake. It is in particular observed for rice. The political implication of supplying cheap rice throughout production increment, thus envisaging welfare of rural rice purchasers including landless multitude who are living in rural areas may be in a sense justified. On the other hand, farmers are not at all "means" of producing crops but "managing entities" who make decisions including the crop selection to produce and marketing options taking account of market situations.

During the era of socialism based on a planned economy which continued until 1988, it may be said that farmers had been treated as means of production from state viewpoint under cropping system constrained by compulsory harvest delivery (refer to box in the right). Such way of thinking may be still remaining in the attitude of MAS staff even today despite economic liberalization that abolished

compulsory cropping system except for paddy in irrigated perimeter, sugarcane and cotton, the latter two of which are much less cropped in the Study Area. Under such situations, principal duty is given to agricultural extension to achieve the target production of crops hierarchically allotted from Division, District and TS decided at state level. It is equal to say that the principal norm given to agricultural extension still remains in cropping and production drive following the cropping plan though the controlling authority through planned cropping and compulsory delivery system has been loosened as compared to that prevailing before 1988.

Crop production drive is not deniable, but in so far as agriculture is "means" of mainstay for farmers, consideration of what can be done with the surplus brought about by the production drive is more important. This may paradoxically be equivalent to the argument that lower income itself is not a problem in poverty reduction but inability of doing something due to short income is really the problem.

Planned Cropping and Compulsory Delivery up to 1988:

In Myanmar, nationalization of farmland, planned cropping and compulsory delivery of major crops continued until 1988 (controlled crops of compulsory sale to government included rice, sugarcane, cotton etc, but excluded oil-crops and pulses). Under nationalized farm land ownership, cropping was allocated from government such as rice to lowland, oil crops and pulses to upland, and in the case of rice compulsory sale to the state at around 1/4 of market prices was imposed to rice producers.

It had been instructed to expropriate farmland from the farmers who did not follow cropping allocated or did not accept compulsory delivery to other villagers. In other words, land nationalization, planned cropping and compulsory crop delivery comprised of trinity system as a foundation of planned economy for fulfilling targeted crop outputs.

Nowadays, land nationalization still continues as it is, but as to planned cropping and compulsory delivery, they are discontinued except planned cropping of rice in irrigated land, sugarcane and cotton, compulsory sale of sugarcane and cotton. However, agricultural extension still instructs farmers to follow what government plans for every year cropping even now. Namely, way of agricultural extension itself does not change much from the state before 1988 in spite of no need of compulsory delivery and no worry about deprivation of landholding right.

something due to short income is really the problem. Also, deeming farmers as managing entity, way of extension services by which diverse options can be offered for them is really required. In other words, whether a technique is employed or not is a matter of selection by farmers who are farm-managing entities, meanwhile technique providers like extension staff should provide a wide spectrum of options of farming techniques and also their combinations.

Since 1963, Myanmar maintained practically isolationist system until 1988, and is still later from 1989 to date subject to economic blockage by western countries. That is to say, except the support from Japan, a major donor thereto, almost no support has been made from other DAC countries. Further, even support from Japan has mainly be confined to hardware like construction of dams and irrigation facilities, with fewer contribution for software like farming techniques. It seems therefore that, in Myanmar's agricultural sector, development of farming techniques by outer stimulation has been less than that of other Asian countries. Likewise, amidst the planned economy stream, priority has tended to be placed on the fulfillment of targeted outputs by heavy input of chemical fertilizers, thus agricultural sector has been in a closed state where endogenous development for farming techniques hardly takes place.

Farmland in the CDZ has larger yield variance, except for irrigated lands, under the natural condition typically represented by erratic rainfall pattern. In such unstable area, straightforward output-oriented efforts such as heavy input of expensive chemical fertilizers often lead to vain hope. Under such unstable environment, it is essential to make a livelihood founded on a risk hedge strategy. Standing by the side of extension staff responsible for supporting farmers, they have not only to straightforwardly fulfill targeted yields but to be versed in various techniques to avoid and hedge risk in livelihood so that they can advise these wherever necessity arises. Therefore, shift of attitude toward extension is prerequisite for government staff in addressing poverty reduction in the CDZ. The attitude of extension staff brewed in an atmosphere familiar with planned economy for a long time, consequently tamed by standardized norm to straightforwardly fulfill targeted output without fail, might be the largest issue in pursuing poverty reduction in the CDZ.

4.2.3 A View of Livestock by Veterinary Extension: not as Means of Livelihood but as Animals

A TS Veterinary Office is placed functioning as the frontline of livestock extension at the TS level of the Study Area. He/ she belongs to Livestock Breeding and Veterinary Department (LBVD) under the Ministry of Livestock and Fisheries. 51 TSs exist in the Study Area where 34 veterinary officers and 179 deputy veterinary officers have been stationed (as of September, 2006 as interviewed from LBVD). That is to say, 213 staff in total are servicing in extension activities in the field of livestock in the Study Area.

Number of veterinary officers and deputy veterinary officers per TS varies with TS, for example 12 staff work in Taundwingyi TS whereas no staff has so far been assigned to Nyaung U TS. In this regard, average number of staff per TS veterinary office is counted as around 4. Their terms of reference in the service activities are as follows:

- · Vaccination,
- · Medical treatment,
- · Livestock development, extension and education,
- · Artificial insemination,
- Taking of livestock census,
- Meat inspection for public health, and
- Duty assignment by TS Peace and Development Council

Viewing the current activities rendered by the staff of TS Veterinary Office, they are almost confined to the charged vaccination and medical treatments. In other words, the original duty to be pursued in their extension activities, i.e., livestock development, extension and education seems to be put aside as an auxiliary administrative service. Artificial insemination for improving livestock breed has hardly been practiced.

Furthermore, the target priority of vaccination and medical treatment seems to be attached to draught and indigenous cattle kept in paddy producing areas from the standpoint of relative importance given to paddy production. They are farm households with landholding right that keep draught cattle, while their livelihood is relatively better off than the landless living in the same villages. It follows that an interrelation seems to have formed in which well-off farmers have room for requesting LBVD staff for treatment and as consequence the targets of veterinary services are concentrated on draft cattle.

On the contrary, the above-cited performances of service activities for goat herds including both vaccination and medical treatment tend to be inert as compared with those oriented to draft animal. The main cause of this inertness may lie in the inclination that major services by TS Veterinary Office put their priority on the care of draft cattle all right, but it is further considered that owners of goat herds have weaker access to such veterinary services as vaccination and medical treatment. In other words, villagers to raise goats are mostly smallholder farmers and the landless who are mostly not economically viable, hence they hardly have access to preventive (and charged) veterinary services apart from such emergency cases as outbreak of epizootic diseases.

Such vet-services as vaccination and medical treatment are important on one hand, feeding environment of livestock is also an essential factor, on the other, to affect livestock productivity. Although environment of livestock raising influences productivity thereof, current services seldom instruct on such environmental implication as structure of barns, hygienic care around barns and barnyard, fodder production.

In the Study Area, large disparity is observed in live weight of livestock of the same age, and this

reflects different ration in terms of both quantity and quality. Frequent occurrence of such epizootic diseases as Foot and Mouth Disease (FMD) has bearing to lack of systematic extension activities to control livestock diseases, as judged from current random state of grazing or browsing herds and lack of restricting direct contact of herds with ambient people.

In short, current status of extension activities by TS Veterinary Office is too much specialized in vet-services recognizing livestock as mere animal. As a result, farmer's recognition towards the services provided by TS Veterinary Office comes up with similar to that of office staff, requesting livestock treatment to veterinary officers only when such emergency case arises from their livestock herds as progressive diseases of cattle that is the most important property for them.

Of course vet-services are essential, but livestock in rural areas is vested with special position as means of livelihood improvement of the villagers as well as even sustenance of their life. Therefore, in addition to currently operated practices of extension services, that is veterinary oriented services, it is necessary to address to improvement of farmer's feeding management techniques and of livestock capacity.

Current extension staff of TS Veterinary Office consists of veterinarians, mostly young staff, but their capacity building is still required in terms of such comprehensive livestock management as nutritional management, rearing environment management, fodder crop production and storage, treatment and utilization of farmyard/ barn manure. Especially, it is imperative that these staff have recognition of livestock not only as animal but also essential means of improving and sustaining villager's livelihood.

From now onward, it is necessary to build a service system in which, in addition to hitherto vet-services, adequate feeding management techniques can be packaged to offer villagers, among others poor strata so that they can raise their livestock in a sustainable and productive manner and thus realizing livelihood improvement. It is also considered necessary to strengthen such agronomic activities as fodder cultivation, pasture development, manure utilization or restoration to soils, regeneration of fodder seeds, but only little particular coordination with MAS has so far been provided. Therefore, from now it is required to create liaison with MAS in providing extension for this field.

4.3 Poverty and Development of the Study Area

In this sub-chapter definition of poverty employed in Myanmar and concept of poverty proposed by JICA and international organizations are articulated. Thereafter, based upon the results of the Study, profile of poverty as major issue in the Study Area is illustrated and thereby direction of development intervention to the CDZ can be foreseen.

4.3.1 Definition of Poverty in Myanmar: Poverty in Economic Term

Central Statistics Organization (CSO) carried out Households Income and Expenditure Surveys (HIES) in 1997 and 2001. Referring to the results of these surveys, CSO publicized the rate of poverty estimated on the basis of subsistence cost, namely the minimum cost to secure nutritional requirement defined by the Ministry of Health. This concept (though it is not explicitly described in HIES) could be referred to as overall poverty (in economic term) if it is interpreted including nutritional and other prerequisite necessary for daily life¹.

In the above publication, CSO has not specified any "minimal cost" required for getting along minimum level of life including nutritional requirement, or economic poverty line. At any rate, however, as far as the government places base for the estimation of poverty rate on "the cost" of sustaining minimum life, it considers so-called "poverty in economic term" as major component of poverty.

4.3.2 Definition of Poverty in JICA: Poverty Reduction on Capability Approach

JICA defines poverty as follows: "poverty means a state in which people are deprived of any chance to develop capability to humanly sustain basic life and at the same time they are excluded from social arenas and development process". Further, poverty reduction doesn't merely aim at betterment of income, but it is termed as "Everyone can spend healthy and creative life without lack of clothing, eating and dwelling, can be a member of social community without being maltreated from the State or from the community to which she/he belongs and also is capable of sustaining freedom, dignity and self-respect".

