

CHAPTER V. FORMULATION OF BASIC DEVELOPMENT PLAN

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5.1 Land-Use Plan and Soil Conservation Measures

5.1.1 Land-Use Plan

1) Land-Use Policy

The marginal area has various constraints for agricultural development. Among the constraints, steep land, thin top soils with less fertility, and lack of soil moisture bring about to the farmers stagnant and low agricultural production. This situation tends to worsen every year through destructive use of land resources for agricultural activities. In this connection, proper land use plan oriented to sustainable land management has to be formulated, considering the following items.

Focusing on soil problems, the marginal land should be properly utilized according to slope. The general land use requirement in terms of land slope is indicated as follows:

Land Requirement by Crop

Crop	Slope Range
Wetland Rice	0-3 %
Upland rice and annual upland crops	0-8
Coconut	0-30
Fruit Trees (Lanzones)	0-30
Cassava	0-8
Pasture	0-30

Source: Agricultural Land Use Management Evaluation Div.(ALUMED). BSWM

The land with slope of more than eight percent is not suitable for growing almost all annual crops including paddy rice, upland rice, root crops, and vegetables according to the ALUMED standard. On the other hand, coconut and fruit trees are moderately suitable even in lands with eight to 30 percent slope. The planting of forest trees is well suited for lands with slope of more than 18 to 30 percent.

As for the land with slope of 18 percent, soil conservation measures are required. The following agricultural land use are generally recommendable from the aspect of soil conservation.

Land-use Plan with Slope more than 18 percent

Slope	Recommendable Land Use
8-18 %	Coconut based farming (mixture of coconut, fruit trees, diversified crops forest trees/shrub)
18-30%	Agroforest (mixture of forest trees/shrub, coconut, fruit, trees, and diversified crops)

Contour farming is basically needed in lands with slope of eight to 18 percent. Also, growing of hedge trees/shrub together with the counter farming is effective to conserve soil from erosion.

Although rice land and relatively flat upland are very limited in the marginal area, the development of the land is important for the farmer to secure staple food for subsistence. Especially, farmers have strong interest in self sufficiency of rice. For this purpose as well as from the aspect of environmental management on soils and water resources, the rice land should be irrigated as much as possible. In the irrigated riceland, two cropping of paddy rice in the wet season and diversified crops in the dry season will generally be recommended, taking into account the limited water resources. Not only irrigation, but also drainage conditions may be required to remedy flood damages which may occur in some depressed portions as noted from the results of the rural-socio-economic survey.

Even gently sloping upland is not fully utilized at present due to lack of farm roads and cogonal vegetation in some of the Study Areas like Sappaac ARC. The development of farm roads as well as proper soil management based on soil analysis will be required for efficient land use.

2) Basic Land-Use Plan

Obviously, no two farm lands are found identical in the Study Areas. The topographic conditions, the physical and chemical soil conditions, as well as availability of soil moisture are different by location. Also, land resources are vulnerable to deterioration due to soil erosion, land sliding and others. On the other hand, the marginal areas has very significant merit in the sense that the land is free from pollution. This means that the marginal areas could be developed as supplier of healthy agricultural products. Proper approaches for betterment of soil/land and water conservation together with improvement of soil productivity are necessary in the marginal area.

The land use plan is preliminarily prepared based on the above considerations and also on the results of the topographic and rural-socio-economic survey. The general proposed land use is shown in Figure F.1-11. However, it should be noted that this land use plan was formulated using the participatory approach with the proposed beneficiaries even at the planning stage of development project.

5.1.2 Soil Conservation Plan

Soil conservation-based farming systems together with soil erosion control measures would be established in the marginal areas. The bio-engineering soil erosion control will be used. This would depend on the slope and soil depth. The table below will be the guide in establishing the soil conservation measures.

Proposed Soil Conservation Measures for Different Soil Depths and Slopes

Soil Depth (cm)	Slope (%)				
	<8	8-15	15-30	30-50	>50
> 90	Strip and contour cropping	alley cropping; bench terracing	alley cropping; bench terracing; hillside ditching	AF	F
50-90	strip and contour cropping	alley cropping; bench terracing	alley cropping; bench terracing; hillside ditching	AF	F
20-50	alley cropping; bench terracing	alley cropping	alley cropping	AF/F	F
< 20	AF/F	AF/F	AF/F	F	F

Note: AF-Agroforestry, F-Forest

The agricultural practices of strip and contour cropping will consist of alternate strips of row and creeping crops. Crop rotation will also be included. Sloping Agricultural Land Technology (SALT) will be adopted. Two rows of leguminous plants which serve as bio-fertilizer and animal feeds will be grown between alley of annual and perennial crops. Alley cropping with contour ditching will be established in the high rainfall areas with deep soil. The excess runoff will be drained to the grass water way and check dam. The check dam will be constructed using boulders and/or branches of trees that can be propagated by stem cutting like kakawate or ipil-ipil. Hillside ditching can be used up to 45 percent slope. Planting of crops with good ground will cover the runoff on the slope. Construction of diversion canal of runoff from the upper slope outside the farm land will improve the effectiveness of the soil conservation structures. The establishment of the hedge row will be the initial stage of the soil conservation program in the field. Check dam together with the diversion of the water flow at the head of the gully will be done. The agroforestry system will have multi-story of crops: upper strata of sun loving and shade tolerant species, middle layer of moderately shaded-tolerant species, and lower layer of shade tolerant species. The forestry system in the protected zone will provide fuelwood, lumber, roofing materials, and raw materials for the cottage industries.

Reconnaissance soil survey including soil erosion and land use assessment will be done to determine the suitable crop and soil conservation method suited for the area. More detailed survey of the selected site for on-farm demonstration of soil conservation farming systems, agroforestry, fuelwood and forest tree production will be needed. While the demonstration farms are being implemented, detailed soil survey of the marginal area will be done to develop the soil conservation-based farming systems for the stakeholders of the agrarian reform communities.

5.2 Agricultural Development Plan

5.2.1 Strategy of Agricultural Development Plan

1) Improvement of agricultural production

According to the responses of sample farmers, the following are the felt needs for the land development of the marginal areas:

Item	Percent of Respondent (%)
Development of roads	70
Application of more organic fertilizers	65
Development of irrigation	59
Remedy of soil acidity	30
Deep plowing/soil breaking	28
Improvement of drainage	25
Others	0

Source: Rural Socio Economic Survey, 1996, JICA Study Team

For the increase on agricultural production, the marginal land has to be utilized efficiently, including full development of the idle area. Then, the existing small farm size will be enlarged to about two ha in size. Also, it is required to increase the cropping intensity and the unit yields of respective crops.

The marginal land has rolling and hilly topography with relatively thin and inadequately fertile top soils. In addition to this, water resource is quite limited. Soil fertility continue to deteriorate year by year through soil erosion. Another thing to be considered is small amount investment in the aspect of proper operation and maintenance. Under these conditions, the agricultural development in the marginal land will have the following strategy:

- Staging development with full participation of the beneficiaries will be required in the development of marginal area,
- The production of rice and corn has to be increased to meet the demand for self sufficiency through development of small scale irrigation system. The small scale irrigation system may provide irrigation water not only for stable food production but also for other water uses required for raising cattle and carabaos, maintenance of nursery stations and establishment of orchard at the initial stage, and emergency water supply for domestic water use and fire fighting,
- An agricultural land use of the rolling and hilly land shall be prepared according to the degree of slope as well as soil characteristics. The general land use plan has to be formulated on the basis of the topographic map and

Thus, it is assumed that the model will be formulated on the following conditions:

- Case 1: Requirement of quite high farm income growth:
Achievement of farm income, 15 percent; non-farm income, three percent
- Case 2: Requirement of high farm income growth:
Achievement of farm income, ten percent; non-farm income, three percent
- Case 3: Moderate farm income, seven percent; non-farm income, three percent:
Achievement of moderate farm income growth (5.0-10%)
- Case 4: Moderate farm income, five percent; non-farm income, seven percent:
Achievement of moderate non-farm income growth (5.0-10%)

In addition, all the cases assume an expenditure growth of two percent (the same pace as the population growth rate* per annum).

* The average annual growth rate of population will be two percent from 1993 to 2000 in the Philippines: It was 2.3 percent increased from 1980 to 1993. (World Bank Report 1995, Table 4. Agriculture and Food, p.168)

Further, the following assumptions are made for estimating the future farm income.

- The production and sale price is constant,
- Land use is promised at the same level of existing situation and effective use of idle land,
- Infrastructure investment including post harvest facilities will be introduced (e.g., irrigation scheme),
- Agricultural extension services are provided continuously and sufficiently, and in addition to that, cooperative and NGO will encourage farmers' activities, and
- Rural farm credit shall be made more available and the condition more favorable to farmers.

Here, the typical farm model is described, which can adopt the integrated land use and farming system, even though the model only appears in aggregate amongst a varied groups of farms in the selected Areas.

The average farm household income in each region is presented in the previous chapter. In the selected Study Areas, the average annual income per household is aggregated as 32,044 pesos. Thus, the farm income target will (i) achieve the same income as the national level, and the first target will increase the income substantially and sustain the balance in Cases 1 and 2 and (ii) sustain the

income increase at the same rate as the national economic growth or regional standard of development in Cases 3 and 4.

Its figure should be increased gradually by the availability of agricultural inputs and benefits from infrastructure development. However, the actual effect and benefit which are to be introduced by specific agricultural development program would be on the long term basis. The result of the analysis under the above conditions are shown in the next table and summarized as follows:

According to Figure O.1-4, the living standard of farmers will evidently be enhanced with the implementation of the program and will tend to show an increasing farm income. The benefits are dependent on the extent and rate of changes to be adopted by the farmers and the way in which they use land and water more effectively and appropriately.

5.2.2 Proposed Crop Selection and Cropping Pattern

1) Proposed Crop Selection

The following crops are preferred to be grown in the marginal area in the near future by the sample farmers based on the rural-socio-economic survey (refer to Table 5.2-1 for more details):

Crops Preferred to Grow in Very Near Future

Crops	Percent of Respondent (%)	Remarks
Paddy Rice	53	
Fruit Trees	52	Mango, Citrus, Guyabano, etc.
Corn	50	
Coconut	44	
Vegetables	27	
Beans	21	
Pineapple	1	
Coffee	1	
Abaca	1	
Timber Trees/Bamboo	28	Gmelina, Acacia, Narra, etc.

Source: Rural Socio Economic Survey, 1996, JICA Study Team

Paddy rice will be planted during wet season in rice lands. Followed by wet season paddy rice, diversified crops such as corn, beans and vegetables will be grown in irrigated rice lands, even in areas which has few rains during the dry season. On the other hand, corn and beans will be the major crops in wet and dry season in the gently sloping upland.

In the areas of SALT (8 to 18 percent of slope) contour farming as well as areas of agroforestry (18 to 30 percent of slope), perennial crops such as, coconut, fruit trees, abaca, and pineapple may cover most of the area. The fruit trees include mango, citrus, durian, and others according to location. However, corn, upland rice, beans, and vegetables will be grown especially in the wet season. In areas like Mindanao, where it rains almost evenly throughout the year, similar crops to those in gently sloping area will be grown even in the dry season. The hedgerow plant of leguminous shrubs will be planted in SALT contour farming, which are source of feed (forage) and organic fertilizer. Timber trees will be planted in some type of SALT contour farming and agroforestry.

In areas where the slope is more than 30 percent, fast growing timber trees including gmelina, acacia, eucalyptus and ipil-ipil and also ordinal timber trees like mahogany and narra will be planted for firewood and lumber purposes. Also, bamboo will be grown in as much large area as possible.

2) Cropping Pattern

In irrigated rice lands, double cropping of wet season paddy rice and the diversified crops like corn, beans and vegetables will be introduced. In the gently sloping area, corn and beans will mostly be planted not only in wet season but also in dry season where sufficient soil moisture is available. In the area of SALT contour farming and agroforestry, upland crops will be grown in similar cropping pattern to that of gently sloping areas. The area for fruit trees, abaca, pineapple and hedgerow plant will be expanded slowly, step by step. The proposed cropping pattern by category of land, namely, the irrigated riceland, the rainfed riceland, the existing upland, the existing coconut/orchard land, the land with slope of 8~18%, land with 18~30% slope, and the land with 30% and above slope were preliminary formulated for each Study Area (refer to Table F.1-11).

5.2.3 Proposed Farming System

There are many farmers who cultivate the land by hired carabaos or manually due to lack of working animals. It is necessary to implement the carabao dispersal program for small scale farmers. With enough number of working animals, cultivation practices is expected to be improved.

Basically, establishment of soil conservation-based farming systems is required together with soil erosion control measures in the marginal areas. To develop suitable soil conservation-based farming system, the successfully implemented SALT contour farming and agroforestry in similar areas will be introduced in the typical marginal areas. These farming system technology will be demonstrated in the representative farms for each typical marginal area. The most suitable crops/plants and varieties of fruits trees and other perennial crops, as well as hedgerow shrubs and timber trees will be examined in each marginal area.

As for soil management, the improvement technology including the remedy of soil acidity to be adopted in each type of the marginal areas, based on soil analysis will be demonstrated.

The target yield is tentatively estimated as 2.5 times that of the present yield in case of irrigation area. However, the target yield for non-irrigated area is estimated to be about 70 to 80 percent of the potential yield in non-marginal areas.

5.2.4 Animal Husbandry, Fisheries and Other Farming Plan

1) Development Strategy

Based on the extensive spot survey of present situation described in Paragraph 3.3.4 and in line with the National Policy, strategy for the livestock sub-sector development in the Study Areas was drawn up. Main measures are as follows:

- To improve the overall productivity of livestock by making available sufficient number of high quality breeder stock,
- To organize and improve livestock, poultry and fisheries farming activities of small scale farmers through demonstration effects of model farms as well as provision of training and technical extension services,
- To promote livestock farming systems through the improvement of folder crop production, pasture grasses and introduction of effective agriculture manual tools such as sickles and hoes in place of traditional tools,
- To establish more widely intensive farming systems, especially in high potential areas, and
- In view of present situation in the Study Areas and the recent policy emphasis, the strategy presented above should aim initially at increasing traction animals and secondly at increasing meat production. Other objectives are expected to be attained to a certain extent in the course of attaining these more important objectives.

2) Cattle and Carabao Development

The biggest problem of the Study Areas is the large percentage of unproductive cattle and carabao population. Among females, unproductivity is mainly due to infertility and sterility. Hence, special campaign could be organized for treating such infertile females to make them breedable. In the country, male calves are not adequately cared for and die before attaining six months of age. Schemes should be devised to protect and make them grow as working animals and for beef production. Apart from this, most of males are separated from the females, thus causing difficulties in detecting the mating season. Therefore, it is necessary to build a mini breeding center (Bull Camp) in an effort to increase the population and the productivity level of cattles and carabaos.

3) Goat Development

Goat is subsidiary source of livelihood for large number of small and marginal land farmers. Plans are necessary to improve its productivity.

4) Pig Development

Pork is the major contributor of meat production in the country. The performance of indigenous breeds should be evaluated under local sustainable conditions as they are well adapted to heat stress, diseases, and low energy diets. However, cross breeding with exotic breeds is going to be the main focus for improving growth efficiency and carcass composition.

5) Poultry and Duck Development

Poultry meat is the second largest producer of the country's total meat output. Rural poultry farming shall continue to be a source of additional income and nutritional support to the marginal land farmers. Remunerative price for local chicken produce and streamlining of marketing are the other issues to be addressed. Duck farming should be intensified as source of white meat and egg in the country.

6) Feed and Fodder Development

In most of the Study Areas, there is need for optimum utilization of existing feed and fodder resources and agro-industrial by-products. Natural grazing lands, wherever available, need to be properly managed and developed. Fodder trees may be planted in livestock farms and around farm fields.

7) Animal Health

Animal health support to livestock systems is the most vital segment of planning. Whereas farmers easily learn by experience the techniques of feeding, breeding and management in which they become self-sufficient, they need expert's help to specialize in health services. In the Study Areas, animal health picture is divergent. Production losses due to diseases and pests are immeasurable. They are perhaps the single largest coming in the way of production and farming. It is therefore essential that the Regional Animal Disease Diagnostic Laboratory (RADDL) in the region and the provincial animal health section need to improve diagnostic equipment, communication and transportation facilities.

8) Environmental Issues

Animal farming systems have both positive and negative linkage with the environment. Planning should therefore aim at maximizing positive linkage and minimizing the negative issues. Animal manure disposal is an important issue. If

the manure is not utilized as fertilizer or as fuel as is the case in mixed systems in the marginal areas, it makes a positive interaction.

Utilization of a range of large lands for grazing, or availing grazing areas of forests by livestock, is a positive use of land resource. But overgrazing resulting in soil erosion and desertification has a negative impact. This calls for better management of pasture lands in fragile ecological zones.

Animal traction power preclude the need for petroleum-based energy. Livestock provide incentive to nitrogen-fixing crops and forage which serve to improve soil fertility and reduce soil erosion. Often, low productive animals are the mainstay of sustainable livestock farming.

5.2.5 Post-Harvest Plan

Usage of post harvest equipment and facilities is aimed at shortening of working hours, lightening of heavy work, reduction of losses of agricultural produce and upgrading of quality. It is necessary that the selection of equipment and facilities shall be done taking into consideration capacities. The plan should include design of the input, output and the capacities that will be brought into full play. It is also essential that periodical inspection and repair of the spare parts will be carried out for securing their capacities. Especially, it is important to consider the following in the Study Area:

- Raw product to be harvested should be obtained in economic lot by means of better agricultural infrastructure, farming technology and operation,
- The cooperatives should be well organized and its members should have the firm intention to introduce the equipment and facilities,
- Some members of the cooperatives should have the experience to operate and maintain the equipment and facilities, or at least, should be able to be trained any time by the institutional agencies or the private entities concerned, and
- Marketing route for the produce should be settled or should be obtained easily.

Though development in the Study Areas has many problems and constraints, it should cover initially the introduction and distribution of equipment and facilities at the first stage. Farmers in the Study Areas have their own conceived plan as to the kind of post harvest they want to be provided as shown in Table F.1-9. Almost all of their plans coincide with the present conditions to be developed.

Based on the above premises, plan for the introduction and distribution of equipment and facilities will be designed with the following concept:

- Equipment and facilities to be introduced should be simple, not sophisticated and complicated, and be suitable to the natural and agricultural conditions in the Study Areas,
- Excessive investment should not be considered, but should take into account the development of other surrounding infrastructures such as roads, electricity and water supply,
- Cooperatives or public agencies should own and operate the equipment and facilities introduced, and
- The plan should be harmonized with the other development plans.

Equipment and facilities (including farm machinery) to be introduced and distributed should be the same as that which has already been introduced in the Study Area or neighboring areas. Therefore, major equipment and facilities recommended are as follows:

- Hand tractor
- Sprayer
- Multi-purpose dryer
- Reaper
- Thresher
- Warehouse

Plan for each Study Area should be designed taking into consideration the following criteria and conditions:

1) Shortening of Working Hours

It should be determined considering the farm area and unit yield, and whether or not there is a chance to be used at the shortest possible time at higher-cost works.

2) Lightening of Heavy Works

Since heavy work may appear during cultivation, planting and harvesting, it should consider farm area and production.

3) Production Losses of Pre and Post Harvest

Production losses may occur during harvesting, flooding, overdrying, transporting and storing. At present, total losses of these are estimated at 20 to 30 percent of production amount.

4) Upgrading of Quality

Owing to crack by overdrying, germination and coloring by heavy rain and flood, as well as lack of quality standards by the Government, farmers are

obliged to sell to the traders at lower prices. It should be considered that farmer's selling powers will be strengthened by good variety and upgraded quality of produce.

5) Operation of Equipment and Facilities

It seems that equipment and facilities in the Study Areas are limited. Also, farmers lack the experience and skill to operate such facilities and equipment. However, the Philippine Government (DA, NFA, QUEDANCOR, ATI and Phil. Rice) has been assisting the establishment of equipment and facilities and has been conducting the necessary training programs (refer to Table K.1-3 and Table K.1-4). Therefore, there is the chance that even in the Study Areas, such assistance may be provided. Study Areas which has more production capability and better accessibility may be advantageous.

6) Maintenance of Equipment and Facilities

The Philippine Government is also conducting maintenance training in their above programs. Maintenance of equipment and facilities is required in the supply of spare parts for repair. It should be noted that almost all of the Study Areas are far from the urban areas. The Study Areas which are nearer the urban areas and have better access roads may be more favorable.

7) Others

It would be better if the location of the equipment and facilities are accessible to the farmers and located near their residence or farms. However, it is necessary to acquire the lands legally prior to implementation. Detailed selection criteria for post-harvest facilities is shown in Table K.1-5.

According to the above premises, concept and criteria, plan for each Study Area will be designed. Considering that QUEDANCOR and NFA are conducting the facilities center program (refer to Table K.1-6), one of the facilities will be designed as shown in Figure K.1-1, as General Plan of Multi Purpose Dryer. The proposed scale of the post-harvest facilities is shown in Table K.1-7, while the proposed post-harvest plan for each Study Area is shown in Table K.1-8.

5.2.6 Marketing Plan of Agricultural Products

To sum up the marketing issues as presented in the preceding chapter, the major problems encountered by the farmers are (i) absence of transportation facilities; (ii) poor infrastructure; (iii) insufficient pre-and post-harvest facilities; and (iv) lack of technical know-how/appropriate technology. A secondary cause is small volume of produce/low productivity which is caused further by poor soil fertility and some degree of soil erosion.

To improve the above present situation, a systematic approach is hereby suggested, as follows:

1) Primary Stage (one to three years)

a) Minimum Essentials

- Encourage the farmers to sell their produce in bulk or what we call "Organized Selling". Small production when pooled together becomes bigger in volume. In this manner, the farmers can dictate their price without control by traders. Or, they can directly negotiate/transact their business with established marketing institutions, and
- Encourage the farmers to purchase farm inputs also in bulk or what we call "Organized Buying". As a matter of business practice, private dealers give significant discounted rates when customers buy in bulk. There are even instances where cost of delivery is free of charge. In this way, cost of farm inputs are drastically lowered adding to farmers income.

b) Some Hard Infrastructure Measures

Aim to accelerate the farmers income and ultimately sustain some hard infrastructure measures are suggested as the above Chapter already mentioned.

- All-weather farm-to-market roads,
- Conduct continuous organizational, managerial, and technical training programs, and
- With all things mentioned above properly in place, the cooperative/s may invest in transportation business. The farmers can benefit from the business because the transportation cost can be minimized.

2) Secondary Stage (four to five years)

a) Organizational Consolidation

This phase calls for the formation of Federation/s. In this manner, exchange of ideas among farmers, market positioning, and influencing market price policies are consolidated.

b) Economic Integration

This phase calls for the integration of some economic activities, to wit:

- Establishment of central processing facility, and
- Area-specific production activity, e.g., one to three ARCs producing the same high value crops either to create a demand or respond to market demands.

5.2.7 Farmers' Organization Plan

The target of future plan for farmers institutionalization is based on the condition of the present cooperatives. It aims to establish the capability of the farmers' organization in the following activities.

1) Group Production/Purchase

Group production of fruit tree seedlings, group purchasing of seeds/seedlings, animals, farm input such as fertilizers, agricultural chemicals, and agricultural implements and machinery.

2) Planning of Crop Production and Forwarding of Products

Plan formulation on planting area, cropping time, harvesting time, forwarding time and amount by crop.

3) Training and Field Trip

To invite extension workers, RIARC or ROS expert and PSS technicians to the area, and/or to visit Municipal Agricultural Office, RIARC, ROS, PSS for training on agricultural technology, and visit pilot farms.

4) Group Use of Agricultural Machinery

To enhance group use of agricultural machinery such as big type tractor, pest control machinery when need arise for such activities.

5) Group Forwarding of Products and Market Development

To enhance collecting and forwarding facilities of products, group purchase of cargo truck for transportation of products, participation to wholesale/retail market, opening of direct selling station, and collection of marketing information.

6) Reinforcement of Auto-Saving, Sari-Sari Store Activities

To improve cooperative's source of income, it is necessary to reinforce present activities of sari-sari/consumer store.

7) Establishment of Water Use Association

To establish Irrigator Water Users Association for the planning on irrigation water use, the operation and maintenance of the irrigation facilities and the collection of O&M fee.

5.2.8 Institutional Development of the Support for Farmers

Plan of the organizational support system for the improvement of farming in the marginal areas is shown in Figure B.1-3. Development of basic infrastructure, provision of funds, development of market, introduction of improved technology, provision of seeds/seedlings and animals, strengthening of farmers' organization and continuous training of farmers' successors are the necessary conditions for the improvement of farming in the marginal areas. To meet these necessary conditions, the following institutional development plans are proposed.

1) Development of Agricultural Infrastructure

a) Development of Access Road to Market

As the absence of access road to market is the biggest constraint for the development of farming in the marginal areas, immediate construction of the access road is necessary.

b) Water Resources Development

Identification of water resources and construction of intake facility, reservoir, and main canal.

c) Supply of Large Tractor for Reclamation of Cogon Area

Reclamation of cogon area in the marginal areas is presently done manually in the limited reclamation capability of around 1.5 ha per farm household. In Sappaac ARC, the developed area remains only about 30 percent of the cogon area due to the above reason. Therefore, supply of large tractor for the initial plowing of the area is needed.

2) Provision of Efficient Agricultural Credit System

To carry out timely financing of necessary farming funds, the function of the Consolidated Agricultural Loan Fund (CALF) and the Agricultural Credit Policy Council (ACPC) which have been established in 1986, should be reinforced. On the other hand, in order to prevent delay of repayment of debts, the Provincial Subject Matter Specialist (SMS) and the Municipal Agricultural Office (MAO) should support the farmers in the planning of their farm activity. With the above view, the extension workers must acquire the necessary farming knowledge so as to be able to support and advice the farmers.

3) Market Development

The government should support farmers' participation to wholesale or retail market and support the opening of direct sales store (administrative aspect).

4) Reinforcement of Technology Development and Extension Service System

Technology development and extension services should be carried out in close cooperation with the ROS, PAO and MAO.

ROS has the responsibility of developing practical technology needed for farming in the marginal areas and the training of MAO's extension workers and farmer leaders.

The agricultural development plan in the marginal area shall be decided jointly by the ROS, PAO and MAO with the central role played by the Provincial Subject Matter Specialists. Hence, the provincial SMSs should be composed of researchers in important fields, and have to keep close relationship with the Research Bureaus, NRCs of DA and DA.

The extension workers of MAO is in charge of technology transfer to the farmers in cooperation with ROS and the provincial SMSs, and have the task to identify selected farmers' needs and provide the information back to ROS.

To assist the extension workers' activities, farmer leaders shall be selected at a rate of one out of ten farm households and the selected leaders shall be provided training at the nearest training center.