In that definition of poverty reduction, an idea attached on Capability Approach introduced by A. Sen and M.C. Nussbaum can be found, that is poverty reduction or in another word development "towards better well-beings", "broadening choices of individual's way of life" or "expanding freedom of choosing one's life". In nowadays context, it may therefore be said that capability approach has presented basic concept of poverty reduction advocated by JICA and international organizations (of all others UNDP).

Capability approach attaches importance on the facilitation of environment and institutions as a core strategy of national public policy, thereby enabling individual actor to enlarge their liberal living. That is to say, current concept of poverty reduction is founded on an assertion that the individual can enlarge extent of freedom in individual way of life, in which expanding domain of 'being' and 'doing' of each and every individual is considered the most important where need arises for public policy.

In this connection, as to what capability means concretely, A. Sen declines from listing up, leaving it liberal selection of what capability means according to individual contexts. Differently, M.C. Nussbaum suggests fundamental 10 articles of capability from her view of giving suggestions of how development interventions should be by policymakers. Both of these supporters deem political freedom – a core function of democracy – as an imperative capability in the context of development, in other words poverty reduction, in their argument.

¹ In contrast, exclusive cost meeting basic nutrition only is generally called "Food Poverty".

As seen in the present government development interventions, it is understood that the norm of directly controlling people's production related activities is still prevalent in government staff including those working in CP organizations, in a narrow context in agriculture sector it is still trying to directory control production, instead of facilitating of environment wherein the individual lives and the individual can make choice of ways of how to improve their productions. Consequently, policies and their development interventions of this Country are different from its root of concept from the viewpoint of the context of poverty reduction that the capability approach stresses. The following argue poverty issues apart from the consideration of political environment:

4.3.3 Presentation of Poverty in the Study

In this Study, the most backward poverty in economic term is concluded as poverty, after referring to the definition of JICA and studying social dimensions, particularly focusing on the examination of 3 profiles of human development indices (HDI), namely economy, education and health that are convenient for availability of data and for comparison. In this regard, CP organizations of this Study consist of Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries and Ministry of Cooperatives in charge of small-scale industrial promotion, and all of these line ministries are in charge of support for livelihood sector of the population, or the agencies directly related to the reduction of poverty in economic term.

It is interpreted that such social development sectors as education and health are important ones for the sake of poverty reduction, while these are found to be relatively favorable in the Study Area. Based on the concept of HDI, life expectancy as a barometer of health in 3 Divisions where the Study Area is located is averaged at 71 years old for female and 67 for male², implying not so short as compared to that of Myanmar mean or of



namely, Economy, Education and Health

ASEAN countries. In addition to the relatively better life expectancy, infant and under-5 mortality rates and also maternal mortality rate are lower as compared to those of other parts of Myanmar (for detailed discussion, see Chapter 4.1.2). It can therefore be said that health status may not be so back-warding as in the economic situation to be mentioned later.

With regard to education, adult literacy, as an earmark indicator of education level, of the area indicates 96%, a considerably high level³. HDI educational indices include gross primary enrollment rate in addition to the adult literacy rate. However, data for estimating gross primary enrollment rate, indicating ratio of enrolled number of children versus number of children who reach schooling age at a specified period, was not available though data was available on how many people have graduated from primary school and how many have dropped out. According to an inquiry in villages of the Central Dry Zone, some children who fail to graduate primary schools no doubt exist. However, the rate estimated by the result of inquiry may be at maximum 20% or less, and even these non-graduated children can read and write owing to literate-trainings in monasteries.

² The life expectancy in the Study Area was collected from TS PDC office.

³ It is assumed that favorable health and educational indicators have bearing with the degree of women's status observed in the Study Area. Even though woman's activities in social forum or in public societies are as inert as that in Japan, no bias in gender has existed in property succession or daily labor (labor division by gender does exist), and women directly manage household budget in many households. Under such circumstances, woman's status is outstandingly high at family level, and this seems to contribute to providing favorable state in the dimensions of health and education.

Meanwhile, from economic point of view, the results of PRA and interview survey have revealed that there are marginalized people who are indebted as a result of failing to procure enough income to sustain livelihood, who cannot borrow money anymore because of outstanding debts, who cannot buy enough food to meet nutritional supply, who cannot help allowing their children being engaged in child labor (for an example, see box), who have lost landholders right that had been placed as collateral becoming a landless (precisely no landholders right) though the extent varies with villages or with individuals.

Particularly observable in the case of landless farm laborers, many people live from hand to mouth due to their limited income amount, and seasonal fluctuation of income source availability is considerable. The result of individual

An example of child labor:

It is reported that within the 6 target villages of the Pilot Project carried out in year 2007/08, there are 2 villages which graduation rate of the primary school is not 100 percent. Recent rate of primary graduate in Khaungkawe Village stands at 75% only, and that in Mingan Village at around 90% only (reported by the village chairmen concerned). Presence of available occupations, tinsmith cottage industry in Khaungkawe Village and sandstone ware production in Mingan Village which even children can be engaged, gives negative impact on the graduation rate, implying that children have to drop out from primary education because of poverty of their households in economic term.

interviews also shows that some landless farm laborers hardly have the chance of eating meats other than the occasions of religious festival / events in the villages. Some of them even have rare chance to eat vegetables, and usually they live on poor menu consisting of rice, fish-paste and edible oil only.

That is to say, such poverty now arises in the Study Area because of lack of income, the basic means of life as failing to spend decent and healthy life with insufficient nutritional intake, or depriving children of education opportunities, one of fundamental human rights, as observed in Khaungkawe Village and Mingan Village. Further aggravated state of poverty seems to appear when one fails to refund his/her debt. Failing of settling his/her debt may degrade one's self-respect and may lead to possibility of losing landholding right entailing to the increased landless population.

4.3.4 Poverty Line

This Study employs Cost of Basic Needs method to establish the Poverty Line same as the previous studies⁴. Under this method, there are conventionally 2 poverty lines; namely, 1) Food Poverty Line, and 2) Non-food Poverty Line. Then, so-called Poverty Line is defined as sum of the 2 poverty lines. Food Poverty Line is the minimum food expenditure in monetary term necessary to pay for a consumption basket that will satisfy caloric requirements of a representative typical adult. Non-food Poverty Line, on the other hand, is defined as reasonable non-food expenditure to meet basic human needs apart from food expenditure. The non-food expenditures are incurred from, for example, education, health and medical treatment, clothing, housing, charity, etc. The Non-food Poverty Line is usually estimated as the non-food expenditure for those whose total food expenditures are around the food poverty line.

1) Food Poverty Line

To establish the Food Poverty Line, we need to calculate the caloric requirements of a representative household in calories per adult equivalent⁵. This Study employs 2,300 kcal per adult equivalent per day as the basis of the requirement. In fact, Dolly used 2,100 kcal while UNDP estimated the basic requirement at 2,303 kcal for the first round survey and 2,295 kcal for the second round survey. UNDP multiplied the size of each population category by the weighted caloric requirement, summed up all population categories, and then divided the sums by the reference household size in adult

⁴ One was carried out by UNDP in 2004 to 2005, from which Poverty Profile covering the entire nation was published in June 2007. Another study was carried out in 2003 by Dolly Kyaw covering Central Dry Zone and published in 'Arming & Rural Systems Economics' edited by Siegfried Bauer and Lila Bahadur Karki.

⁵ In estimating the adult equivalent, 0.65 is applied to child for 5 - 14 years old and 0.24 to child from 0 year to 4 years old.

equivalent. The calculated caloric requirements were 2,303 kcal and 2,295 kcal respectively for the 2 round surveys. The average of the calories is around 2,300 kcal, which is employed in this Study.

Second step is to establish a food basket, based upon what the population actually consumes, in order to meet the basic caloric requirement of 2,300 kcal. To establish the food basket, this Study refers to the food composition table presented by Dolly Kyaw and also the questionnaire survey result by JICA Team carried out in 2007. Following table shows representative food items which are actually consumed by the CDZ population, necessary food consumption scaled up to meet the basic requirement of 2,300 kcal per adult equivalent, and calories contained in each food item⁶.

Items	Consumption per Year, Kg	Calorie per 100g	Received Calorie (contribution,%)	Unit Price In Aug. 2007	Cost, Kyats/ Year (contribution,%)
Rice	160.6	351	1,545 (67)	600	45,897 (28)
Oil	13.3	884	323 (14)	3,200	25,854 (16)
Meat/fish	11.7	147	47 (2)	2,889	20,424 (12)
Eggs 0.0		156	0 (0)	100	30 (0)
Pulses 23.0 2		218	137 (6)	1,300	18,118 (11)
Vegetable	61.7	33	56 (2)	844	31,538 (19)
Spices	19.7	144	78 (3)	1,000	11,917 (7)
Sugar/ Jaggery	8.3	382	87 (4)	1,200	6,060 (4)
Beverage	1.4	278	11 (0)	3,162	2,759 (2)
Others	5.7	106	16 (1)	380	1,305 (1)
Total			2,300 (100)/day		163,903 (100)

Table 4.3.1 Estimation of Food Basket and Food Poverty Line per Adult Equivalent per Year as at August 2007

Source: the JICA Study Team

By using the prevailing food costs in August 2007, when the survey was carried out, above Table 4.3.1 now gives the Food Poverty Line. The Food Poverty Line estimated is 163,903 Kyats per adult equivalent per year at the current price of August 2007. This is equivalent to US\$ 130 by applying prevalent market exchange rate of 1,260 Kyats against US\$ 1.0. The table also shows a typical food basket, to which rice contributes the most by 67% in terms of calorie composition, followed by oil (14%), and then by pulses (6%), so on so forth. As to monetary value, rice also consists of the largest portion of the food basket by 28%, followed by vegetable (19%), by oil (16%), by meat/fish (12%), etc. There is a unique finding, e.g. though rice contributes as much as 67% in calorie consumption while people spend as low as 28% on it in monetary value.

2) Non-Food Poverty Line

Figure 4.3.2 shows the contents of the non-food item that the people actually consume or spend on. Figure 4.3.2 shows the average expenditure monetary value in Kyats per typical household per year out of valid 397 sample households carried out in baseline survey of year 2007. As we can notice, what comes first is the payment to farm casual labors, followed by purchase of farm input such as chemical fertilizer, seeds, etc, and by charity, by clothing, education, medical expenses, and so on so forth. Obviously, the largest 2 expenditures; payment to farm casual labors and purchase of farm input do not accrue for non-farmer households. Figure 4.3.3 and Figure 4.3.4 show the difference very clearly by illustrating the expenditures by social category; namely, by farm household and non-farm household respectively.