For the above activities to be carried out, the ROS shall provide the required facilities and equipment with the fulfilled personnel. The MAO shall provide the necessary number of extension workers with sufficient knowledge and skills and equipped them with sufficient number of motorbikes for extension work/activities.

5) Establishment of Seeds/Seedlings and Animal Supply System

PSS role is the production of seeds and seedlings for farming in the marginal areas. To accomplish this activity, the PSS shall be provided with complete and necessary facilities and personnel. Dispersal of animals shall be the responsibility of the Philippine Carabao Center (PCC) and the Bureau of Animal Industry (BAI).

6) Strengthening of Farmers' Organization Activities

MAO shall support farmers' organization activities in cooperation with the barangay captain and farmer leaders, such as, planning of crop production and forwarding of products, group production of seeds/seedlings, group purchase of input materials, construction and management of food processing facilities, farmers' training and field trip, group use of agricultural machinery, group forwarding of products and market development, reinforcement of auto-saving and sari-sari store, and establishment of water users association.

7) Continuous Training of Farmers

MAO shall conduct continuous selection and training of farmers in cooperation with the ROS, PAO and SMSs on information on new varieties/new crops, advanced technology and modern agriculture from local and international sources.

5.2.9 Social Development Support to Farmers

The following should be taken into account for social development support to farmers:

1) Construction of Minimum Rural Infrastructure

Provision of necessary basic social infrastructure and services which will help make the farmers productive and prosperous through improvement of living conditions by (i) providing and/or improving primary health care services and facilities; (ii) providing and/or improving basic education services and facilities; and (iii) other facilities and services which would help the farmers in the integration and participation in community work;

2) Establishment and Strengthening of Farmer's Organization

Enhancement of the role of the cooperatives/associations in the upgrading of the social capacity of the farmer beneficiaries so as to involve them in all phases of the marginal area development process, from (i) the identification of problems and needs, (ii) recommendation of solutions to their problems and needs, (iii) identification of their involvement and participation in the implementation stage and (iv) enhancement of their capability to sustain the Project, since they will have to operate and manage the Project after completion and/or provision of services and facilities. The support, assistance and cooperation efforts of the GO-NGO-PO in the social capacity process are necessary to make the process meaningful and successful.

3) Participation of Women and Youth

Involvement of the women and youth by giving them the opportunity to co-manage the facilities and services to be provided. The women and youth shall be provided the necessary knowledge and skills through training, exposure to other on-going and successful projects, seminars and the like. Other opportunities for the improvement of their life shall be provided, as necessary and as required, such as, livelihood projects, skills development for specific projects applicable to the resources of the community, maternal and health care programs, family improvement programs, etc.

4) Tapping of NGO

DAR has been implementing the comprehensive agrarian reform program on the selected ARCs located through out the country, in close cooperation with related organizations such as, the GO, PO and NGO.

One of the important role for implementing the above mentioned purposes is played by the NGO. Therefore, it would be important to promote participatory approaches of farmers with cleared demarcation of works among these organizations.

Tapping of NGO groups in the development process not only as providers of credit and other basic social services but also mobilizing the NGOs (i) to design self-help projects for the farmer beneficiaries, (ii) to support and assist in the development and improvement of the cooperatives and associations within the community, (iii) to mobilize their own resources to implement projects and (iv) to assist the GO in the evaluation of the progress of development in the Study Area.

5) Role of Local Government Unit (LGU)

Though the marginal area development is the main responsibility of the DAR, it is very important that the LGU participation and involvement, specially at the municipal level be identified. There is a need to assess the capability of the LGU to support the marginal areas in terms of technical and financial support. Specially, the capability of the LGU to mobilize resources to finance and implement social development projects.

5.2.10 Proposed Agricultural Credit System

Most of the farmers in selected sample areas do not have enough income or capital to purchase agricultural inputs. Particularly, the poorest farmers have no sufficient money to purchase even the most basic needs. In addition, access to farm credit is very limited or not easy for most of the farmers. To cope with such severe present condition, financial assistance shall be required to help vulnerable farmers, particularly the rural poor.

First, it shall propose to introduce efficient farm credit system. The credit system should be established in a way of helping farmers to generalize the necessary lending activities. To accomplish this goal, the rural credit institution in the farm sector shall analyze and identify the appropriate institution which will hopefully be established in the areas where it can be easily accessed by all farmers.

Second, to put in action, the rural credit institution aims' to provide necessary fund for the purpose of agricultural inputs, such as seeds, fertilizer, pesticide and other borrowing. The institution will provide credit with favorable transaction for the customers, e.g., low lending rate, easy application and timely

lending with quick disbursement. In addition, the institution shall provide necessary information on agricultural technology and finance. Moreover, the credit system shall go through an efficient channel with rural farmers, so the system can operate much more efficiently and be sustained in long run. However the ultimate objective of the system is to strengthen self-supporting capability of rural farmers and develop their mutual-help.

Third, to establish such credit system, government incentive shall be essential, and maximum support and arrangement would be strongly required, such as, for instance, credit lending policy, procedure and regulation. In this extent, the credit system will operate in a right way and all farmers can benefit from the system. Government advice on rural credit and training for farmers on basic accounting and record keeping of farmers' activities such as income and expenses, would be useful.

On the other hand, private credit already exist in the rural areas. The non-official (informal) money lenders, such as merchants and local traders, lend directly or indirectly with agreed conditions to individual farmers. Their influence is great and dominant in the rural area. Thus, their existence can not be ignored. We need to analyze the actual impact on the current financial situation, and consider its effective utilization within the proposed credit system. For instance, we need to evaluate their lending conditions, e.g., interest rate, collateral requirement and payment scheme.

The guidelines and program on the proposed agricultural credit system will be prepared on a regional basis, because each region has a different credit system and various lending system. The tentative program is shown as follows:

- Phase 1: Formulate credit system and set up basic design
The design shall be based on current credit condition, and further studies need to be undertaken.

- Phase 2: Introduce detailed planning and identify and/or establish appropriate farmers' credit institution.
The planning shall be carefully drawn with the aim to appraise micro lending in rural areas based on the desire of credit. The planning will be implemented by the introduction of effective and appropriate credit institution.

Finally, as already mentioned in the previous chapter, farmers' organization shall be necessary to strengthen the credit system. Farmers' cooperative or organization can strengthen farmers' participation and provide an easy access to the rural financial mechanism.

5.3 Water Resources Development Plan

5.3.1 Development of Surface Water Resources

Prevailing available and potential surface water sources should be developed for irrigation and rural water supply considering minimum investment, although their amounts are limited.

In the formulation of the Basic Development Plan of the Project, the following sites in the Study Areas were considered to be developed for surface water sources:

Potential Development Sites for Surface Water Resources

Surface Water to be Developed	Development Method
Sappaac ARC (CAR)	Small Water impounding dam
Cofcaville ARC (Region-II)	Small water impounding dam
Montilla ARC (Region-III)	Tank irrigation system
Pag-asa ARC (Region-V)	Small water impounding dam
Abiera Estate (Region-VI)	Pumping system
Marangog ARC (Region-VIII)	Tank irrigation system
Silae ARC (Region-X)	Farm pond and diversion system
Kipalili ARC (Region-XI)	Diversion system

Quantitative analysis of the potential water resources to be selected as the Typical Study Areas, will be undertaken in the course of the feasibility study stage.

5.3.2 Development of Groundwater Resources

Since very scarce water sources are presently available as mentioned in the previous paragraph, development of groundwater in the Study Areas as water source could not be fully expected for irrigation purposes. However, Talugtog ARC (Region-I) has a small potential with the use of shallow wells.

5.4 Agricultural Infrastructure Plan

5.4.1 Irrigation Plan

1) Basic Concept

The possible water sources for irrigation in the marginal areas are springs and creeks and some possibilities for groundwater source as in wells. Some sources can be taken by gravity, but some others need pumps. Present irrigation practice seen in the areas are all by gravity system. It is considered that pump irrigation system will not be introduced in the marginal areas at this stage due to high operation and maintenance costs, lack of operation skills of farmers, difficult purchase of spare parts, and unreliability of repairs when broken down. Since both the water sources and farm lands suitable for irrigation are small, the scale of the proposed irrigation system will also be small.

Under such circumstances, the basic concept of the irrigation plan is established as follows:

- Proposed irrigation plan shall basically be the gravity system utilizing every available water source, efficiently and economically,
- Since capacity of water source is limited, the priority for irrigation use shall be given to paddy followed by vegetables, and other upland crops. Water for back yard garden and nursery shall also be considered, and
- Irrigation system shall be simple, easy to operate and maintain, and locally repairable.

2) Proposed Irrigation Plan

The proposed major irrigation systems are listed below:

- Small water impounding dams (SWID) which collect creek, river and spring water as well as rain water. Impounding dam site shall be carefully selected taking into account watershed area, geological and topographic conditions, location of irrigable areas, availability of dam embankment materials, and so on,
- Intake weirs or small scale diversion dams at creeks or rivers are also considered. Intake gates are to be provided for efficient water management and flood protection purposes,
- Tank irrigation system with pipeline is applicable to scarce water sources to minimize water losses and also to the sloping hilly lands provided that water sources are altitudinally well located. This system can be applied for irrigation of vegetables, upland crops and nursery garden,
- Spring development plan shall be established in connection with the rural water supply plan,

- Conveyance and distribution canals/pipelines, turn-out structures and other appurtenant structures shall be provided for the above mentioned irrigation systems, and
- As an exception, shallow open well (dug well) with movable pump shall be planned at lower Talugtog ARC (Region-I) where present access road is only two km from San Juan with good condition.

These facilities shall be planned taking into consideration water source availability, topographic conditions, target irrigable areas, cropping plans, etc. Framework of proposed irrigation plan by marginal area is presented in Table M.1-2.

3) Operation and Maintenance

Operation and maintenance of irrigation facilities shall be carried out by the water user's association to be formed by the beneficiary farmers.

5.4.2 Drainage Plan

Heavy rains caused by typhoon is the most common cause of flooding at the lowland in some of the marginal areas. Schistosomiasis is one common disease caused by improper drainage system at the lowland irrigated paddy areas in Philippines. Therefore, basic concept of the drainage plan shall be to provide proper drainage system to areas affected by typhoon and schistosomiasis and where irrigation for paddy is planned.

Drainage improvement plan shall be to provide proper drainage system, such as drainage canals/ditches and culverts, in the proposed paddy irrigation areas. Proper and stable side road drain structures shall also be considered in the rural/farm road improvement plan (refer to Table M.1-3).

5.4.3 Farm Land Conservation

Most farm lands in the marginal areas are naturally sloped, as topography is rolling, undulating, sloping or mountainous. There are also terraced and flat lands used for paddy only but on a smaller scale.

The concept of farm land improvement is that farm lands shall basically remain at present conditions/slopes providing certain measures for erosion protection and considering the natural topography and crops to be cultivated. Terraced and flat paddy fields shall also remain as exist. Improvement plan for farm lands, therefore, shall be the provision of efficient measures to protect farm lands from soil erosion. One such protective measure shall be the planting of trees along contour line. Seedling of these trees shall be propagated in the nursery to be

provided under the agricultural development plan, and shall be distributed to the farmers (refer to Table M.1-3).

5.4.4 Farm Road Plan

Farm roads are required to connect farms and households/barangay, and obviously necessary to support the irrigation and agricultural development plans.

Therefore, farm road development plan shall include the adequate supply of farm roads to the farming areas in accordance with existing and proposed irrigation and agriculture development plans. As the marginal areas are rolling, undulating or mountainous, the topographic conditions shall be considered for road alignment. Farm roads shall be adequately located and distributed, and its grade shall be all-weather road with at least gravel surface. Steep road section over eight percent gradient shall be with concrete surface to keep the road accessible even during the wet season. Operation and maintenance of farm roads shall be undertaken by the beneficial barangays/sitios (refer to Table M.1-3).

5.5 Rural and Social Infrastructure Plan

5.5.1 Rural Roads and Transportation Plan

1) Basic Concept

Rural roads are vital element to ensure accessibility between barangays and towns not only for upgrading the living standard but also for the development of agriculture and relevant industries in the marginal areas. The basic concept of the rural roads and transportation plan shall be to provide accessibility to all barangays/sitios with all-weather road. Rural roads other than the national road are classified as follows:

Road Classification

Road Classification	Administrative Classification	Function
Secondary Road	Municipal/City Road	Inter-region, farm-to-market road
Feeder Road	Barangay Road	Inter-barangay, farm-to-market road
Farm Road	Other Roads	Trunk farm road, farm to household connection

The most essential function of rural roads to be considered in the marginal areas is the farm-to-market road which is particularly utilized for transportation and distribution of agricultural products and inputs such as fertilizers and farming materials. Direct effects/merits of rural road development are the savings of transportation costs and time, increase in agricultural production and promotion of agro-industries.

2) Proposed Roads and Transportation Plan

The framework of rural road development plan is established based on the problems of the present road system, as described below:

- To improve, rehabilitate, upgrade and open the rural roads (farm-to-market roads) as all-weather road with at least gravel surface, in which steep road sections of over eight percent gradient are lined with concrete,
- To provide adequate and firm road protection structures, drainage facilities and river crossing structures taking into consideration, the frequent typhoon and heavy rains,
- To provide concrete pavement roads in barangay/sitio centers for multipurpose uses such as drying pavement for agricultural products, market areas, meeting place, recreation area, playground, etc.,
- To reinforce the motor pool of LGUs, particularly municipal government, to encourage road operation and maintenance activities, and

- To provide vehicles to barangay unit for public transport system to be newly established.

Based on the framework described above, individual rural road development plan was made for the 12 marginal areas (refer to Table M.1-3).

3) Operation and Maintenance

The operation and maintenance of rural roads consists of two categories, i.e. regular (routine) and periodic maintenance. If road maintenance is neglected for years, the road conditions may become so bad that heavy operations will be required with more funds to restore the road to its original standard. Thus, it is important to perform steady and efficient maintenance operations as scheduled.

Operation and maintenance of rural roads shall be carried out by LGUs, i.e., provincial roads by the provincial government, municipal/city roads by the municipal/city government and barangay roads by the barangay unit. However, the barangay unit may seek the assistance of the municipal/city or provincial government for road maintenance equipment.

Public transport system shall be operated and managed by the transport cooperative which shall be established by the barangay unit. Government assistance or subsidy will be required to attain sustainable operation.

5.5.2 Rural Water Supply Plan

1) Basic Concept

Water supply is a basic human necessity for farmers to settle and reside in the marginal areas. Its operation level is classified into three systems, i.e. level-I, level-II and level-III systems.

- Level-I system : supply at common wells with hand operated pumps, or at spring intake box.
- Level-II system : supply at communal faucets through simple pipeline from water sources.
- Level-III system : supply in every household through pipeline network.

On the other hand, available water sources for the rural water supply in the marginal areas are ground water and spring water. Ground water is taken by the deep well, shallow well or dug well, while spring water is generally utilized providing the spring intake box.

Basic concept of the rural water supply plan shall be as follows:

- Proposed operation level of the rural water supply shall be level-I system, and level-II system, if possible, by gravity pipeline. However, level-II system with motor pumps is not recommended in the marginal areas due to considerations on the operation and maintenance, spare parts for repair and frequent power line cut by typhoon or heavy rains, and
- When ground water is used as water source, deep well which could provide safe water with longer life span than shallow or dug wells is recommended.

2) Proposed Rural Water Supply Plan

The proposed major rural water supply facilities are described below:

- Deep well development on level-I system will include tube well construction and hand pumps,
- Spring development in level-I system will include spring intake box and outlet valves,
- Spring development in level-II system will include spring intake box, pipeline and communal faucets, and
- Some facilities will be attached to the above mentioned systems, such as drainage, washing places and chlorinating equipment, as necessary.

Framework of the proposed rural water supply system by marginal area is shown in Table M.1-2.

3) Operation and Maintenance

The most important element of the operation and maintenance is to assure a continuous supply of water. The operation and maintenance of both level-I and level-II systems shall be carried out by beneficiary communities so called Barangay Water and Sanitation Association (BWSA).

5.5.3 Rural Electrification Plan

Rural electrification is one of the important social services to improve the living standard in the marginal areas. Therefore, the main item of development plan on the rural electrification shall be the supply of power line (lateral line) from the nearest existing power line to the barangays/sitios. House-connection and inner house wiring, however, would be the decision of each farmer, since costs shall be shouldered by them.

Since five marginal areas have not yet been energized, development plan aims to provide electric power line to these four areas. The areas under this plan

are Montilla ARC (Region-III), Abiera Estate (Region-VI), Marangog ARC (Region-VIII), and Kipalili ARC (Region-XI). Operation and maintenance of power line shall be carried out by each local electric supply cooperative.

As an alternative plan for electric sources, electrification plan using solar energy could be planned. However, from the results of comparison studies on both normal electrification plan and solar electrification plan, of which studies were made in case of Silae Area as a sample, solar electrification plan is not recommendable for the time being considering the operation and maintenance of facilities especially in case of out of order and shortage of sunshine hours during the wet season, although initial construction costs for project facilities are quite same as show below:

Normal electrification plan :	
Construction costs for electric line : 3.5 km x 150,000 peso/km=	P525,000
Construction of service line: 115 houses x 3,000 peso=	P345,000
Total	P870,000
Solar electrification plan ; 115 housesx100 w/housex80 peso/w=	P920,000

5.5.4 Other Rural and Social Infrastructure Plan

The marginal area development to be successful must also include provisions for rural and social infrastructures to make small farmers productive and prosperous. It is vital to improve the lives and prospects of the rural population and make their environment favorable. Thus, building the human capital is a key factor in improving living conditions. It is therefore, essential to give emphasis on the development of the basic social services and other social structures to build the human capital. This can be facilitated by providing and/or improving primary health care and basic education and other facilities and services which would help the farmer in its integration and participation in community work and endeavor.

For the building of the human capital, one important factor is the improvement of the access to educational facilities. Also another important factor is the provision of at least a primary school in areas where it is not available. For most of the areas, elementary school buildings will have to be expanded for lack of classrooms, with reinforce concrete structures and/or rehabilitated as in the case of Sappaac area. The construction programs must be supported by improvements on teachers, particularly preparedness for multi-grade teaching (a necessity in areas where school children population are limited), materials (books, desks, instructional materials, etc.) and curriculum. In addition, complementary health and nutrition services should be provided to improve the health and well being of the children.

Primary health care services are provided by the barangay health stations and rural health units which are usually located in the center of the barangays or poblacions. It is therefore essential that health programs and services be also concentrated at this level. The establishment of additional barangay health stations, the construction of new ones where facilities are not available and the improvement of existing facilities will allow health facilities to be used more extensively. Improved quality of health services would require not only construction and improvement of the infrastructure but must also consider provision of basic and necessary equipment, materials and supplies including pharmaceuticals, selection and continuous training of health workers and supervision and support of the municipal health officer.

Another important social infrastructure which is proposed to be provided to the model areas is the multi-purpose center for the use of the beneficiaries for social, training and education purposes and other functions. This facility will be useful in promoting camaraderie, unity and understanding in the community. For areas with existing barangay halls and/or multi-purpose centers, upgrading and rehabilitation activities shall be undertaken including provision of additional space and facilities (Table I.1-11).

5.6 Small-Scale Rural Agro-Industry Development Plan

There are many problems and constraints for the development of the rural agro-industry even on a very small scale in the marginal areas. If the cooperatives will be better organized and the other infrastructure conditions becomes available, development potentials of agro-industry would also become viable. The concept of development plan for rural agro-industry shall be considered taking into account the following present conditions, as well as other farming and infrastructure development plans:

- Raw materials to be produced should be sufficient for processing and selling to the market,
- Cooperatives should be better organized and strengthened,
- Cooperatives should have keen intentions to introduce the agro-industry,
- At least a member of the cooperatives should have the experience of agro-industry, or at least can be trained any time by the institutional agencies or the private entities concerned,
- In case they do not have any experience on agro-industry, but the other conditions are suitable for introduction of agro-industry, some simple equipment and facilities should be introduced and operation and maintenance be evaluated before full-scale equipment and facilities are installed,
- Marketing route for the produce should be settled or should be able to be obtained easily,
- Excessive investment should not be laid out, taking into consideration the development of other infrastructure,
- Operation and maintenance of the equipment and facilities to be introduced should be carried out by the cooperatives or public agencies, and
- It should be considered that the plan is harmonized with the other development plans.

Farmers in the Study Area have their conceived development plan as shown in Table F.1-9 which almost seem to be suitable to the present conditions to be developed. According to the above concept and farmer's conceived plans, the development for the rural agro-industry will be on small scale with the introduction of the following equipment and facilities:

- Rice mill with solar dryer and equipment for quality control,
- Corn mill with solar dryer and equipment for quality control,
- Collecting and selecting facilities for banana and mango,
- Collecting facilities with solar dryer for coconut, and
- The incidental facilities such as warehouse.

Since various crops will be planted in the Study Areas, the equipment and facilities to be introduced should be utilized for multi-purpose use for these crops in order to reduce investment. Considering that QUEDANCOR and NFA are conducting the facilities center program (refer to Table K.1-6), one of their design is proposed and is shown in Figure K.1-2 and Table K.1-11. The other plans for the Study Areas are presented in the Table K.1-2.

Small scale agro-industry, such as, home-made meat processing, mango processing, loom weaving & processing, etc. which have been introduced by the DAR and DTI in some areas, may be developed in the near future even in the marginal area. Hence, equipment and facilities for research, test, training and evaluation of said agro-industry activities such as, tables, chairs, balance scale, quality control equipment, etc., will be considered at the initial stage and proposed to be placed in the barangay hall or in other barangay facilities.

5.7 Environmental Conservation and Public Health Improvement

The development of the agrarian reform communities in the marginal areas also aims to improve the sustainability of the life support systems while improving the public health conditions and the environment. Enhancement of the carrying capacity of the environmental resources of the ARC should meet the intergeneration basic needs. Ecological approach to conservation-based farming systems will rehabilitate, conserve, and protect the landscape of the ARC. This component will focus on soil conservation, rehabilitation of the forest cover and the stream corridor, and public health related environmental conservation (Figure P.1-1).

5.7.1 Soil Conservation Plan

In addition to the soil conservation of the farmlands, soil erosion control of the cutslope and backslope of the upgraded road alignment and proper disposal of the runoff from the road will be done. Soil conservation will be done for any civil construction to be undertaken to prevent controllable erosion and to minimize off-site sediment damage. The rehabilitation of the corridors will prevent the transport of the sediment from the farmland into the stream. Stream bank erosion will be done to protect the structures along the river. Monitoring of the soil erosion damage will be done after the occurrence of a heavy rainfall or typhoon event to institute immediate repair of the soil conservation structure.

5.7.2 Forest Reservation and Development Plan

The public land along the river, stream or creek which is the easement between the boundary of the farm of the agrarian beneficiaries and the river will be the focus of the reforestation plan. Afforestation will be done in the part of the farmlands not suited to agricultural crops and for the establishment of windbreak.

1) Reforestation of the Public Land

Since the agrarian reform area is an alienable and disposable land, the only available public land for reforestation is the easement between the creek or river and the private land.

Forest tree species, preferably the native species will be established like narra, molave, mahogany, kamagong, anabiong and other hardwood species. Fast growing trees like acacia aureocoloformis (Japanese acacia) and acacia mangium will be used as the nurse tree. This will be intercropped with anahaw, buri, or kaong which will serve as source of roofing and raw materials for cottage industry. Buri leaves are made into mat and the stalk into ropes. The anahaw leaves are made into fan which could be designed to command a better price. As soon as the hardwood species are grown up, rattan will be planted and the former will serve as

the trellis. In the Cordillera, the fruit of the rattan serves as food. The community maintain forest trees near their house for rattan trellis. Stream corridors far from the settlement will be planted to bamboo both for lumber, food, raw materials for bamboo craft and animal feed in case of prolong drought. Bamboo furniture and sawali are formed into bamboo lumber. The leaves of the bamboo can be harvested when the grasses dries up during the extended drought without cutting the bamboo trees. More than 30 percent of the households of the ten Model ARCs are very much willing to grow bamboo for lumber. Eight ARCs would like as well to produce bamboo shoot.

Nursery needs to be established for production of forest seedling and to harden the young seedlings before transplanting to the field. The barangay and municipal councils of the ARC Study Area will be requested to pass a resolution on greening of the easement of river, creek, and stream as a means to protect their source of water for irrigation and domestic water, and the fishes in the river.

2) Afforestation of the Farmlands

Greening or afforestation of the part of the farmlands not suited for agricultural crop production and the strip of the land along the property boundary, and establishment of windbreak for the protection of the crops will improve the landscape of the marginal lands of the ARCs. This will provide the farm households with fuelwood, lumber, and forage for animal feed. Mahogany, gmelina, and narra are the preferred forest species by the ARCs. Ipil-ipil is preferred as fuel wood. Native species should be planted to improve the diversity and to prevent the build up of pest and diseases with monocropping of forest tree species. The forest tree species can serve as trellis of shade tolerant root crop like ubi (*Discorea Spp.*). Shade tolerant food crop like *amorphophallus campanulatus* (pungapong) can be grown between trees. These can be used as well as feed for the pig when cooked. Other fuelwood tree species are *gliricidia sepium*, *leucaena diversifolia*, *acacia diversifolia*, and *gmelina arborea* among others. Identification of the available local species for lumber and fuelwood will be undertaken during the feasibility study stage.

In typhoon hazard areas like Mat-i, Marangog, Pag-asa, Maulawin, and Cofcaville ARCs which are frequently hit by strong winds of at least 120 km/ hour, establishment of windbreak to protect the cropland is a must. It can also serve as a live fence and source of agroforestry products. The forestry/agroforestry establishment along the property boundary of the farm can be a shelter belt. Additional shelter belts need to be established perpendicular to the main wind direction. It will follow more or less the contour on the hilly land areas. These areas would require five rows. The first and the last rows should be planted mainly to shrubs and the central row, a combination of tall and medium-sized trees in small clusters of 2-5 plants of the same species. The shelter belt should be 100 m apart and about 200 - 300 m in ordinary conditions.

Grassland fire control of the cogonal areas needs to be done during summer. Prescribed burning and establishment of fire break will be done around the private forest or agroforestry areas near the grassland to prevent the spread of the fire into the farm.

5.7.3 Environment Related Public Health Plan

Planting materials of medicinal plants will be propagated at the nursery of the cooperative for distribution to the ARBs. Medicinal plants for livestock will also be propagated .

Construction of water sealed toilet bowls will be promoted in all of the ARCs with readily source of water for flushing the bowl. Otherwise, improved Antipolo type toilet with cover and flooring will be promoted.