Figure 4.3.3 tells us that typical average farm household spends 850,000 Kyats per year for non-food items, amongst which what comes first is the payment to farm casual labors and followed by purchase of farm input. They spend an average amount of 261,000 Kyats for the payment to farm casual

⁶ Calorie values came from FAO calorie conversion table of 1985, and calorie recommendations by the Ministry of Agriculture of Japan, etc.

labors and 162,000 Kyats for the farm input, totaling 423,000 Kyats. The total expenditure of 423,000 Kyats arrives at around half of their total expenditure of 850,000 Kyats.

On the other hand, obviously no such expenditures as payment to farm casual labors and purchase of farm input accrue in non-farm households as shown in Figure 4.3.4. They, non-farm households, spend the most on charity, which may root in the deep religious belief in this Country, and then followed by clothing, education, livestock, medical treatment, cleansing, travel, etc. Their total expenditure arrives at around 308,000 Kyats per non-farm household per year, which is about 36% of what an average farm household spends per annum.





The difference on the non-food expenditure between farm household and non-farm household indicates that the non-food poverty line should be established separately by social category, e.g. by farm household and by non-farm household. To establish the non-food poverty line, firstly non-food poverty line excluding the 2 items of payment to farm casual labors and purchase of farm input is estimated, which can be regarded as the Non-food Poverty Line for non-farm household, and then the 2 expenditures are to be topped up for the Non-food Poverty Line for farm household.



Figure 4.3.5 illustrates the relationship between food expenditure on its horizontal axis and non-food expenditure excluding the 2 items of payment to farm casual labors and purchase of farm input on its

vertical axis⁷. Non-food poverty line per adult equivalent per annum is the non-food expenditure on the food poverty line of 163,903 Kyats. This arrives at 67,147 Kyats (US\$ 53) per adult equivalent per year, which is the non-food poverty line for non-farm household. Figure 4.3.6 shows the relationship between the sum of the 2 expenditures of payment to farm casual labors and purchase of farm input on its vertical axis and food expenditure on its horizontal axis. The expenditure amount in Kyats corresponding to the food poverty line of 163,903 Kyats is 30,897 (US\$ 25). Topping up of this 30,897 Kyats onto 67,147 Kyats arrives at 98,044 Kyats (US\$ 78), that is the Non-food Poverty Line for farm household.

3) **Poverty Line by Social Stratum**

The Poverty Line as aforementioned is the sum of Food Poverty Line and Non-food Poverty Line. The lines are summarized in Table 4.3.2 and illustrated in Figure 4.3.7; which are 261,947 Kyats (US\$ 208) per adult equivalent per annum for farm household, 231,050 Kyats (US\$ 183) per adult equivalent per annum for non-farm household. The shares of the food poverty line out of the poverty line are 63% and 71% for farm household and non-farm household respectively.

Deverty Line	Farm HH	Non-farm HH	Market Rate in	Farm HH	Non-farm HH		
Poverty Line	Poverty L	ine, Kyats	2007	Poverty Line, US\$			
Food Poverty Line	163,903	163,903		130 (63%)	130 (71%)		
Non-food Poverty Line	98,044	67,147	1,260 (Kyats/\$)	78 (37%)	53 (29%)		
Poverty Line	261,947	231,050		208 (100%)	183 (100%)		
Sources UCA Study Team							

Table 4.3.2 Poverty Lines per Adult Equivalent per Year estimated by JICA Study as of August 2007

Source: JICA Study Team

Poverty lines estimated above are the necessary expenditures in Kyats per adult equivalent per annum to keep their livelihood by uptaking 2,300 kcal per day and also basic non-food items. By multiplying number of typical family members into the poverty line per adult equivalent per annum gives us a typical poverty line now estimated per household per annum. According to the baseline survey carried out by JICA Team in 2007, average number of family members is 5.141 and this comes to 4.680 after multiplying reduction factors⁸ to children against adult-equivalent in order to adjust caloric requirement for children. The poverty lines per household per annum are therefore worked out as shown in Table 4.3.3. The poverty lines are about 1.2 million Kyats (US\$ 973)



and about 1.1 million Kyats (US\$ 858) for farm household and non-farm household respectively.

⁷ One may say that the non-food poverty line can be estimated based on the whole non-food expenditures by social category, in that non-food poverty line based on what is shown in Figure 1.2.2 and on what is shown in Figure 1.2.3. In fact, this may be one of the estimation methodologies, however this estimation would lead us to lower non-food poverty line for non-farm household since their expenditures are obviously lower than that of farm household simply because they are poorer. As human being equal in its right to make livelihood, the JICA Team is of the opinion that expenditures excluding the 2 items of payment to farm casual labors and purchase of farm input should be equally pursued regardless he/she is farmer or not. Therefore, the non-food poverty line in this report was firstly estimated for those excluding the 2 items regardless he/she is farmer or not, and then the 2 items were topped up on the base non-food poverty line.

⁸ In estimating the adult equivalent, 0.65 is applied to child for 5 - 14 years old and 0.24 to child from 0 year to 4 years old, Poverty Lines in Theory and Practice, Living Standard Measurement Study, Working Paper No.133, WB)

Deverty Line	Farm HH	Non-farm HH	Market Rate in	Farm HH	Non-farm HH
Poverty Line	Poverty L	ine, Kyats	2007	Poverty Line, US\$	
Food Poverty Line	767,066	767,066		609 (63%)	609 (71%)
Non-food Poverty Line	458,846	314,248	1,260	364 (37%)	249 (29%)
Poverty Line	1,225,912	1,081,314		973 (100%)	858 (100%)

Table 4.2.2 Boyerty Lines per Tyr	ical Household per Veer estimated by	WICA Study on of August 2007
Table 4.3.3 Foverty Lines per Typ	Dical nousenoiù per rear estimateu p	y JICA Sludy as of August 2007

Source: JICA Study Team

In countries that poverty lines have not yet been established based upon baseline survey, a simple methodology is often applied. The simple method estimates poverty line to be just US\$ 1 per day per person. This gives us US\$ 365 per person per annum. Given a typical number of family members of 4.68, the simple poverty line for a typical household comes to US\$ 1,708. The poverty lines shown in Table 4.3.3, US\$ 973 and US\$ 858 for farm household and non-farm household respectively, are found to be about half of the simple poverty line of US\$ 1,708. This fact attributes to the low prices of the major commodities, especially rice, in the Study Area, and in the Country by and large.

4) **Poverty Ratio**

Given the Poverty Lines in Table 4.3.2, poverty ratios are estimated by all the sampled households, by farm household and non-farm household separately, and further poverty ratio only for farm casual labor household, the poorest of the poor in most cases, is estimated. Then poverty ratios by gender, by male-headed household and by female-headed household, are estimated separately. In addition, poverty ratios by village are also estimated. The poverty ratios for all the samples, by gender, and for the villages are calculated by weighting the poverty ratios for farm and non-farm households with the sample numbers respectively.

Figure 4.3.8 shows the cumulative adult equivalent headcount by category such as farm HH, non-farm HH and farm-casual labor HH, and Figure 4.3.9 by gender such as male-headed HH and female-headed HH, versus log of the annual expenditure per adult equivalent. The poverty line of 261,947 Kyats per adult equivalent per year is at the scale '5.42' in log while the poverty line of 231,050 Kyats is at the scale '5.36'. With these log scales, poverty ratios are calculated as summarized in Table 4.3.4, and pointed out are:

1) Poverty ratio by all the sampled households is 43%, and the ratio for farm household only 33% is whereas the one for non-farm household is 55%. This clearly shows poverty for household non-farm is deeper than that of farm-household. Further the poverty ratio for farm casual labor is as high as 75%. This result clearly shows where the poorest people are; that is in the category of farm casual labors.



2) Poverty ratio by gender shows deference as expected; namely, the ratio for male-headed household

is 43% while the one for female-headed household is 49%. Though the sample number for female-headed household is not enough, say only 34 samples (only 8% out of whole 419 sample households), yet we can see the tendency for female-headed household suffering more in poverty.

 Poverty ratio by village varies widely from 31% to as high as 72% (see Table 4.3.4). Villages showing



relatively low poverty ratio are Ar La Ka Pa village (31%), Ma Gyi Sauk village (42%), Khaungkawe village (43%) and Legaing village (43%). Ar La Ka Pa village is endowed with good accessibility to urban areas by which economy is facilitated. Khaungkawe village has lots of cottage industry activities giving employment opportunities to the villagers, while such 2 villages as Ma Gyi Sauk and Legaing are equipped with irrigation facilities whereby 2 paddy croppings are available. On the other hand, the poverty ratio for Mingan village is 56% and the one for Magyi village is as high as 72%, the highest amongst the 6 villages. These 2 villages are located in very remote areas and hit often by drought, resulting in unstable agricultural production.

4) Table 4.3.9 shows poverty gap ratio as well, indicating the depth of the poverty; corresponding to the distance between the poverty line and the average of expenditures for those who fall below the poverty line. In other words, adding the monetary value calculated by multiplying the poverty gap ratio into the poverty line, the person can be lifted up to the poverty line. The poverty gap ratios are; 11%, 8%, 14%, and 20% for whole sampled households, farm household, non-farm household, and farm casual labor household. It is indicated that the depth of the poverty for non-farm household is deeper than that of farm household, and again that of farm casual labor household is further deeper than that of non-farm household. The poverty for farm casual labor household is more than 2 times deeper than that of farm household (20% vs. 8%).

Particular	Valid Sample No.	Poverty Ratio, % (Expenditure)	Poverty Gap Ratio (%)	Poverty Square Gap Ratio (%)
Whole of 6 Villages	397	43	10.69	3.68
Farm HH	212	33	8.19	2.75
Non-farm HH	185	55	13.56	4.74
Farm Casual Labor	66	75	19.68	6.75
Male Headed HH	363	43	10.73	3.71
Female Headed HH	34	49	10.20	3.36
Mingan village	21	56	8.34	2.06
Magyi village	49	72	23.33	9.06
Khaungkawe village	48	43	9.88	3.32
Ar La Ka Pa village	130	31	6.97	2.21
Ma Gyi Sauk village	53	42	8.56	5.90
Legaing village	96	44	9.65	2.89

Table 4.3.4 Poverty Ratios by Category and by Village

Source: JICA Study Team

5) Necessary Sum of Raising the Poor to the Poverty Line

The poverty gap ratio is used to provide an estimate of the sums required to raise the consumption level of all poor families up to the poverty line. For example, at all the village average level, the poverty gap ratio stands at 11% which means that the additional expenditure to raise the poor up to the poverty line equals to 11% of the poverty line as average. Here the average poverty line arrives at 247,594 Kyats by weighting the 261,947 Kyats for farm household poverty line and 231,050 Kyats for non-farm household poverty line with its sample numbers, 212 and 185 respectively. Then, by multiplying the target population with the additional expenditure, we can know how much total sum is required to raise all the poor people up to the poverty line.

Table 4.3.5 calculates the necessary sum to raise all the poor in CDZ. To raise a typical poor, there should be an additional expenditure of 26,463 Kyats per year (equivalent to 21 US\$ by applying market prevalent ratio of 1,260 Kyats against US\$ 1.0 as of August 2007). Multiplying the population to the additional expenditure arrives at 102 billion Kyats (US\$ 93 million) per year for the whole population of CDZ (51 TSs), and 98 billion Kyats (US\$ 81 million) per year for the whole rural population of CDZ (51 TSs). Note is that the poverty line, 247,594 Kyats, was estimated on basis of household survey done in 6 villages for the FY 2007/08 pilot project, thereby in essence it can be applied to the rural population only but not accurate in applying to the population in urban area.

Particular	Estimation	US\$ (1,260 Kyats/1US\$)	Remarks
Poverty Line, Kyats	247,549		Waighted mean of FUU
Poverty Ratio, %	43		
Poverty Gap Ratio, %	10.69		
Required Amount per Poor, Kyats & US\$	26,463	21	@1,260Kyats/\$
Population in CDZ in 2003	9,841,620		for 51 townships
Rural Population in CDZ in 2003	8,293,199		84%
Urban Population in CDZ in 2003	1,548,421		16%
Adult equivalent Pop. in CDZ in 2003	8,959,109		X 4.680 / 5.141
Adult Equivalent Rural Pop. in CDZ in 2003	7,549,537		Factor to estimate adult
Adult Equivalent Urban Pop. in CDZ in 2003	1,409,572		equivalent population
Required Sum for Total Pop. of CDZ, Kyats	101,946,507,630	80,909,927	exclusive of City Council Area
Required Sum for Rural Pop. of CDZ, Kyats	85,906,860,981	68,180,048	
Required Sum for Urban Pop. of CDZ, Kyats	16,039,646,649	12,729,879	reference

Table 4.3.5 Estimation of Necessary Sum of Raising the Poor to the Poverty Line

Source: JICA Study Team

4.3.5 Inequality in Income: Gini Index

There should be inequality in villagers' income. The inequality itself may be justified if it is not so big since it may spur people's competition towards economic vigorous activities. However, if the inequality between the rich and poor, or between the Haves and Have-nots, are considerably high, it may not be accepted socially and social security cost may arise in some societies. Here inequality among villagers is examined by using the baseline survey results administered to the 6 target villages for the pilot project implemented in FY 2006/07.

1) Measuring of the Inequality: Gini Index

To measure the inequality among village members, Gini index is employed in this Study. Gini index is understood by the geometry definition "Area enclosed by the *Lorenz* curve and the diagonal". If one may take the horizontal axis as the cumulative share of people from lower income and draw the cumulative share of income earned, then the curve becomes *Lorenz* curve, and the area between the *Lorenz* curve and the straight line



(diagonal = even distribution line) becomes Gini Index (the triangular area composed of the axis and the diagonal is assumed to be 1).

Given the magnitude of the Gini Index, one can understand the value of the Gini Index as the degree of income inequality. The Gini Index is 0.3 in "the society where one king owns 30 % of the whole income and the other people have others" and also in "the society where the citizen layer of 70% gets all income and the slave layer of 30% gets nothing"⁹. There is no clear definition of the difference in this case. A right

Table 4.3.6 Standard Interpretation of Gini Index					
Gini Index	Standard Interpretation of Gini Index				
Less than 0.1	There is an artificial background for leveling.				
0.1 – 0.2	Though considerably equal, there is an anxiety to obstruct the effort to the improvement.				
0.2 – 0.3	Usual distribution type that exists in general in society.				
0.3 – 0.4	Though there are some differences, there is also a desirable respect in the improvement through				

The difference is serious

competition.

Over 0.5 The improvement is required except under special circumstances

Source: Wikipedia

table is one standard to understand the degree of inequality according to the value of the Gini Index.

0.4 - 0.5

2) Gini Index for the 6 Villages

Figure 4.3.11 shows the *Lorenz* curve for the 6 villages, based on which Gini Indexes are calculated. Table 4.3.7 summarizes the Gini Index by village with incomes by such category as whole sample, farm households who in most cases are the richest, farm casual labor households who in turn are the poorest, etc. Figure 4.3.12 compares the Gini indexes by village and Figure 4.3.13 comparatively shows the annual incomes of farm household and farm casual labor household; the richest and the poorest (since almost no farm



casual labor household in Mingan village, it was replaced by income of those who earn from sandstone ware production, the poorest of the people in the village). It is noted that:

- 1) Gini Index ranges from 0.197 for Mingan Village to 0.411 for the Legaing Village with an average of 0.387. Mingan village is only the one whose Gini index is lower than 0.2 while there are 2 villages where the Gini index is already over 0.4, which are Ar La Ka Pa and Legaing.
- 2) Mingan village's Gini index is the lowest, 0.197, and also the average income per year per household is 817,317 Kyats which is also the lowest amongst the 6 villages. This village is located in remote area in Bago Hills and very often hit by drought, resulting in low and unstable agricultural production. Here in this village, we may say people are poor and equally poor.
- 3) In 2 villages of Ar La Ka Pa and Legaing where the Gini index is over 0.4, we may say the difference between rich and poor is considered somewhat already serious. As indicated in Figure 4.3.13, the gap in annual income between the farm household and farm casual labor reaches as much as 3 times. Ar La Ka Pa village is situated at a relatively accessible location to urban areas where some villagers may have fetched good opportunities to raise their income while the others

⁹ This Gini Index is decided by the area, and is not related to the shape of the Lorenz curve. Therefore, even if the ratio of a rich layer to the poor layer is different, the Gini Index becomes the same in some cases.

may have not. Legaing village is blessed with irrigated paddy field, whereby income gap between the farmer and landless may have become large, giving the Gini Index over 0.4.

	Valid	alid Average of Income (Kyats/Year/HH)						Cini	
Village Name	Sample	Whole	Farm	Casual Farm	Livestock	Cottage	Industry	Others	Index
	No.	WHOle	Household	Labor	LIVESIOCK	Employed	Self-running	Others	Index
Mingan	22	817,317	1,037,467	-	-	789,600	724,545	584,755	0.197
Magyi	47	1,131,688	1,147,471	550,700	707,500	-	1,159,876	2,367,500	0.321
Khaungkawe	47	1,059,165	1,442,082	894,750	841,897	1,204,173	877,797	499,300	0.291
Ar La Ka Pa	139	1,543,106	2,022,950	860,665	1,684,475	1,066,625	1,279,183	964,777	0.406
Ma Gyi Sauk	52	1,126,079	1,183,606	597,940	723,000	1,455,000	1,709,000	1,231,108	0.363
Legaing	108	1,269,271	2,184,371	748,074	1,068,800	708,500	1,199,112	1,067,423	0.411
6 Villages	415	1,304,199	1,669,984	754,956	1,200,146	1,063,644	1,127,951	1,286,556	0.387

Table 4.3.7 Gini Index by Village and Income by Source

Source: JICA Study Team



Taking into account above results, one may suggest that income for the poor should be increased. In fact, even in case that both husband and wife have been engaged in farm casual labor work throughout year, they cannot get out of the poverty, as indicated by their annual income 648,000 Kyats (1,800 x 360 days) vs. 1,081,314 Kyats that is the poverty line for non-farm household. They need to find additional means of income, or they cannot get out of the poverty. Assistances of increasing their income or diversifying their income should be provided.

In addition, a distribution policy from the rich, mostly farmers, to the poor may have to be put in place since there are already villages where a considerable income gap is found as Gini index over 0.4^{10} . With respect to this, there is land tax for farmers in Myanmar, which is about 5 Kyats per acre for a productive land and as little as 1 Kyats per acre for non-fertile lands. These rates were established under the colonial rule, since which they have not been revised. One of the policies for raising the poor in economic term or narrowing the gap between the rich and the poor may be to raise these land taxes, and then distribute according to social needs.

¹⁰ As a reference, Gini index of Japan is 0.526 before tax adjustment, and this is converted into 0.387 after taking into account social warfare programme, tax redistribution, pension payment, etc., Source: Report on Income Distribution, August 2007, Ministry of Labor and Welfare)

4.4 Development Vision, Strategy, and Typology of the Study Area

4.4.1 Development Vision of the Study Area

Major means of livelihood in the Study Area is agriculture, and also animal husbandry and small-scale industries are run supporting the mainstay. While extensive agriculture is practiced over dry upland of rolling hill topography as typically observed in Bago Hills, intensive agriculture also exists in the Study Area that is engaged in fertile farmland developing along Ayeyarwady River and in irrigated paddy land. Animal husbandry is complementary means supporting agriculture, possibly serving as a precious income source especially for the landless poor who raise sheep and/or goats depending on dryness of land. Indigenous endemics seldom occur owing to land dryness, but some parts of the dry zone have difficulty in securing water while in some other parts along Ayeyarwady River floods in rainy season deteriorate living environment.

Thus, a variety of livelihood and life are sustained adapting to various natural environment in the CDZ. In view of these situations, it has been agreed in the Scope of Works prior to the commencement of this Study to elaborate development programmes including 4 major scopes consisting of 1) agricultural development, 2) creation of off-farm income sources, 3) living improvement and 4) supporting activities, focusing on the inhabitants livelihood. Taken these scopes into account, development vision in the CDZ – future scope of development – is proposed as "Area Wherein People Enjoy Well-beings¹ Based Primarily Upon Agriculture and Livestock Production Suitable to the CDZ Environment, Off-farm Incomes from Cottage Industry, Good Living Environment and also Better Supporting Systems".