Biogas production together with backyard pig production will be piloted in the model ARCs. The Bureau of Animal Industry design of biogas digester will be used. This will promote proper disposal of animal waste and use of compost for crop production. The slug of the biogas can be drained into the paddy during fallow period or after harvest. Otherwise, it will be disposed into a lagoon. The slug in the lagoon will be used as fertilizer for the crop. Use of wastewater from the pig pen for tilapia production should avoid the rapid depletion of dissolved oxygen which would affect the growth of the fish.

Environment and public health education will be promoted in cooperation with the Department of Natural Resources and Environment and the Department of Health through the cooperatives. Schistosomiasis control program needs to be implemented immediately at Silae ARC and malaria control program, in Cofcaville and Kipalili ARCs.

5.7.4 Mini-watershed Development of the Source of Irrigation

Some ARCs divert stream flow using brush dam to irrigate patches of paddy field at the foothill or alluvial pan. Water is not adequate to support the second crop of rice in the dry season. Development of the watershed program in cooperation with the Local Government Unit, Department of Agriculture, and the Department of Natural Resources and Environment will be done to improve the water quantity and quality overtime. Their assistance is very much needed for the part of the watershed outside the ARC. Soil conservation-based farming systems, agroforestry reforestation, and afforestation program for this area will be recommended to the municipal council through the Municipal Planning and Development Officer for support and passage of municipal resolution to incorporate the recommendation as part of the municipal land use zoning ordinance.

5.7.5 Environmental Management Plan

To improve the sustainability of the environmental security of the proposed development of the model ARCs in the marginal lands, environmental management plan should be prepared. The community is part of the planning, implementation, monitoring and evaluation, and sharing of the costs and benefits of the projects. Representatives of the beneficiaries and other stakeholders will be selected as members of the monitoring and evaluation team.

Environmental impact assessment of the proposed project components will be done. Monitoring and evaluation system should be established in consultation with the community. The inputs into the communities in terms of "biophysical and social engineering" should be quantified. Changes in the attitude and perception of the community, participation, natural environment, and development will be assessed. This will be an input to the succeeding targets or plans. Process documentation is needed to learn lessons for the transfer of information and experiences to other ARCs.

5.8 Basic Development Plan for Each Study Area

5.8.1 Project Components for Each Study Area

1) Overall Project Components

The overall project components are planned on the following development concept:

a) Improvement/Construction of Access Roads to the Areas

Present access roads to the Study Areas connected from the main roads are either absent and/or under very poor conditions. These access roads should therefore be improved or constructed to make access easy not only for rural communication but also farm-to-market roads in agricultural activities.

b) Formulation of Land-Use, Crop Selection, Sloping Agriculture under Scarce Water Sources

Under severe physical situations such as hilly topography and scarce water resources for irrigation purposes, the most suitable agricultural plan should be formulated in terms of land-use, crop selection and farm management applying Sloping Agricultural Land Technology(SALT). Also, disbursement of working animals like carabao should be considered in the plan.

c) Development of Small-Scale Irrigation Systems

In case the Study Areas have potential water sources which can be developed for irrigation purposes, small-scale irrigation systems consisting of small water impounding dam, diversion dam, tank systems, etc. should be planned.

d) Establishment/Strengthening of Farmers' Organization

Beneficiary farmers' participation to the project during the stages of planning, project implementation and O&M works for implemented facilities are essential for an effective implementation of the project. Therefore, establishment or strengthening of farmers' organizations, such as, multipurpose agricultural cooperative and irrigation association should be undertaken. Production, processing, marketing, and credit services are proposed to be managed by these organizations.

e) Raising and Upgrading Social Capacity

Since each Study Area is situated as a part of ARC in the marginal area, the farmers' capacity to produce and manage resources and services for their production and living activities, and the social systems mechanism by which the

capacity is activated, are still very undeveloped. Participatory approach (PA) is, therefore, indispensable for the farmers, so as to be able to learn and acquire technique, knowledge, attitude, etc.

Also, social preparation (SP) of the farmer beneficiaries shall have to be undertaken through the assistance and support of outside forces, such as, DAR, LGUs, NGOs and other agencies and entities concerned. The farmer beneficiaries through the cooperatives and/or associations will have to be organized, trained and developed so as to prepare them to grasp their own problems and needs, recommend their own solutions to the problems and needs and determine their participation in the solution and implementation of their problems and needs. By doing so, the farmer beneficiaries will have a complete involvement in the development process. It is anticipated that the facilities and resources to be provided to the farmer beneficiaries will be managed and operated by themselves. The social preparation of the farmer beneficiaries will help them manage and operate the projects and facilities to be provided in the marginal areas in the near future.

f) Consideration for Environmental Conservation

Environmental observations, especially protection of soil erosion, protection of water pollution, enhancement of watershed management should be taken into account in accordance with project implementation in the ecologically fragile marginal lands.

2) Project Component in Each Area

The project components in each Area were formulated based on the results of field works and studies, considering the overall project components mentioned above. The formulated project components are presented in Table M.1-1 and Figure M.1-1.

a) Sappaac ARC, Bangued, Abra, CAR

i) Problems, Constraints and Development Potential

The rice land covering 84 percent of total cultivated area are located contiguously. All the rice lands are rainfed, with low cropping intensity and poor yield. There is one promising dam site where a small scale water impounding dam (SWID) can be constructed. The areas which has a slope of less than 18 percent occupies a large area and most of these areas can be converted from idle land to cultivated land. The existing roads surrounding the Study Area are not passable by any type of vehicle. Few internal roads are available .

ii) Development Plan

The surrounding roads of the Study Area shall be improved. One small scale water impounding dam shall be constructed to irrigate some rice lands, to increase cropping intensity as well as to introduce diversified crops. Farm roads between the barangay proper and sitios shall be improved and/or newly constructed to develop agricultural production in the internal area. Some portions of the Study Area would require drainage improvement and soil conservation. The major facilities proposed including agricultural development support, rural and social infrastructure are shown below:

- Road
 - Improvement of access road and farm road : length=6.8 km
 - Construction of new farm road : length=3.3 km
- Irrigation
 - Construction of new irrigation system(SWID) : area=30ha
- Drainage / Soil Conservation
 - Improvement of drainage facilities : l=1.2km
 - Tree planting for soil conservation : 40ha
- Agricultural development /post-harvest and rural industry
 - Nursery : one
 - Demonstration farm : one
 - Animal breeding center and livestock dispersal : lump sum
 - Multi-purpose dryer : two places
 - Agro-industry center : one
- Rural Infrastructure
 - Rural water supply system (Level-1, deep well) : nine
 - Health center : one
 - Barangay Multi-Purpose Center : one

b) Talugtog, San Juan, La Union, Region-I

i) Problems, Constraints and Development Potential

The rice land covering 83 percent of total cultivated area is located contiguously. The rice land has low cropping intensity with low unit yield under rainfed condition. There is a possibility to exploit certain number of shallow wells for irrigation in more than 50 percent of the total rice land. The average size of distributed land per farm household is the smallest among 12 Study Areas. However, the Study Area has favorable market nearby including San Fernando for production of vegetables. The areas which has slope of less than 18 percent is large and most of these areas can be converted from idle land to orchard production. The road passing through the hilly land suitable for the development of orchard is almost not passable by vehicle.

ii) Development Plan

The rice land shall be improved with the development of irrigation, drainage and farm roads and the introduction of diversified crops production like vegetables to raise cropping intensity. A farm road passing through the central portion from the barangay proper shall be constructed. This is expected to accelerate the agricultural development in the sloping area. The major facilities proposed including the agricultural development support are shown below:

- Road
 - Improvement of access road and farm road : length=1.7 km
 - Construction of new farm road : length=3.0 km
- Irrigation
 - Construction of new irrigation system (Shallow well) : area=44ha
- Drainage / Soil conservation
 - Improvement of drainage facilities : area=44ha
 - Tree planting for soil conservation : area=20ha
- Agricultural development / post-harvest and rural industry
 - Nursery : one
 - Demonstration farm : one
 - Animal breeding center and livestock dispersal : lump sum
 - Multipurpose dryer : one unit
 - Agro-industry center : one
- Rural Infrastructure
 - Rural water supply system (Level-1, deep well) : five
 - Health center : one
 - Expansion of primary school classroom : one

c) Cofcaville ARC, Maddela, Quirino, Region-II

i) Problems, Constraints and Development Potential

The upland covers 83 percent of total cultivated area. An average farm household cultivates about 2.2 ha. Present cultivated land occupies only 54 percent while the remaining areas are left as idle lands. The existing roads between the barangay proper and sitios are not passable with vehicles even during the dry season. A portion of the existing access road also becomes impassable by any type of vehicle during the wet season. Typhoon frequently attack the area bringing about severe hazardous crop damages. There is a promising site where a small scale water impounding dam (SWID) can be constructed which would help farm households irrigate some of their rice lands.

ii) Development Plan

It is planned to improve the access road to the Study Area and all existing roads connecting the barangay proper to the sitios. Farm roads shall be constructed to accelerate the development in the internal areas along the roads. One SWID shall be constructed to irrigate some parts of rice land, to supply not only irrigation water but also for other purpose. The major facilities proposed including the agricultural development support are shown below:

- Road		
Improvement of access road and farm road	:	length=3.8 km
Construction of new farm road	:	length=8.7 km
- Irrigation		
Construction of new irrigation system(SWID)	:	area=6 ha
- Drainage / Soil conservation		
Improvement of drainage facilities (canal)	:	l=0.6km
Tree planting for soil conservation	:	area=50ha
- Agricultural development /post-harvest and rural industry		
Nursery	:	one
Demonstration farm	:	one
Animal breeding center and livestock dispersal	:	lump sum
Multi-purpose dryer	:	two places
Agro-industry center	:	one
- Rural Infrastructure		
Health center	:	one
Expansion of primary school classroom	:	one

d) Montilla ARC, Tuyoy, Balanga, Bataan, Region-III

i) Problems, Constraints and Development Potential

About 98 percent of the Study Area is covered by land with slope of less than 18 percent. There is no rice land. The cultivated land occupies 72 percent of the total area which is composed of upland and orchard. The area coverage of idle land is the smallest among the 12 Study Areas. During the wet season, vegetables are grown in a relatively large area for commercial purposes. Fire during the dry season usually occurs in the orchard damaging fruit trees because landscape of the plateau in the area is severely dried-up. Since no rural infrastructure is available in the area, most of the farm households are transient farmers from the adjacent area. Spring water in the hill located at the back of the Study Area is presently being utilized by some farmer beneficiaries by installing about 1.5 km of thin plastic pipe for multipurpose use including irrigation.

ii) Development Plan

It is proposed to improve the access road of the Study Area and the existing roads connecting the barangay proper to the sitios. Farm roads shall be constructed to accelerate the development in the internal area along the roads. Also a SWIR shall be constructed to irrigate some areas of rice land, supply water not only for irrigation but also for multipurpose use, including raising of seedlings and field fire prevention. The major facilities proposed including the agricultural development support are shown below:

- Road
 - Improvement of access road and farm road : length=4.0 km
 - Construction of new farm road : length=2.6 km
- Irrigation
 - Construction of new irrigation system (SWIR) : area=7ha
- Drainage / Soil conservation
 - Improvement of drainage facilities : area=7ha
 - Tree planting for soil conservation : area=10ha
- Agricultural development / post-harvest and rural industry
 - Nursery : one
 - Demonstration farm : one
 - Animal breeding center and livestock dispersal : lump sum
 - Multipurpose dryer : one unit
 - Agro-industry center : one
- Rural Infrastructure
 - Rural electrification : length=4.0km
 - Rural water supply (Level-I, II, spring) : three
 - Health center : one

e) Maulawin ARC, Calauag, Quezon, Region-IV

i) Problems, Constraints and Development Potential

Gently sloping land with a slope less than 18 percent covers about 70 percent of the total area. About one third of the total cultivated land is covered by rice land, which is rainfed with low land productivity. In the hilly land, orchard planted to citrus has been developed to a certain extent. However the developed orchard area is limited along the existing main road. Since some disastrous diseases are presently infesting the country, special attention shall be paid in the formulation of the agricultural development plan for the area. It may be possible to develop a small scale water impounding reservoir (SWIR) to irrigate about one third of the total rice land.

ii) Development Plan

The access road of the Study Area and the existing roads shall be improved. Moreover, some farm roads shall be newly constructed in order to intensify the use of existing cultivated lands and also to convert the idle land to cultivation land. The rice land shall be developed with the construction of a SWIR and the improvement of drainage facilities. The major facilities proposed including the agricultural development support are shown below:

- Road
 - Improvement of access road and farm road : length=5.0 km
 - Construction of new farm road : length=2.8 km
- Irrigation
 - Construction of new irrigation system (SWIR) : area=20ha
- Drainage/Soil conservation
 - Improvement of drainage facilities : area=20ha
 - Tree planting for soil conservation : area=30ha
- Agricultural development/post-harvest and rural industry
 - Nursery : one
 - Demonstration farm : one
 - Animal breeding center and livestock dispersal : lump sum
 - Multipurpose dryer : three units
 - Agro-industry center : one
- Rural Infrastructure
 - Rural water supply (Level-I, deep well) : four
 - Health center : one

f) Pag-asa ARC, Tinambac, Camarines Sur, Region-V

i) Problems, Constraints and Development Potential

DAR has taken over the distribution of land as well as the extension of agricultural support services for the beneficiaries of the former national resettlement project. The average land distributed per farm household is about six hectare. Not only access road and the related roads in the area but also the concerned provincial road are considerably behind in development. About 40 percent of total area are left as idle. Coconut land occupies 87 percent of the cultivated area.

Typhoon frequently attack the Study Area. Particularly, a large scale typhoon damaged coconut very severely during the previous year. The regional office of DA is promoting on contract basis the cultivation of coffee to alleviate farming conditions mostly beneficiaries whose coconut farms has been severely damaged by the typhoon. It is possible to irrigate some part of rice land with the construction of small scale water impounding reservoir.

ii) Development Plan

The access road of the Study Area and the existing roads between sitios and the barangay proper shall be improved. Moreover, some farm roads shall be constructed to further encourage the conversion of the idle lands to cultivation lands. The rice land shall be developed with the construction of a SWIR. The major facilities proposed including the agricultural development support are shown below:

- Road	
Improvement of access road and farm road	: length=11.0 km
Construction of new farm road	: length=5.5 km
- Irrigation	
Construction of new irrigation system (SWIR)	: area=12ha
- Drainage/Soil conservation	
Improvement of drainage facilities	: area=12ha
Tree planting for soil conservation	: area=30ha
- Agricultural development/post-harvest and rural industry	
Nursery	: one
Demonstration farm	: one
Animal breeding center and livestock dispersal	: lump sum
Multipurpose dryer	: two units
Agro-industry center	: one
- Rural Infrastructure	
Rural water supply (Level-I, deep well)	: five
Health center	: one
Expansion of primary school classroom	: one

g) Abiera ARC, Altavas, Aklan, Region-VI

i) Problems, Constraints and Development Potential

Steep and hilly land prevails in the Study Area. The area coverage of lands with slope of less than 18 percent occupies only 23 percent of the total area. There are two access roads connecting the provincial road. However, the end portion of these roads stops at a very steep area with no connecting roads and becomes impassable by any type of vehicle. Hence, most of the area are isolated. About 86 percent of the total cultivated area are covered by coconut land. The idle area covers about 60 percent of the total area with a slope of more than 30 percent.

ii) Development Plan

The two access roads of the Study Area and the existing roads shall be improved. Moreover, some farm roads shall be newly constructed. It is planned to introduce contour cultivation applying the Slopping Agricultural Land Technology (SALT) and also, agroforestry for areas with slope of up to 30 percent. In lands with has a slope of more than 30 percent, fast growing timber trees shall be planted. The major facilities proposed including the agricultural development support are shown below:

- Road
 - Improvement of access road and farm road : length=4.8 km
 - Construction of new farm road : length=7.4 km
- Irrigation
 - Construction of new irrigation system (SWIR) : area=30ha
- Soil conservation
 - Tree planting for soil conservation : area=30ha
- Agricultural development/post-harvest and rural industry
 - Nursery : one
 - Demonstration farm : one
 - Animal breeding center and livestock dispersal : lump sum
 - Multipurpose dryer : two units
 - Agro-industry center : one
- Rural Infrastructure
 - Rural water supply system (Level-I,deep well) : six
 - Rural electrification : length=5.5 km
 - Health center : one
 - Expansion of primary school classroom : one
 - Multi-purpose barangay hall : one

h) San Vicente ARC, Trinidad, Bohol, Region-VII

i) Problems, Constraints and Development Potential

The average distributed land per farm household is about 2.8 ha. However, the average cultivated area is only less than one ha, although the area coverage of the land with slope of less than 18 percent is the largest among the 12 Study Areas, about 85 percent of the total land area. A large area of about 18 percent is left as idle land because of the hilly topographic feature and lack of soil moisture under rainfed conditions. The existing roads between the barangay proper and sitios are not passable by vehicle even during the dry season. Farm roads are very limited. The source of water for drinking and other domestic use is mostly open wells, which are often polluted. There is a promising site where a small scale water impounding reservoir (SWIR) can be constructed to irrigate some rice land.

ii) Development Plan

It is proposed to improve the access road to the Study Area and all existing roads connecting the sitios to the barangay proper. Farm roads shall be constructed to accelerate the development in the internal area along the roads. A SWIR shall be constructed to irrigate some parts of rice land, to supply not only irrigation water but also other purposes. The major facilities proposed including the agricultural development support are shown below:

- Road
 - Improvement of access road and farm road : length=6.0 km
 - Construction of new farm road : length=4.0 km
- Irrigation
 - Construction of new irrigation system (SWIR) : area=10ha
- Drainage/Soil conservation
 - Improvement of drainage facilities : area=10ha
 - Tree planting for soil conservation : area=40ha
- Agricultural development/post-harvest and rural industry
 - Nursery : one
 - Demonstration farm : one
 - Animal breeding center and livestock dispersal : lump sum
 - Multipurpose dryer : one unit
 - Agro-industry center : two
- Rural Infrastructure
 - Rural water supply system (Level-I,deep well) : two
 - Expansion of primary school classroom : one

i) Marangog ARC, Hilongos, Leyte, Region-VIII

i) Problems, Constraints and Development Potential

To reach the Study Area, the farmer beneficiaries has to cross a river. Because of the absence of a bridge across the river, the area is frequently isolated during the wet season and becomes impassable to any type of transportation. All roads, including the access road as well as the roads connecting the barangay proper to the sitios are in very poor conditions. Steep and hilly lands cover about 50 percent of the Study Area. The area of land which has a slope of less than 18 percent occupies only 46 percent of the total area. The elevation from the sea level range from about 350 m to 400 m. There is a possibility to introduce the cultivation of sub-high altitude vegetables with the introduction of tank irrigation type system.

ii) Development Plan

The access road shall be improved with the construction of a light type bridge as submergible crossing bridge. Moreover, some farm roads shall be constructed to intensify cultivation of present land and to convert the idle lands to cultivated lands. The tank irrigation type system shall be introduced to supply water for irrigation of sub-high altitude vegetables and other crops and for other purposes. The major facilities proposed including the agricultural development support are shown below;

- Road	
Improvement of access road and farm road	: length=9.6 km
Construction of new farm road	: length=3.2 km
- Irrigation	
Construction of new irrigation system	: area=15ha
- Drainage/Soil conservation	
Tree planting for soil conservation	: area=30ha
- Agricultural Development/post-harvest and rural industry	
Nursery	: one
Demonstration farm	: one
Animal breeding center and livestock dispersal	: lump sum
Multi-purpose dryer	: three units
Agro-industry center	: one
- Rural Infrastructure	
Rural water supply system (Level-II, Spring)	: one
Health center	: one
Multi-purpose barangay hall	: one

j) Silae ARC, Malaybalay, Bukidnon, Region-X

i) Problems, Constraints and Development Potential

The Study Area is located near the boundary of Bukidnon. It has an elevation of more or less 550 m from mean sea level. There are two access roads from Malaybalay to the area with a total length of 17 km and 52 km. Upland field covers 95 percent of the total cultivated area, which is located contiguously along one of the major creek. Some rice land is located in the lowland along the creek. There are reported cases of schistosomiasis affecting the lowland. Corn is mainly planted not only in the gently sloping area but also in the steep hillside area without any kind of soil conservation measures. The main creek may have enough amount of water which can be tapped for irrigation purposes to grow rice and sub-high altitude crops.

ii) Development Plan

There are good roads existing between the barangay proper and sitios. However, some farm roads shall be newly constructed to intensify the land use of the existing cultivated lands and to convert the idle land to the cultivated lands. An irrigation system may be constructed with the provision of a intake in the existing creek. Drainage facilities shall be developed in the lowland. The major facilities proposed including the agricultural development support are shown below:

- Road
 - Construction of new farm road : length=2.7 km
- Irrigation
 - Construction of new irrigation system (2 places) : area=13.2ha
- Drainage Improvement of drainage facilities (canal) : l=1.5km
- Tree planting for soil conservation : 20ha
- Agricultural development/post-harvest and rural industry
 - Nursery : one
 - Demonstration farm : one
 - Animal breeding center and livestock dispersal : lump sum
 - Multi-purpose dryer : two units
 - Agro-industry center : one
- Rural Infrastructure
 - Rural water supply system (Level-I,deep well) : five
 - Rural electrification : 3.5km

k) Kipalili ARC, Asuncion, Davao Del Norte, Region-XI

i) Problems, Constraints and Development Potential

The average distributed area is as large as 2.9 ha. The area of land having a slope of less than 18 percent is limited to 30 percent of the total area with prevailing hilly and steep cogonal land. Most of the cultivated lands are scattered in small patches in the upland and are susceptible to severe soil erosion. Most of the farmers cultivate these lands with corn as main crop. None of the existing roads between the barangay proper and sitios are passable by vehicle even during the dry season. There are very limited roads within the marginal area. There is a promising site where it is possible to construct an intake to supply irrigation water to some rice lands.

ii) Development Plan

The existing roads connecting the sitios to the barangay proper shall be improved. Also farm roads shall be constructed to reach the central portion of the area. Contour cultivation and also agroforestry may be introduced in areas which has a slope of up to 30 percent. In the land which has a slope of more than 30 percent, fast growing timber trees shall be planted. A SWIR shall be constructed to irrigate some parts of rice land, to supply not only irrigation water but also for other purposes. The major facilities proposed including the agricultural development support are shown below:

- Road	
- Improvement of access road and farm road	: length=8.2 km
- Construction of new farm road	: length=6.6 km
- Irrigation	
- Construction of new irrigation system (SWIR)	: area=12ha
- Drainage/Soil Conservation	
- Improvement of drainage facilities	: area=12ha
- Tree planting for soil conservation	: area=30ha
- Agricultural development/post-harvest and rural industry	
- Nursery	: one
- Demonstration farm	: one
- Animal breeding center and livestock dispersal	: lump sum
- Multipurpose dryer	: two units
- Rural Infrastructure	
- Rural water supply system (Level-I,deep well)	: seven
- Rural electricity supply	: length=9.0km
- Expansion of primary school classroom	: one
- Barangay health center	: one

l) **Mat-i ARC, Surigao City, Surigao Del Norte, Region-XIII**

i) **Problems, Constraints and Development Potential**

The area coverage of land having slope of less than 18 percent is limited to 30 percent of the total area. Generally, the landscape of the Study Area is hilly and steep. Because of the absence of rural infrastructure like road, water supply system, school, etc., most of the farm households are transient farmers from the adjacent area. Only some trails are available. Coconut land cover almost all area, where the extensive farming with low production is prevailing. The idle area covers about 60 percent of the total area, with most of the land having a slope of more than 30 percent.

ii) **Development Plan**

It is planned to improve the existing roads connecting the sitios and the barangay proper. Also, farm roads shall be constructed. Contour cultivation and also agroforestry may be introduced in areas having a slope of up to 30 percent. In land which has a slope of more than 30 percent, fast growing timber trees shall be proposed to be planted. The major facilities proposed including the agricultural development support are shown below:

- Road
 - Construction of new farm road : length=3.0 km
- Soil conservation
 - Tree planting for soil conservation : area=20ha
- Agricultural development/post-harvest and rural industry
 - Nursery : one
 - Demonstration farm : one
 - Animal breeding center and livestock dispersal : lump sum
 - Multipurpose dryer : two units

5.8.2 Project Costs

1) Basic Conditions

a) Construction Costs

Construction costs shall be determined based on similar work items used in recent projects in the Philippines. All the unit costs will then be updated to the price level of September 1996, applying the price index issued by NSCB.

b) Currency Components

It is assumed that equipment and materials to be utilized in the Project are mostly locally manufactured. Therefore, the direct foreign currency cost as the Project components can be taken to a minimum. Thus, the project costs are estimated in local currency only.

c) Pre-Engineering, Administration and Consulting Services Costs

The pre-engineering cost means costs for topographic survey, route survey, geological investigations, etc. to be conducted prior to the detailed design stage. The administration cost contains salaries and wages of the office staff, miscellaneous costs for administration, fuel and light expenses, water charge, etc. during the implementation period. Consulting services will be required for the detailed design, preparation of the tender documents and supervision of the construction works. These costs shall be included in the cost estimate.

For estimation purposes, these costs are normally taken as a percentage of the basic construction costs. Five percent of the construction costs is adopted for the pre-engineering cost, ten percent for the administration cost and ten percent for the consulting services cost.

d) Physical Contingency

It is assumed that physical contingency shall be ten percent of the construction costs.

2) Project Costs

The construction costs shall be estimated at current prices on a contract basis for all sectoral project plans. The project costs are composed of seven items according to the sectoral plans as follows:

Construction Cost

- Agricultural Development
- Agricultural Infrastructure Development
- Rural Infrastructure Development
- Post Harvest Development
- Institutional Development

Community Development & Support Services Cost

- Agricultural Support Services
- Institutional Development

The project costs by Study Area were estimated between 17 and 76 million pesos. Refer to Tables N.1-1 to N.1-3.

3) Operation and Maintenance Costs

The annual operation and maintenance costs are composed of salaries and wages of operation and maintenance staff, administration and general expenditures, equipment depreciation and repair costs, fuel and oil costs, and maintenance cost of the facilities.

It is assumed that annual operation and maintenance costs shall be one and two and half percent of the construction costs. Annual O & M costs by Study Area were estimated between 138,600 and 565,060 pesos (refer to Table N.1-5).