4.4.2 Guiding Principles of the Study Area

Wherever relatively bestowed with resources, efforts of improving the productivity of existing income sources as well as those of enhancing income levels will lead to the entire growth of the CDZ. Not only smallholder farmers but also large-scale ones holding irrigated farmland can additionally create benefits for poorer strata through the enlarged employment opportunities. On the other hand, wherever handicapped by precarious climatic/ meteorological conditions in the CDZ, first of all it is imperative to stabilize the existing crop production, following to diversifying income sources for hedging risks. Further, in parallel with these measures, living environment should be improved and basic infrastructure must be improved in order to activate/ facilitate economic activities by the inhabitants. Keeping these in mind, 5 guiding principles are given as follows to achieve the above proposed development vision;

- Improving productivity of the existing income sources including agriculture, livestock, small-scale industries: Though people living in the Study Area earn their livelihood by means of agriculture, animal husbandry and small-scale industries, their crop and animal husbandry techniques still remain in a low level, and crop sales networks are not well developed either. These bottlenecks have kept productivity at low level and have limited benefits from their activities. Hence, it is planned to improve the production and productivity of the existing income sources, and to strengthen sales network thereby increasing income.
- 2) Diversification of income sources by introducing livestock/ new industrial activities to improve and stabilize income of the poor strata: Diversification of income sources serves as safety net for livelihood sustenance above all that for the landless and smallholders, playing an important role of reducing their poverty. Diversification of income sources is pursued through the promotion of livestock promotion chiefly with goat raising that is more suitable for dry zone, also

¹ Bamar race people residing in the CDZ are very much concerned with their religious beliefs in their ordinary life, in that 'Well Beings' rather than just 'Economic Betterment' may be suitable for their future vision.

through the promotion of small-scale industries that are not affected by climatic vagary to envisage stabilizing the income of poor strata.

- 3) Raising productivity and expansion of employment opportunities of poor strata/ the landless by promoting fore-running industries: In order to raise productivity as well as to create employment opportunities for poor strata, on-going industrial activities in progressive TSs or in leading villages should be strengthened/ escalated. Likewise, as advanced agricultural areas like irrigated perimeter have been under the stable productive environment, improvement of farm productivity is pursued and in parallel increased employment of farm laborers is envisaged.
- 4) Improvement of living environment through improvement of basic infrastructure as a public safety net: Among village life-related infrastructure, those particularly related to poverty in the Study Area including 3 profiles, namely, secured supply of safe water, housing improvement and rural electrification are given prior importance, for which support for vitalizing villagers economic activities is planned. Besides, vitalization of economic activities in wider area requires better marketing networks especially improvement of road networks.
- 5) Extension of living improvement providing options: Livelihood base on risk hedging serves as rationale of village life for the villagers living in the unstable environment like dry zone except for the villages bestowed with irrigable farmland tracts. In such an area, instead of a mere fruit-oriented extension pursuing straightly the same pre-determined goals, a more flexible way of extension is required providing so-to-speak options for villagers selection so that diversification of livelihood can be realized. The government staff concerned should acquire diversified and versatile techniques and employ a flexible extension approach, leaving the villagers what to select for their own development.

4.4.3 Typology of the Study Area with the Development Strategies

The Study Area holds an area of 75,169km², extending latitudinally about 560km, longitudinally about 130km. In this vast space, natural conditions like precipitation, topography, soils etc diversely vary, so do inhabitants' livelihoods. In formulating development plan of the CDZ, typology should be established for this vast area based on relevant indicators. It is necessary to make the development plan more concrete and more effective, so that diverse types of development plan – intervention measures – can be proposed according to various typologies.

Typology is tried at TS level. 51 TSs are included in the Study Area. TS is a frontline where many government offices are placed, and data required for the basis of typology are available at this level. In this concern, basal unit of inhabitant's life is village. 10,358 villages exist within the Study Area (as of August 2006), however, no systematized data exists at this level. This is the reason why the unit of typology is set at TS level, though it inevitably means that some of the averaged 203 villages in a TS have different characters from the established typology for the TS.

Even within the same TS, cases possibly arise where mainstay of livelihood – namely typology at village level – varies from village to village. Many villages belonging to certain TS fall into the typology given to the TS, but it doesn't necessarily mean that all the villages in the TS have the same typology. Therefore, in so far as so-called community-based services except for public works like widely stretching roads are concerned, interventions by village unit (or its upper stratum; Village Tract) will commonly be made, but practically, actual intervention menu should be examined not only referring to the given typology at TS level but also by identifying village-wise (or Village Tract wise) typology.

As to indicator to be employed for the typology, diverse indicators are applicable such as natural condition represented by topography and rainfall, social one including health and education. Though

the former greatly varies with areas, the latter doesn't have much difference as the inhabitant's type of behavior within vast predominance of the same ethnicity (Bamar race). Also, health and education are heavily dependent on uniform administrative services given by the Government. That is to say, although some difference by location is possibly found in the dimension of health/ hygiene, for example water security that is heavily affected by natural environment, social condition as a whole tends to be similar regardless of location as compared to natural one.

Taking these into accounts, establishing of typology of the Study Area starts with natural environment, above all such natural condition as topography, rainfall, soil types etc that directly influence inhabitants' livelihoods and daily life, then examined are mean landholding, ratio of smallholder farm households, ratio between upland and paddy land, rate of irrigated perimeter (irrigable paddy land) and other factors related to agriculture, the mainstay of the Study Area.

In addition, ratio of farm/ off-farm households, rate of agricultural sector contribution to regional GDP and degree of access to market estimating from the distance from village to township etc are taken into consideration. The results of the examination are briefed in the following along with Table 4.4.4 indicating 5-step evaluation, in a scale of 1 to 5, of these indicators by TS.

- 1) Topography and soil conditions of the Study Area can roughly be divided into Bago Hills running through around the central part of the Study Area from the southern tip of the Area towards north and the rest of plain area. Because Bago Hills is situated in exceedingly dry area and is covered with weathered soils derived from sandstone, agricultural productivity on this hilly area is very low. Extensive upland farming predominates in overall land use along Bago Hills range except Myothit TS and Taungdwingyi TS characterized with developed paddy farming along streams, located in the south of this hilly area.
- 2) Out of the areas where livelihood relies on plain land, the part nearer to Bago Hills belongs to the same upland area where extensive farming is engaged. Also, upland farming is engaged in remote areas distant from the plain of Ayeyarwady River bestowed with fertile fluvial deposit soils. On the other hand, on the same plain more intensive farming is practiced in fertile farmland tracts along Ayeyarwady River and its tributaries, and in the areas located nearer to townships where economic activities are viable.
- 3) Intensive paddy farming develops where water resources are relatively available (farmland area located in lowland where irrigated paddy can be cultivated accounts for 28% of the whole Study Area). In addition, irrigated paddy is cropped in farmland equipped with irrigation facilities where intensity of agriculture reaches a peak. In brief, the most extensive farming is practiced on upland over Bago Hills, whereas the most intensive one engages irrigated paddy area located along Ayeyarwady River and its tributaries.
- 4) The geographic distribution of goats is closely correlated with rainfall distribution. In fact, around the center of the Study Area where rainfall is scanty, the population of goats tends to be larger. Also, crop area under pigeon pea that is most resistant against dry climate tends to increase. Inversely, wherever with higher precipitation farming becomes more intensive, accompanying with lowering rate of goats against cattle. In such an area draft cattle used for tillage are more held instead of goats.
- 5) The relation between rate of smallholders or ratio of farm households to off-farm ones and farming intensity does not distinctly appear (in common, the higher farming intensity grows the smaller farmland area per household becomes, and vice versa the more extensive farming remains the larger landholding area is required). One of the reasons of this complexity may come from incomplete aftermath of past agrarian reforms. Another conceivable reason is found in the fact

that edible oil extracted from sesame, typical extensively produced crop in upland field had been dear in the past that allowed farmers to sustain their livelihood with narrow farmland (at present, however, prices of domestically produced oilseeds have been slackened because of large imports of palm oil from Malaysia).

6) Where farm household ratio is high, i.e., rate of the landless is low, and share of agricultural sector contributing to Regional GDP is naturally high. However, high agricultural sector contribution at TS level does not necessarily warrant high farm output per farm household. While the share of agricultural sector in Regional GDP composition is high in TSs where agriculture predominates, the determinant factor of agricultural productivity in these TSs is the presence and degree of irrigated farmland that has the highest intensity among various forms of farming.

Concluding from what is mentioned above, 5 types as illustrated in Figure 4.4.1 and summarized in Table 4.4.1 are proposed as typology that are positioned in between two extremes, one representing TS located mostly along Bago Hills where the most extensive upland farming takes place and the other representing that with irrigated paddy land where the most intensive paddy farming is engaged.



Table 4.4.1	Characteristics and Explanatory	/ Remarks of Type I -	V Observed in the Study	/ Area

Туре	Characteristics	Explanatory Remarks
Ι	Plateau, Extensive farming, Livestock area with goats, Inert cottage industrial activities, highly poverty stricken area	The area extends over Bago Hills. Soils are futile and very much dry due to scanty rainfall. Agricultural productivity is low and goats are raised. Poverty rate is the highest of all the area.
II	Plain, Remote and extensive farming area, Inert cottage industrial activities, high rate of poverty	Located in plain but particularly nearer to Bago Hills, or remote area from township. Farming is chiefly practiced on upland, rather extensively though soils and other ambient conditions are better than those in Type I.
111	Plain, in the vicinity of streams, fertile soil, nearer to township with favorable market access, fairly active cottage industries, medium poverty rate	Area develops along Ayeyarwady River and its tributaries. Upland farming predominates, and slightly intensive with favorable ambient conditions with better soils. Industries have more developed than type I and II because of large townships are located inside the area nearer to it.
IV	Paddy land zone, intensive farming area, more cattle are kept in place of goats, fairly active cottage industries, low poverty rate	Paddy area occupies over one-third of whole farmlands in this area. Farm productivity is higher than that in Type I - Type III owing to fairly flat farmland with more bestowed rainfall where upland extends beside paddy land. Farming becomes rather intensive. Draft cattle are more fed in place of goats. Cottage industries are highly developed near townships.
V	Intensive farming area with irrigated paddy. Draft cattle are held rather than goats, low poverty rate, but larger disparity. Industries like rice mills exist.	Paddy area occupies over one-third of whole farmlands in this area, and further one-third of them are irrigated. Farmers practice the most intensive farming. Fewer goats are reared but more draft cattle are fed. Various industries prosper from cottage scale weaving to rice milling starting by investing surplus of farm income. Poverty rate in the area is low but wider disparity is found between farm households and the landless.