5.8.3 Project Benefit and Evaluation

A preliminary financial analysis of the 12 Study Areas was initially undertaken and reported in the Interim Report of July 1996. With more information and data collected from the four Project Areas and related institutions in the Philippines from September 1996 to January 1997, the said preliminary analysis has been reviewed. Based on the findings of the four Project Areas, namely, the Sappaac ARC in Region CAR; the Coscaville ARC in Region II; the Marangog ARC in Region VIII and the Silae ARC in Region X; the financial analysis of all other eight ARCs have been revised. The detailed analysis of such revisions are presented in Tables O.1-1 to O.1-15 in Annex O which is summarized below:

Financial Analysis of 12 Study Areas

Level of Return	Region	Study Area	FIRR (%)	NPW (15%) ('000 peso)
High	X	Silae	26	15,890
	VII	San Vincente	19	7,901
	IV	Maulawin	19	6,067
Medium	Car	Sappaac	15	695
	XI	Kipalili	15	212
	V	Pag-asa	15(14.6)	-974
	VI	Abiera Estate	14	-2,801
	II	Cofcaville	13	-4,214
	XIII	Mat-i	12	-1,364
	III	Montilla	12	-4,506
	I	Talugtog	12	-5,007
VIII	Marangog	12	-6,710	

The above analysis indicates the following:

- The Financial Internal Rates of Return (FIRR) of all the 12 Study Areas range from a low of 12 percent at Marangog to a high of 26 percent at Silae. What is interesting about this is that both the ARC of the highest and the lowest ARCs are included in the four Typical Study Areas. In other words, the method of Principal Component and Cluster Analysis used in identifying the four Typical Study Areas has rightly covered all categories of the marginal areas where the projects are to be implemented,
- At the present Opportunity Cost of Capital (OCC) of 15 percent as identified by the National Economics and Development Authority (NEDA), the Net Present Worths at such rate of OCC (NPW-15%) of several Study Areas fall below zero. These, however, may not be immediately taken as an indication of failure to meet the minimum rate of return so set. The Internal Rates of Return are but one among several indicators of project achievement. The ultimate objectives of development projects, in particular those in the marginal areas like these 12 Study Areas, should not be placed on monetary returns alone. Other forms of benefit which are of equal or more importance than the monetary returns are the improved welfare and better quality of life of the poor people in the marginal areas, who have mostly been neglected in the past,
- Closely related to what mentioned above are the non-quantifiable benefits, indirect or intangible, in the form of improved environmental conditions as a result of contour farming and agro-forestry recommended in the project areas. One among such benefits which may later be quantifiable with improved data and analytical techniques are savings of inputs like fertilizers from less occurrence of soil erosions; savings of irrigation costs

due to more soil moisture and less drought; savings of road damages due to land slides and so on, and

- All above together with the indirect benefits from improved income and related benefits, namely better education, health, social status etc. of the people in the marginal areas, are more than enough for the decision to implement the projects in all the 12 Marginal Areas.

5.8.4 Project Implementation

1) Implementing Agency

The leading implementing agency is the DAR (refer to Figure 5.8-1). With DAR representative as Chairman, the Executive Coordination Committee (ECC) shall be organized to execute overall coordination among various sectoral line agencies, LGUs, and NGOs concerned. One of the important functions of the ECC is to provide overall policy, direction and support to the Project. The ECC shall be supported by a Central Project Management Office (CPMO) who is charged with the overall supervision of the Project. At each Project Area, a Provincial Project Management Office (PPMO) shall be organized who shall be in-charged of the day-to-day operations of the Project activity.

The national line agencies concerned will be DA, NIA, BSWM, DPWH, DENR, DTI etc. These line agencies and LGUs shall undertake the actual implementation of each sectoral part of the Project in the field. Close cooperation between the PPMO and participating agencies/LGUs is important for the smooth implementation of the Project to attain the project goals.

The CPMO and PPMO shall be assisted by the Consultants and NGOs to provide proper guidance, technical supervision and monitoring of project activities (refer to Figure N.1-1).

2) Implementation Plan

All facility constructions formulated in this Study could be completed within two years after commencement of the detailed design. As for community development and support services, two years are required for institutional capacity building and social preparation, and four years for agricultural support services and institutional development (refer to Figure 5.8-2). In order to implement without delay, intense efforts for financial arrangement or fund procurement from foreign governments and/or international development banks shall be made by the Government of Philippines.

FIGURE 5.8-1 ORGANIZATIONAL STRUCTURE OF DEPARTMENT OF AGRARIAN REFORM

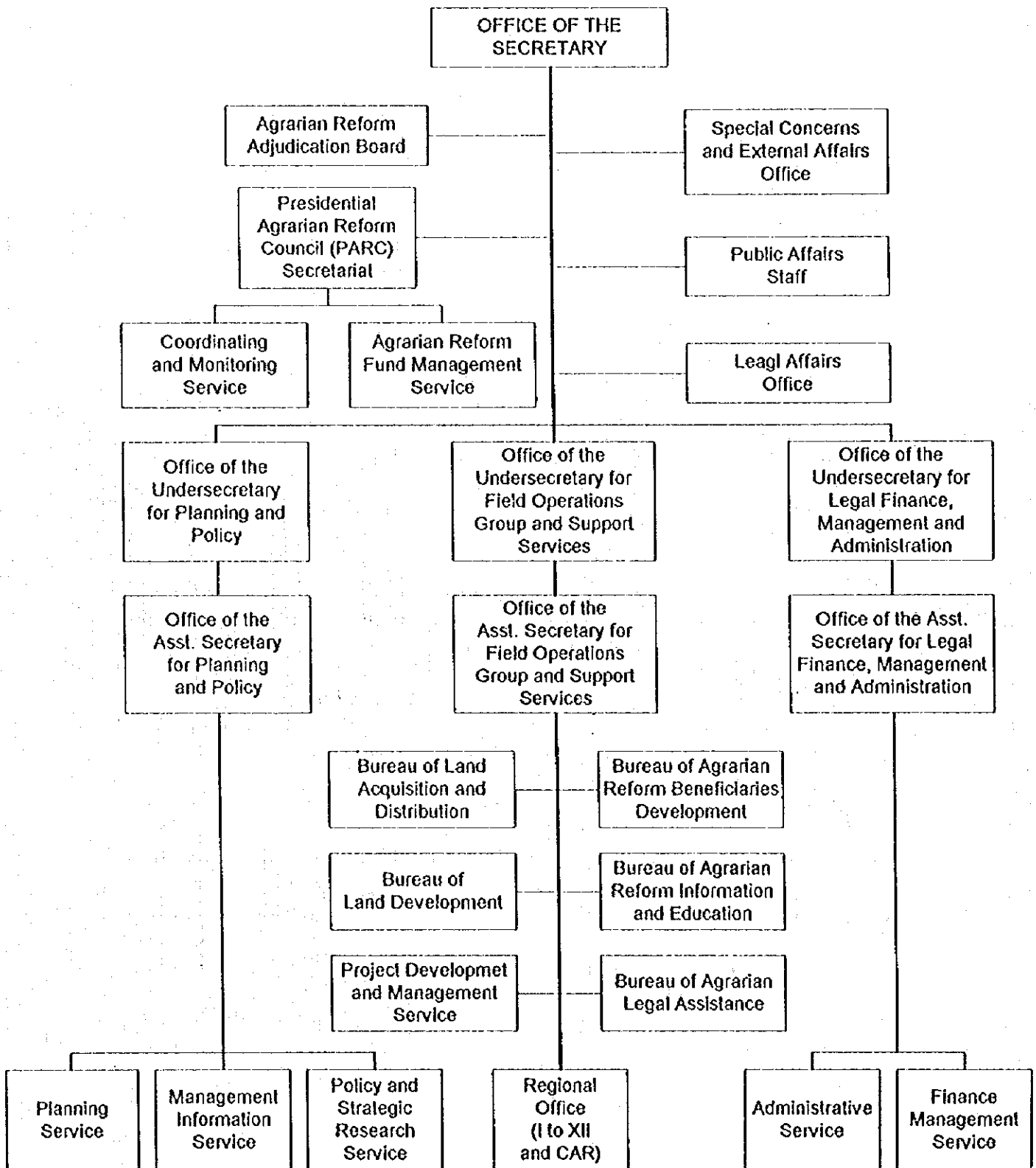


FIGURE 5.8-2 IMPLEMENTATION SCHEDULE FOR THE MODEL AREA

Work Items	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year
A. Social Preparation and Institutional Strengthening							
1. Barangay Consultation	—						
2. LGU & Other Local Agency Consultation	—						
3. Formation of Executive Coordinating Committee (ECC), Project Management Office (PMO)	—						
4. Strengthening of Institution	—	—					
a) DAR	—	—					
b) Other Local Agencies	—	—					
5. Selection and Contracting of NGO	—	—					
6. Social Preparation for Community Development	—	—					
B. Facility Construction and Equipment Supply							
1. Fund Procurement for Social Preparation and Community Dev.	—						
2. Preparatory Works							
a) Land Acquisition	—	—					
b) Pre-Engineering Works	—	—					
3. Consulting Services							
a) Detailed Design		—					
b) Tender Procedure		—					
c) Construction Supervision		—					
4. Construction Works							
a) Agricultural Development							
b) Agri. Infrastructure Development							
c) Rural Infrastructure Development							
d) Post-Harvest and Agro-Industry Development							
e) Institutional Development (Equipment Supply)							
C. Community Development and O & M							
1. Formation of Technical Working Group (TWG)	—						
2. Community Development							
3. Operation and Maintenance of Project Facilities							

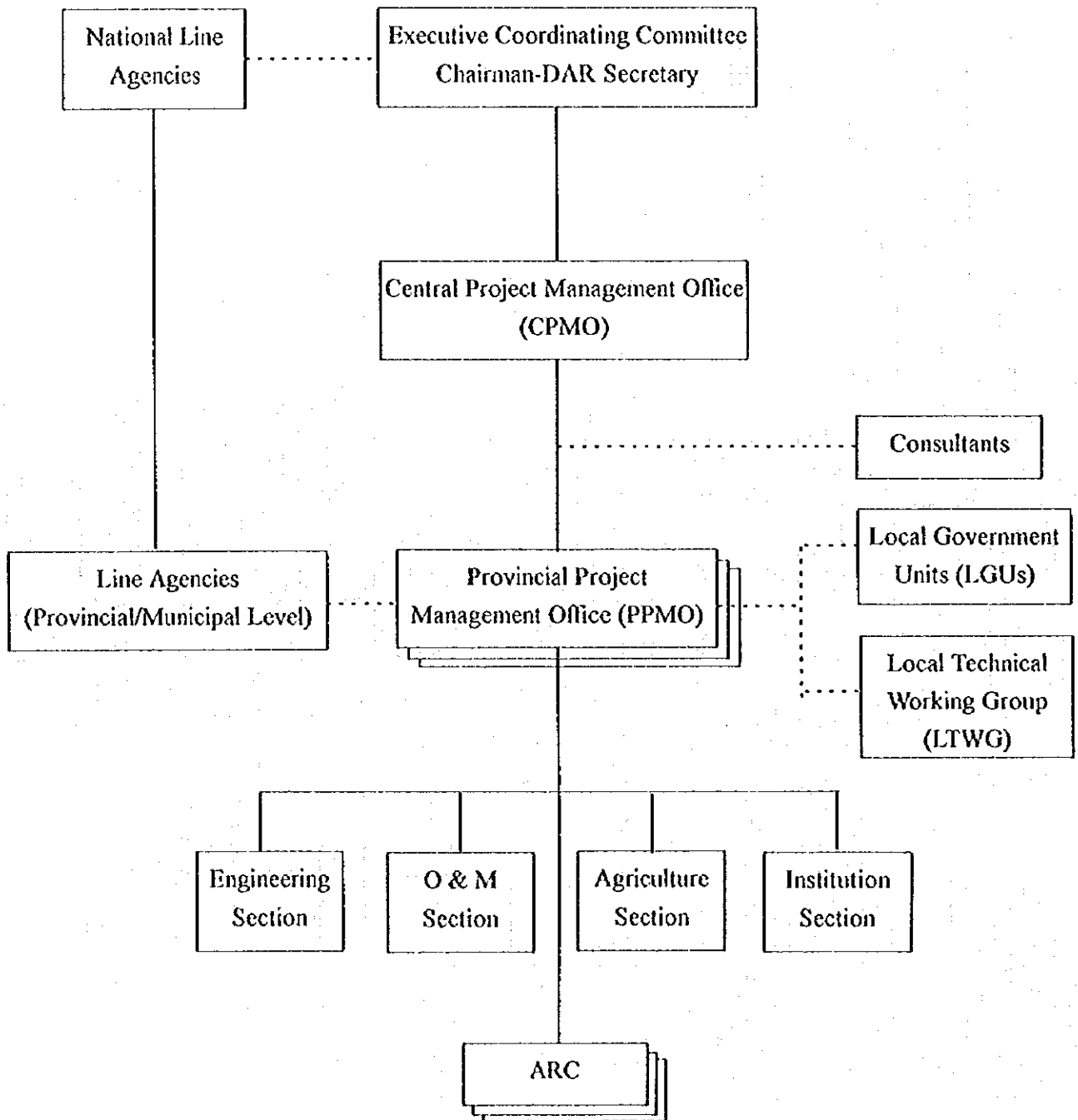
3) Operation and Maintenance Body

Executing agencies for the operation and maintenance of facilities and equipment constructed/purchased under the Project are divided into two categories, i.e. public sector and private sector.

The operation and maintenance of the irrigation facilities, rural water supply facilities, electric power line, transport vehicles, and post harvest and cooperative facilities will be turned over to the private sector. O&M body of these facilities shall be undertaken by the associations/cooperatives which are to be organized by the DAR, NGO and LGUs.

On the other hand, facilities and equipment provided by the Project such as, rural roads, farm roads, road maintenance equipment and social facilities shall be managed and maintained by the relevant local government units (LGUs). Operation and Maintenance (O&M) Section shall be attached to PPMO in order to guide and assist above mentioned farmers' organizations and LGUs. NGOs will assist O&M Section in terms of training coordination, guidance, monitoring, etc (refer to Figure 5.8-3).