Source: JICA Study Team
Further, the result of typological characterization of 51 TSs according to the proposed typology is shown in Table 4.4.2 and Figure 4.4.4. The area mainly developing over Bago Hills is typed into Type I, while the area with large extent of irrigated paddy land is classified into Type V. Thus, the nature of farming shifts from extensive to intensive as the Type proceeds from I towards V.

Туре	Characteristics	-	Target Area (Division / TS)
I	Plateau, Extensive farming,	Mandalay (2)	Kyaukpadaung, Nyaung-U
	cottage industrial activities, highly	Sagaing (0)	
	poverty stricken area	Magway (7)	Pakokku, Pauk, Chauk, Natmauk, Minhla, Aunglan, Sinbaungwe
	Plain, Remote and extensive farming	Mandalay (4)	Taungtha, Natogyi, Ngazun, Mahlaing
	activities, high rate of poverty	Sagaing (3)	Budalin, Yinmabin. Pale
		Magway (3)	Myaing, Yesagyo, Seikphyu
	Plain, in the vicinity of streams, fertile	Mandalay (2)	Tada-U, Myingyan
	soil, nearer to township with favorable market access, fairly active	Sagaing (4)	Sagaing, Myinmu, Monywa, Salingyi
	cottage industries, medium poverty rate	Magway (3)	Magway, Yenangyaung, Minbu
IV	Paddy land zone, intensive farming area more cattle are kept in place of	Mandalay (3)	Meikhtila, Thazi, Wundwin
	goats, fairly active cottage industries,	Sagaing (6)	Myaung, Chaung-U, Ayadaw, Taze, Khin-U, Kanbalu
	low poverty rate	Magway (7)	Myothit, Taungdwingyi, Salin, Ngaphe, Thayet, Mindon, Kamma
V	Intensive farming area with irrigated paddy. Draft cattle are held rather	Mandalay (2)	Kyaukse, Myittha
	than goats, low poverty rate, but larger disparity. Industries like rice	Sagaing (4)	Shwebo, Wetlet, Ye-U, Tabayin
	mills exist.	Magway (1)	Pwintbyu

Table 4.4.2 Typology and Target Area of Type I - V Observed in the Study Area

Source: JICA Study Team

Likewise, annual rainfall progressively augments from Type I to Type V. Coinciding with this shift of precipitation, high rate of goats observed in Type I or Type II shifts to high rate of cattle in Type V. As to the distribution pattern of small-scale industries no distinct characterization can be mentioned. However, a tendency is detectable that cottage industries including rice milling are slightly more developed where more intensive farming is practiced, in other words favorable living conditions prevails.

Viewing the extension of typology from physiographical aspect, Type I develops over hilly area, while type II - Type V are mostly situated in flat plain. Then, Type II is found in remote areas and in the vicinity of Bago Hills where farming intensity is higher than that in Type I, but still extensive farming is practiced. Such extensive farming is shifting as area approaches to Type III to more intensive farming such as one practiced in fertile farmland along Ayeyarwady River and its tributaries.

In addition, townships are located near the area under Type III where access to market can be secured. Then, paddy cultivation that enables more intensive farming than upland cultivation is often observed in the area under Type IV and Type V. The TS in which paddy area exceeds one-third of the total farmland thereof falls into Type IV, and further out of these TSs those with more than one-third of paddy land therein irrigated fall into Type V.

Above typology is examined by a statistical analysis, e.g. principal component analysis. Table 4.4.3 shows the result of the factor proportion ratios according to the component No.1 to No.5. Factor proportional ratio means correlation ratio between the factors and the components where the nearer to 1.0 the factor is the higher positive correlation it is observed. Component one shows 0.879 in the percentage of paddy area against upland area and 0.586 in the share of irrigated area in cultivated land.

This	result	implies	these 2	factors	command	the	typology	to	greater	extent	whereby	the	above
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Factor	1	2	3	4	5	Remarks
Share of marginary arable land	0.197	-0.230	-0.525	-0.430	0.445	
% of Deposit & Alluvial Soil	0.172	0.655	0.012	-0.436	-0.199	
% of Foot Plain & Terrace	-0.305	-0.351	0.424	0.716	-0.202	
Average rainfall for 5 years (2001/05)	0.510	-0.220	0.126	0.263	-0.200	
% of Goat/Sheep ag/ Cattle	-0.841	-0.098	-0.127	-0.256	-0.095	
% of Pigeon Pea against net sown area	-0.643	-0.325	0.131	-0.301	-0.061	
Average Farm Land, acre	-0.430	-0.230	-0.396	0.426	0.140	
Share of small scale farmer less than 5 acres	0.078	0.637	0.623	0.016	0.108	
% of Paddy ag/ Upland	0.879	0.220	-0.235	0.097	-0.101	
Share of irrigated area in cultivated land	0.586	0.031	-0.515	0.386	-0.028	
% of Kaing/ Kyun ag/ whole	0.078	0.687	0.255	0.043	0.150	
% of Farm Households	0.474	-0.698	0.252	-0.323	-0.100	
% of Non FHH in Rural	-0.471	0.695	-0.254	0.336	0.151	
% of Agriculture GDP	0.278	-0.366	0.401	0.196	0.523	
Agr. GDP per FHH	0.118	-0.042	0.387	-0.170	0.524	
Distance from Divisional HQs	0.118	-0.018	0.150	-0.181	-0.635	

Table 4.4.3 Proportional Ratios in Accordance with Factors (showing only factor No.1 – No.5)

Source: JICA Study Team

From inhabitant's extent of poverty point of view, Type I may have the highest poverty rate, and the rate would become lower as the type proceeds to Type V. In this connection, Type V in which farmers are engaged in the most intensive irrigated paddy farming may have wider disparity between irrigated landholders and the landless. Namely, though TSs falling into Type I are poor but the villagers may be uniformly poor, whereas those falling into Type V has higher average income but may be with larger economic disparity.

This estimation is exampled in Figure 4.4.2 as the case of Gini index by 6 target villages for the pilot project implemented in 2007/08. The Gini index for Mingan village which falls in the TS of Type I is 0.20 only meaning very minimal income disparity among villagers while the Gini index becomes bigger as moving toward Legaing village which falls in the TS of Type V.

Since TSs falling into Type I - II are susceptible



to drought damages it is not so easy to step up themselves with the accumulated surplus from farm production invested in industries. On the contrary, TSs falling into Type IV and Type V are possible to practice highly productive farming under stabilized environment, where some people can establish their own enterprises such as rice millers making use of the accumulated surplus out of farming activities.

Precarious rainfall typically in the CDZ tends to occur in the area under Type I where livelihood tends to be unstable. In contrast, TSs under Type V with high irrigation rate have capability of yielding stable and high level outputs. Reflecting these conditions, TSs under Type I require measures to stabilize currently unstable livelihood, or development based on risk-hedging as the development strategy. Under higher risk of losing output from investment, it is the best policy to refrain from venture oriented to ambitious production through straightforward input of chemical fertilizers. Whereas, TSs under Type V have tools, e.g. irrigation facilities, that can control natural vagary,

enabling to follow straightforward process of growth that entails increased outputs as very often resorted by the extension services in Myanmar. A kind of linear growth oriented development can be applied in this Type V as the development strategy.

In summary, development strategy should be changed according to the typology of the TSs in the Study Area; namely the nearer the TS is located in Type I the more risk-hedged strategy should be pursued while the nearer the TS approaches Type V, the more linear oriented growth development can be pursued. Two bipolarized strategies should be pursued in those extremes of the Study Area, and practically somewhat



combined strategy with one or the other more prioritized as to which extreme the concerned TS is nearer should be applied (see Figure 4.4.3).

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4.5 Development Planning for the Central Dry Zone (Macro Level)

This sub-chapter undertakes development planning to meet the development vision, strategies and the typology discussed in aforementioned sub-chapter 4.4. Develop planning here is done at macro level, namely dealing with CDZ as a whole, and development planning at village level is to be carried out in the next sub-chapter '4.6 Development Planning at Village Level'.

The development planning in this sub-chapter is based on a series of participatory workshop inviting villagers as well as government officers from the concerned 3 ministries as agriculture, livestock and cottage. Summing up all the works done in the workshops together with contributions by the JICA Study Team, a prioritized CDZ framework is finally presented together with project/ programme description in a simplified project design matrix (PDM).

Development framework presented in this sub-chapter can be a guide when the concerned 3 ministries try to carry out development activities in the CDZ because the framework provides with concrete development components, those priorities by sector and by area (TS) at which what projects should be carried out. In addition, any organizations which work in CDZ can refer to the framework from which they can know where to carry out their development intervention with what priority. In this way, the frameworks can also work as a development platform where all the concerned development partners can make concerted efforts.

When considering development intervention in a village, there should be comprehensive activities required. Not only agricultural activities but also livestock, cottage industry, and other development activities would be required since there are different livelihoods even in a village. Simple example is that there are farmer households and non-farmer households in a village, thereby when thinking of village level development, agriculture alone can hardly raise the wealth of whole villagers. The framework presented here implies that such comprehensive intervention would be achieved as a result in that each concerned ministries carry out development intervention according to the priority set in the framework. Therefore, the plan can be implemented by the current government organizational set up.

On the other hand, there is another development intervention approach undertaking village from comprehensive point of view directly. A village, for example, is picked up and then plural development activities are planned and comprehensively implemented covering agriculture, livestock and cottage industry, so on. In this approach, a task team will be required to coordinate such comprehensive activities. Such task team can be organized by government concerted efforts or otherwise with a help of external organization, like JICA study team which was in charge of coordinating the activities of pilot project implementation. This approach is further elaborated in the next sub-chapter:

4.5.1 Priority Approaches and Strategies by Participatory Approach

This Study had carried out a series of participatory workshops inviting villagers engaged in 6 target villages for the pilot projects done in 2007/08, TS level government officers, district, divisional and also headquarters' level officers. The participatory workshop for the purpose of development planning was done 2 times in 2007 at the same when mid-term and final evaluation workshops for the pilot project were held. Participants to the workshops are listed as below:

Category	1 st (Mid-term Eva.) Workshop 5-7 December 2007	2 nd (Final Eva.) Workshop 30, 31 Jan, 1 Feb, 2008	Remarks
Headquarters Officer	8	5	
Divisional Officer	13	9	

Table 4.5.1 Participants to the Divisional and District Planning Workshop

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District Officer	12	12	
Township Officer	20	17	
Villagers	32	24	
Total	85	67	

Source: Workshop supported by JICA Study Team

During the first workshop, township government officers and villagers participated in prioritization by sector, and problem identification as well as those prioritization since they are considered to be the most familiar with the situation on the ground. The sector prioritization was done in such sectors as agriculture, livestock, cottage, education, infrastructure, health, and environment. Figures 4.5.1 and 4.5.2 show the results of the prioritization, and the former shows the prioritizations by TS officers and villagers separately while the latter shows the aggregated priorities for the 2 groups.

From Figure 4.5.1, it is observed that villagers prioritized agriculture, cottage and livestock in its order, and then followed by education, infrastructure and health, and by environment. The government officers, as shown in Figure 4.5.1, prioritized agriculture, infrastructure, education in its order, and followed by livestock. Cottage industry was ranked at 2nd last next to environment. Top aggregated priority was, as shown in Figure 4.5.2, given to agriculture, and then to education, livestock, infrastructure, cottage, health and environment in its order.



The results implies that the villagers think of such 3 sectors as agriculture, livestock and cottage industry being most important while TS government officers give more priority to infrastructure and education after agriculture. This tendency can be seen commonly; namely, common people tend to put priority on such sectors in which they can make livelihood while government side tends to give priority to public service provisions which in this case appeared in infrastructure and education. Though health was given 2nd last priority, it may not necessarily mean they think so less important but it might be a sign that people feel health condition is not much poor.

Following the sector prioritization, villagers and TS government officers went to a problem analysis session, in which PCM problem analysis¹ was employed as the tool. The problem analysis dealt with only 3 sectors of agriculture, livestock and cottage industry which are the major sectors aimed to improve under the Study's scope. Figure 4.5.3 summarizes the analysis results, left of which was developed by TS officers while right of which by villagers. Percentage in the table shows the priority given in its level, and the problem statements are arranged in its order within the sector; namely the higher it is placed, the higher the priority is given.

Next step is to identify the priority development purposes taking into consideration the problem

¹ A tool employed in Project Cycle Management (PCM). This analysis identifies cause-effect relationship, and develop a so-called problem tree.

statement and those priorities. Basically upon converting the problem statements into positive statements, we can get preliminary development purposes, or development areas to focus, in each sector (In PCM analysis, it is called Objective Analysis). Picking up major problem statements and also dropping such problems out of our control, for example 'no rainfall' which namely cannot be solved by a project, we can have focus problems which should be tackled by project/ programme. Those focus problem statements were converted into positive statements, now called development purposes here. Development purposes were prioritized during the 2nd workshop by such 3 levels as; villagers, TS officers and higher government cadres' officers that are from headquarters, divisions and districts concerned.

Prioritization results for the purposes are given in Figure 4.5.4. The figure starts with sectors; sometimes called development approach, priority ranking by higher cadres' government officers, priority ranking by villagers, and at the most right column are the weighted ranking for those 3 levels. The higher the statement is placed the higher the priority is given in each of the development sector. 'Weighted' was done by simply giving 1 additional mark each as moving to upper statement.

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-			
	No.1 (42%)	Our yield is	s łow.
	(***.0	No.1	Cultivators are weak to follow the technical instruction by
		(13%) No.2	MAS.
		(10%)	We do not get enough water for farming. We do not get enough water coving to weather
		Ma 2	conditions.
		(9%)	We need good and pure variety seeds.
		No.4 #P53	Villagers can not afford to use many inputs.
			inputs are expensive and so we can not use much.
		No.4	Villagers can not do mechanized farming.
Agriculture		No.7	Soil is not fertile.
(Government TS staff)		No.9	There are natural disaster in a Flands.
		(2%) No.12	
	846.2	(0%)	Crop type is unsuitable according to soil type.
	(18%)	Cultivated	land is small scale.
		(1.7%)	Investment is poor.
	No.3 (15%)	Our farm in	puts are expensive but farm-gate price is low.
	1.2.4	No.8	Villagers can not wait to sell their products until farm-gate
		No.4	Farm inputs are expensive
		(8%) No.11	
	No.1	(0.8%)	Labor charge is high.
	(83%)	Villagers h	ave small flock size.
		(13%)	Villagers lack investments.
		No.4 (R%)	Villagers do not have backyard farm.
		No.4	Villagers have difficulties of space for livestock.
		No.6	Villagers have shortage of animal feed.
		(7%)	Villager lack pathing land
		No.7	
	846.2	(4%)	Villagers have no reliable market.
Livestock	(17%)	Villagers la	ck technologies.
(Government 15 statt)		(12%)	Villagers have weakness to follow the instruction by experts
		No.2 (12%)	Villagers have weakness to follow the technical instruction by LBVD.
		No.3	Villagers lack upgrade for breeding.
		No.3	Villagers lack first aid training.
		(10%) No.5	Wilsours investment is near.
		(8%) No.8	100 march and the stand have been been been been been been been be
		(3.5%)	Villagers lack livestock knowledge.
		(2.5%)	We lack fulfill the nutrient requirements.
		(2%)	We have weakness of feeding system.
	No.1 (49%)	Villagers la	ck skillful technique.
		No.3 (1910)	Villagers have lack of opportunities on cottage industries technologies.
		No.5	Our products are low quality.
	No.2	(95) Villagers la	ck conduction.
	(42%)	No.1	100 and a local barrents
		(13%) No.1	vilagets lass investments.
		(13%)	Villagers have no modernized instruments.
		(12%)	Villagers lack skills.
		(9%)	Villagers lack instruments.
		No.5 (\$15)	Villagers lack raw materials.
		No.6	We do not have enough electricity for cottage industries.
Cottage industries		No.8	Villagers have difficulties in getting inputs.
(Government TS staff)		(2%) No.8	We tack constration and coordination
		(2%) No.9	ne lack cooperation and coordination.
		(1%)	Production cost is nigh.
		(1%)	The price of raw materials is high.
	(9%)	Villagers la	ck market.
		No.4 (9%)	Villagers are under control of brokers.
		No.5 (615)	We have no available market to sell products after produce.
		No.6	We have no mass production.
			Villagers have lack of individual product.
		No.7	Villagers lack wide market
1		(2.5%)	
		No.8	this have none advertising

Figure 4.5.3 Problem Identification and its Prioritization for the 3 sectors

	No.1 (18%)	We are un	able to do mechanized farming.
		No.8 (5%)	We lack capital.
			Our income is low.
	No.2 (17%)	It is difficu	it to get good variety seeds.
		No.5 (7%)	We can not afford to buy good variety seeds.
	No.3 (16%)	We do not	get enough water for cultivation.
		No.6 (\$%)	We do not get enough irrigated water.
		No.10 (3%)	We get less rain.
	No.4 (15%)	Our yield i	is low.
		No.2 (25)	input such as fertilizer is expensive.
		No.2	We do not have modern technology.
		No.3	Farming method is not correct.
		No.4	We suffer low yield because of insects and
		(/%) No.8	pests. Soil is not fertile.
		(5%) No.12	We can not afford to buy necessary inputs to get
Agriculture	No.5	(2.5%)	high yield.
(Villagers)	(9%)	No.9	a grow crops in time.
		(4%) No.12	We lack female transplanters. Owing to irregular weather, we cannot drow
		(2.5%)	crops in time.
	(8%)	We own a	few acres.
		(4%)	We can not afford to buy more acres.
		No.13 (2%)	Population grows.
	No.7 (7%)	inputs are	expensive.
		No.7 (5%)	We can not produce inputs by ourselves.
		No.11	Assistance given by the state is not enough.
		No.13	Transportation charges are high.
	No.8	We get low	prices for our products.
	(6%)	No.1	We can not do storing up.
		(9%) No.12	We had to sell our products as soon as
		(2.5%) No.12	harvesting.
	No.9	(2.5%)	our products are low quality.
	(4%)	Weather is	s erratic.
	84+ 8	(2%)	Forest is depleting.
	(27%)	There are	no modern technologies.
		No.3 (16%)	There are no experts in respective sector.
	No.2 (24%)	We have n	o good species.
		No.2 (17%)	We are still sticking to conventional method.
	No.3 (18%)	We do not	get much profit.
		No.4	There is no stable market.
Instack		No.5	We sell before well-grown up.
(Villagers)		No.6	Death rate is high owing to disease and weather.
	No.4	(IFS) We can no	t do livestock breeding on large scale.
	(16%)	No.1	We do not have ensuch capital
	No.5	(20%)	
	(15%)	No.7	Bashiran na narray
	-	(7%) No.8	Pastures are narrow.
		(6%)	The price of animal food is high.
		(6%)	cultivation.
	(24%)	We lack m	odern technology.
		No.2 (11%)	There are no experts.
		No.3 (9%)	We can not afford to learn any cottage industry skill.
	No.2 (21%)	We are un	able to use modern machines.
		No.4	We can not afford to buy modern machines.
		No.8	Because we cannot rely on electricity to a large
	No.3	We lack m	arket.
	(20%)	No.1	We can not produce good quality goods.
		(14.5%) No.7	We can not open up a sale abox
		(6%) No.9	The same part should be same solution
Collage Industry		(4%) No.9	we can not compete with the maddlemeri.
(Villagers)	No.4	(4%)	me can not overcome the industrialists.
	(1#%)	Our incom	e is low
		(7.5%)	Job-opportunity is scarce.
		No.11 (2%)	Authough the price of raw materials is high, our products get low price.
	No.5 (12%)	It is difficu	It for us to get raw materials.
		No.6 (7%)	We can not store up raw materials.
		No.7	Raw materials are imported from abroad.
		No.9	The price of raw materials is high.
		No.10	We can not get raw materials sufficiently within
	No.6	(3%) We have a	jour community.
	(4%)	No.4	We do not have see do income
		(8%)	the are not mare regular an only.

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Dev.	Order Development Purpose Development Purpose Development Purpose	Order Development Strategy
Sector	(Siret IRQ, Dirision, & District Leve) (Wilag Level) (Wilag Level)	(Weighted from the Left 3 Levels)
	1.1 Disseminate Improved Seeds 1.3 Disseminate Agriculture Implement	1.1 Disseminate Improved Seeds
	1.5 Increase Agriculture Production 1.3 Disseminate Agriculture Implement 1.2 Promote Fertilization Management	1.2 Promote Fertilization Management
	1.9 Connect Production and Market	1.3 Disseminate Agriculture Implement
	1.4 [Diversity Cash Crops]	1.4 Diversity Cash Crops
1.Agriculture	12 Promote Fertilization Management 12 Improve Post-harvest Technology 1.5 Hanage PestAnsecticide	1.5 Increase Agriculture Production
1st Priority	1.6 Nanage Pest/Insecticide 1.4 Diversity Cash Crops 1.5 Increase Agriculture Production	1.6 Manage Pest/insecticide
	1.7 Improve Post harvest Technology / 1.5 Increase Agriculture Production 1.8 Stabilize Agriculture Production	1.7 Improve Post-harvest Technology
	1.3 Disseminate Agriculture Implement 1.8 Stabilize Agriculture Production 1.7 Improve Post-harvest Technology	1.8 Stabilize Agriculture Production
	28 Protect Fami Land (r. Flood) 29 Protect Fami Land (r. Flood) 28 Protect Fami Land (r. Flood)	1.9 Connect Production and Market
	1.8 Stabilize Agriculture Production	1.10 Protect Farm Land (fr. Flood)
S		
	21 Improve Livestock Species 22 Promote (small) Livestock	2.1 Improve Livestock Species
2 Livestock	2.3 Improve Livestock Rearing 2.2 Promote (small) Livestock 2.1 Improve Livestock Species	2.2 Promote (small) Livestock
Promotion	22 Promote (small) Livestock 23 Improve Livestock Rearing 23 Improve Livestock Rearing	2.3 Improve Livestock Rearing
and Director	25 Improve Livestock Sanitation 24 Prevent Livestock Diseases 24 Prevent Livestock Diseases	2.4 Prevent Livestock Diseases
2nd Priority	2.4 Prevent Lirestock Diseases 2.5 Improve Livestock Sanitation 2.5 Improve Livestock Sanitation	2.5 Improve Livestock Sanitation
	2.6 Robe the Price of Products right and stable	2.6 Hale the Price of Products right and stable
·		
	3.6 Obtain Demosfic and Ferrign Market 3.1 Prepare Initial Capital 3.1 Prepare Initial Capital	3.1 Prepare Initial Capital
	3.1 Prepare Initial Capital 3.2 Increase Production 3.5 Increase Profitability	3.2 Increase Production
3.Cottage Industry	12 Increase Production 33 Minimize Production Costs 32 Increase Production	3.3 Minimize Production Costs
Promotion	3.4 Improve Value of Products 3.3 Hilpinize Production Costs	3.4 Improve Value of Products
2rd Briggiby	3.3 Minimize Production Costs 3.5 Increase Profitability 3.4 Improve Value of Products	3.5 Increase Profitability
Sturmonty	3.5 Increase Profitability 3.7 Obtain Rear Materials	3.8 Obtain Domestic and Foreign Market
		3.7 Obtain Raw Materials
÷		

Figure 4.5.4 Prioritization of Strategies, Areas to Focus, by Different Cadres

4.5.2 Development Framework (Macro Level)

Development framework is a kind of guiding that shows us the tangible way of reaching the development vision aforementioned. It shows development sectors (approaches) and development purposes sought to achieve the development vision, as well as intervention activities that are usually called development project or development programme. The framework should also have the priority at different levels of, e.g. sector, purpose, project/ programme, with which we can consider which development interventions should be put in implementation given limited resources.

The Study Area is categorized in 5 types, and therefore if the framework can relate those projects/ programmes with the typology, it could be great help for those who are participating in developing the central dry zone area. This means that given the relationship we can know which project/ programme should be implemented in which type of the area, making development intervention easier according to the characters of the types categorized and increasing the efficiency in fund allocation as well.

Framework can be presented in several ways, and here applied is a tree structure which starts with development vision, and is cascaded to development sector, development purpose and finally down to the project/ programme. The sector should of course be related to existing government service sectors such as agriculture, livestock, industry, health, education, environment, etc., for each ministry can see and know at which parts of the sectors they are placed and how they are related with other ministries. In fact, what was practiced in the 2 times workshops aforementioned was in line with this.

An example of development framework is shown below schematically. In case of MAS, seeing the development sector of 'agriculture strengthening, they can know what purposes they should follow

and accordingly what project/ programme they should carry out. Also related with the project/ programme is the typology illustrated at the most right hand column. Given, as an example, marks putting different priorities, they know which projects/ programmes should be carried out in which typology with how much priority being put.



Figure 4.5.5 An Example of Development Framework

•: Top Priority in the Typology •: Nid Priority in the Typology O: Low Priority in the Typology

Development framework is now established as shown in Figure 4.5.6 by taking into consideration what was practiced through the workshops as well as Study Team's findings. The sectors are identified as in improving or promoting of 'Agriculture', 'Livestock', 'Cottage Industry', 'Education', 'Health', 'Infrastructure' and 'Environment' with those priorities from top side to down side according to the Study scope and also taking into account the priorities ranked by villagers and TS government officers (though TS government officers prioritized education and infrastructure higher than livestock and cottage sectors, the top 3 sectors are aligned according to the Scope of Work of this Study, that are 'Agriculture', 'Livestock', and 'Cottage'). Purposes are also placed under each of the sectors according to the priority, and accordingly projects/ programmes which were identified by the JICA Study Team together with the counterpart personnel.

At the left side from the list of the programmes/projects, there is a matrix table having such symbols as \bullet , \odot , \odot . This matrix shows the guidance of which projects/ programmes should be carried out in which typology with how much of priority. The prioritization in the matrix was done by cross cutting from top to bottom by the typology, for example 1) half of the projects/ programmes in each typology are prioritized with the symbol of \bigcirc (low priority), out of which half are prioritized with the symbol of \bullet , the top priority.

The development framework further covers; 1) identification of pro-poor projects, 2) level of environmental impact by 'A', 'B', and 'C', 3) implementing agency relative to each project, 4) collaborators to implement those projects, 5) project implementation period, 6) project cost and 7) expected fund sources. Noted here is that since this Study is of master planning, projects which require certain investment, e.g. '7. Irrigation Facilities Improvement Project', should undertake feasibility study before commencement of the investment.

As for project implementation period, the overall time frame was set to cover a total of 11 years from 2010 to 2020. Of them, year 2010 is corresponding to the end year of this Study and therefore it can be set as preparation period for those proposed programmes and projects. In this sense, the development framework covers a net total of 10 years for the implementation. This 10-year period may seem too short for a master plan period. However, taking into account the current situation of Myanmar, it may not be so meaningful to establish a master plan covering long term, e.g. 20 years or 30 years. From another point of view, many of the proposed programmes and projects can be of recurrent activities, which imply the development framework itself can be of rolling plan. Sometime after the government has implemented prioritized programmes and projects, the framework can be reviewed and rolled over to cover further periods. Therefore the development framework presented here is to cover only 10 years.

The 10-year period is composed of; 1) preparation, 2) short-term, 3) mid-term and 4) long-term periods. The terms cover 1 year, 2 years, 3 years and 5 years respectively. During the short-term period, highly prioritized programmes/projects should be carried out, and during the mid-term period, next ones be carried out. During this mid-term period, preparation for those programmes/projects which require huge investment shall also be carried out, e.g. feasibility study. Low priority programmes/projects as well as those which need huge investment are to be carried out the last term period. Programmes/projects under the 3 sectors of agriculture, livestock and cottage are summarized in the following table by the implementation term. Some programmes/projects are to be carried out covering short to mid or mid to long term period, and in this case those ones are repeated.

Term	Programmes and Projects
Preparation:	This year corresponds to the year of the completion of this Study. Therefore this year is set aside
2010	the preparation period during which government current plans have to be adjusted and necessary
	fund should be secured.
Short term:	Agriculture Sector:
2011 - 2012 (2 years)	1. Certified Seeds Dissemination, 2. Low-input Agriculture Promotion, 4. Landless oriented
	Mushroom Promotion, 5. Small-scale Irrigated Horticulture, 6. Paddy Cultivation Improvement, 10.
	Rain-fed Agriculture Improvement, 11. Rain Harvesting Farmpond Establishment,
	Livestock Sector:
	14. Local Bred Improvement (Cattle), 15. Goat Raising Promotion, 16. Pig Promotion, 17. Local
	Chicken Promotion, 20. Livestock Disease Prevention
	Cottage Sector:
	23. Village Revolving Fund Establishment, 26. Product's Quality Improvement, 29. Raw Material
	Revolving
Mid-term:	Agriculture Sector:
2013 - 2015 (3 years)	1. Certified Seeds Dissemination, 2. Low-input Agriculture Promotion, 3. Farm Equipment and
	Machinery Promotion, 4. Landless oriented Mushroom Promotion, 5. Small-scale Irrigated
	Horticulture, 6. Paddy Cultivation Improvement, 7. Irrigation Facilities Improvement, 10. Rain-fed
	Agriculture Improvement, Rain Harvesting Farmpond Establishment
	Livestock Sector:
	14. Local Bred Improvement (Cattle), 15. Goat Raising Promotion, 16. Pig Promotion, 17. Local
	Chicken Promotion, 18. Livestock Feeding Improvement, 20. Livestock Disease Prevention
	Cottage Sector:
	23. Village Revolving Fund Establishment, 24. Equipment Modernization, 26. Product's Quality
	Improvement, 27. Cooperative Strengthening, 28. Marketing Strengthening, 29. Raw Material
	Revolving
Long term:	Agriculture Sector:
2016 - 2020 (5 years)	7. Irrigation Facilities Improvement, 8. Integrated Pest Management, 9. Post-harvest Improvement,
	10. Rain-fed Agriculture Improvement, 12. Market Information Dissemination, 13. Farmland
	Protection (from floods)
	Livestock Sector:
	17. Local Chicken Promotion, 18. Livestock Feeding Improvement, 19. Fodder Crops Promotion, 20.
	Livestock Diseases Prevention, 21. Livestock Housing Improvement, 22. Livestock Market
	Information Dissemination
	Cottage Sector:
	24. Equipment Modernization, 25. Fuel Saving, 26. Product's Quality Improvement, 27. Cooperative
	Strengthening, 28. Marketing Strengthening

Table 4.5.2 Implementation Terms and Programmes/Projects