FIGURE 5.8-3 PROPOSED ORGANIZATION CHART FOR PROJECT IMPLEMENTATION



————— Control/Supervisor
 - - - - - Tight Support/Monitoring

**CHAPTER VI. CLASSIFICATION OF MODEL AREAS AND
SELECTION OF TYPICAL MODEL AREAS**

CHAPTER 6. CLASSIFICATION OF MODEL AREAS AND SELECTION OF TYPICAL MODEL AREAS

6.1 Classification of Model Areas

The classification of 12 Model Areas into similar groups was studied and taken into consideration development pattern and methods and social capacity, such as, establishment conditions of communities (barangay and sitio), area custom and practices, marketing systems, topography, natural conditions, etc. These classification analyses were made in the following two cases:

- Classification of Areas by prevailing present conditions, and
- Classification of Areas by project development plan.

The former analysis was made applying statistical method with quantitative evaluation for prevailing elements of present conditions for each Model Area, and the latter was made by development pattern of the Areas.

6.1.1 Classification of Areas by Prevailing Present Conditions

1) Related Elements for classifying the Model Areas

In order to classify the 12 Model Areas into similar groups, four major subjects such as, i) poverty conditions, ii) living conditions, iii) production conditions, and iv) development potential, are taken into consideration. These were further subdivided into smaller elements as shown below (refer to Table L.1-13).

Poverty Conditions

- Annual income per household
- Employment rate for agricultural sector
- Employment rate for non-agricultural sector

Living Conditions

- Natural conditions
- Agricultural infrastructures (accessibility to the Areas)
- Rural and social infrastructures
- Environment

Production Conditions

- Farming conditions
- Agricultural infrastructures

Development Potential

- Land resources
- Water resources
- Human resources
- Institutional capacity in development

In the individual evaluation, relations between evaluation indices and their rankings are simply explained as follows:

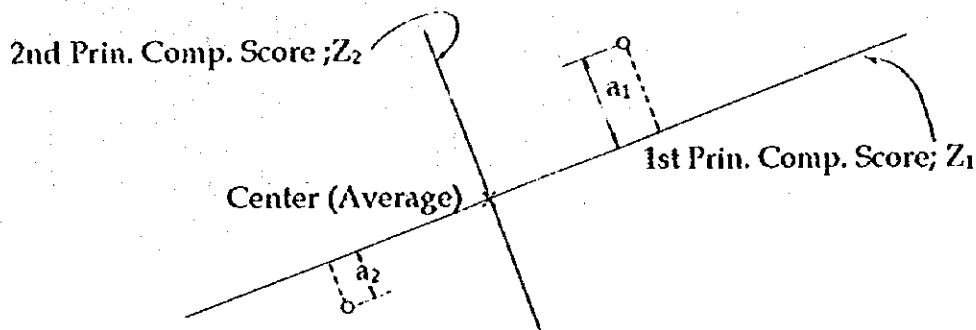
- Rank-3: Best or highest in positive factor and/or least or lowest in negative factor of evaluation indices,
- Rank-2: Medium in both positive and/or negative factor, and
- Rank-1: Worst or lowest in positive factor and/or most or highest in negative factor.

2) Applied Methods for Classification of Model Areas

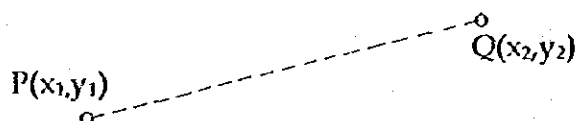
The classification analyses for the 12 Model Areas were made applying two statistical methods, that is, the Principal Component Analysis and Cluster Analysis.

The former is the mathematical transformation of the original data for various elements falling under each of the four major subjects. In its essence, the Principal Component Method searches for the linear combination which would best represent the interrelations between and among the indicators of each major subjects. In the Principal Component analyses, principal component score will be expressed by the following equation; $Z_1 = (A_{11}X_1 + A_{12}X_2 + \dots + A_{1p}X_p)$, where Z_1 is first principal component score, A_{11} is the element (coefficient) of the characteristic vector, and X_{1p} is the linear compound.

The line Z_1 is a linear line passing through an average point of X . The line must have the smallest values (amount), in calculating $a_1 + a_2 + \dots + a_n$. These a_1 and a_n are vertical lines which connect any points and Z_1 . Draw a vertical line that passes through an average point X to the line Z_1 . This linear line becomes line Z_2 , as shown below. This linear compound of Z_2 is the second principal component score. To analyze the principal component score, two ways exist, that is, Eigenvector method and Principal Component Load method.



On the other hand, the Cluster Analysis was applied using different combination of the subjects on the basis of the transformed data. By method of iteration, 12 Model Areas were grouped based on the means of the transformed values of the subject to be considered. The processes of clustering was continued until a convergence is found among the cases. To put it concretely, the scale to be used for clustering the group is scored distance and correlation coefficient among the cases. The scale of scored distance is used for Sample Cluster method, while the correlation coefficient is used for Variable Cluster method. The scored distances between the cases are estimated by the equation of $d = \sqrt{(X_2 - X_1)^2 + (Y_2 - Y_1)^2}$ in the case of a quadratic equation.



Each cluster has a center (a mean squared distance of 0). Hence, the basis for grouping within the same cluster is the distance of each sample case from the cluster center. The computer gives the distance of each sample case from the cluster center for every variable combination.

The Principal Component and Cluster analyses mentioned above were made for the following alternative cases:

Alternative Cases for Principal Component and Cluster Analyses

Items	Case 1	Case-2	
		Case 2-1	Case 2-2
- Principal Component Analysis			
Analysis Method	Eigenvector	Eigenvector	Eigenvector
No. of Principal Components	3	4	4
- Cluster Analysis			
Analysis Method	Sample Cluster	Sample Cluster	Sample Cluster
No. of Cluster	4	3	4

The results of Principal Component and Cluster Analyses are shown in Figure L.1-2. Similar samples (ARC) are grouped by dotted line.

As is seen in Figure L.1-12, Case 2 with four principal components presents slightly higher cumulative percentage of variance in the case of 2nd principal component, compared with that of Case 1. Therefore, the number of principal components will be decided at four (Generally, the number of principal components will be decided expecting that the cumulative percentage of variance should be more than 60 percent).

Furthermore, two alternative studies for Case-2 were made, that is, Case 2-1 with three clusters and Case-2-2 with four clusters. The study results are given in Figure L.1-2. As observed in the figure, the differences between Case 2-1 and Case 2-2 are the clustering of Abiera Estate. In the former case (Case-2-1), Abiera Estate will be involved in Cluster-3. However, in case of the latter case (Case-2-2), Abiera Estate will be an independent cluster (Cluster-4).

As a most adequate number of cluster for classifying 12 Model Areas, Case 2-1 with three clusters will be selected considering the characteristics of Abiera Estate.

The following table indicates the results of classification for the 12 Model Areas.

Classification of Model Areas by Prevailing Present Elements

12 Model Areas	Principal Component and Cluster Analyses		
	Cluster-1	Cluster-2	Cluster-3
Sappaac ARC (Reg.-CAR)	○		
Talugtog ARC (Reg.-I)		○	
Cofcaville ARC (Reg.-II)		○	
Montilla ARC (Reg.-III)	○		
Maulawin ARC (Reg.-IV)	○		
Pag-asa ARC (Reg.-V)		○	
Abiera Estate (Reg.-VI)			○
San Vicente ARC (Reg.-VII)			○
Marangog ARC (Reg.-VIII)			○
Silae ARC (Reg.-X)			○
Kipalili ARC (Reg.-XI)			○
Mat-i ARC (Reg.-XIII)			○

Considering the study results mentioned above, the 12 Model Areas were classified into three clusters applying the Principal Components and Cluster Analyses on the basis of prevailing conditions. However, the selection of Typical Model Areas will be undertaken taking into account the results obtained through the study by means of development plan to be described hereinafter.

The salient characteristic and similar features of the classified three clusters are presented below;

Cluster-1

- Annual income per household is the highest among the three clusters, and its amount is 20-35 thousand pesos per annum, excluding Montilla ARC, of which income amounts to 105 thousand peso/annum,

- The selected ARCs in this cluster are located in the North, Central and Southern Luzon regions. The climate type belongs to Type-I and IV where rainfall is mostly observed with an annual amount of about 1,900-3,050 mm. Also, an average of 21-34 typhoon hit these areas annually,
- The suitable cultivable land with a land slope less than 18 percent is scattered throughout the areas with a ratio of 75-95 percent of the area,
- Accessibility to the Areas is not difficult with provision of minimum rural roads. The Areas are located adjacent to the main roads, such as, national and provincial roads,
- Rural infrastructures such as rural water supply, school, health center, rural electrification, etc., are provided at the minimum level,
- Environmental problems, such as, soil erosion, water pollution of rural water supply and watershed management are presently observed,
- Main proposed crops are paddy rice, upland crops and tree crops, such as, mango and citrus under rainfed conditions. Soil fertility is moderate, and stoniness and gravel content in the field are relatively low, and
- Farmers' organizations are established at the rate of 40-60 percent of the Areas. NGO activities are however, few.

Cluster-2

- Annual income per household is 25-31 thousand pesos per annum, except for Talugtog ARC, where income amounts to 54 thousand pesos per annum,
- The selected ARCs in this cluster are located in the Northern, Central and Bicol regions. The climate type belongs to Type-I, II and III of the Philippine classification. The amount of rainfall throughout the year around Cofcaville and Pag-asa is about 3,000-3,300 mm. However, for Talugtog ARC, the amount of rainfall observed during the wet season is about 2,400 mm. An average of 21-36 typhoons hit these areas annually,
- The suitable cultivable lands with a land slope of less than 18 percent are scattered throughout the areas with a ratio of 68-81 percent. This is lower than that of Cluster-1,
- Accessibility to the Areas is difficult due to absence of adequate rural roads, except for the Talugtog ARC, where accessibility is easy. Talugtog Area is located adjacent to the national road,
- Rural infrastructures, such as, rural water supply, school, health center, rural electrification, etc., are available at the minimum level,

- Environmental problems, such as, soil erosion, water pollution of rural water supply and watershed management are prevalent in the Area,
- The proposed crops are mainly paddy rice, corn, banana, coconut, coffee, etc. Soil fertility is moderate. Stoniness and gravel content in the field are relatively low, except for Pag-asa ARC, and
- Farmers' organizations are established at the rate of 40-50 percent of the Areas. However, NGO activities are few, except for Cofcaville ARC.

Cluster-3

- The annual income per household is 9-25 thousand pesos per annum. This is the lowest among the three Clusters with that of Marangog ARC being the lowest among the 12 Model Areas,
- The selected ARCs in this cluster are located in the Visayas and Mindanao regions. Their climate type belongs to Type-II, III and IV in the Philippine classification. The numbers of typhoons hitting the Visayas region are 26-34 times a year with an almost the same frequency. However, for the Silae and Kipalili ARCs that are located at the interior parts of Mindanao region, rainfall are limited, with only about three times a year,
- The suitable cultivable land with a land slope less than 18 percent is few with ratio of 24-55 percent of the total Area,
- Accessibility to the Areas is difficult due to absence of good and adequate rural roads. Rehabilitation of these roads is needed, specifically in the case of Mat-i ARC, where no access roads exist,
- Rural infrastructures, such as, rural water supply, school, health center, rural electrification, etc., are not provided adequately, resulting to low levels of living conditions in the Areas,
- Environmental problems, such as, soil erosion, water pollution of rural water supply and watershed management are observed,
- The main crops proposed are corn, banana, coconut, mango, etc. under rainfed conditions. Soil fertility is moderate. Stoniness and gravel content in the field are the highest among the three Clusters, specifically those in Mat-i ARC with about 72 percent of the Areas, and
- Farmers' organizations are established at the rate of 30-80 percent of the Areas. NGO activities are found in the ARCs of Abiera, San Vicente and Mat-i.

6.1.2 Classification of Areas by Project Development Plan

As stated in paragraph of 5.8.1 "Project Components for Model Area," components of the development plan for each Area are described below;

- Improvement and Enhancement Plans for Institutional Capacity in the Rural Areas,
- Land-Use and Soil Conservation Plans
- Farm Management and Agricultural Supporting Service Plans
- Water Resource Development Plan
- Agriculture Infrastructure Plan
- Rural Infrastructure Plan
- Rural Agro-Industry Plan
- Environmental Conservation and Rural Health Improvement Plans

Since all project components except land-use and environmental conservation plan (presented by ratio of cultivation and cultivable areas), water resource plan (type of water resources facilities and irrigation methods), and agricultural farm management plan (introduced crops and cropping pattern) are considered to be essential and prerequisite for the whole Areas, the classification of Model Areas by project development plan shall be designed depending on the three main project components.

Considering the study on Model Area classification, the 12 Model Areas were classified into the following four types of development plans, as shown in Table L.1-16.

- Dev. Type-I : High Ratio of Cultivation Cultivable Areas + Irrigated Agriculture + Main Crop (Paddy Rice)
- Dev. Type-II : High Ratio of Cultivation Cultivable Areas + Rainfed Agriculture + Main Crop (Paddy Rice)
- Dev. Type-III : High Ratio of Cultivation Cultivable Areas + Rainfed Agriculture + Main Crop (Upland and Tree Crops)
- Dev. Type-IV : Low Ratio of Cultivation Cultivable Areas + Rainfed Agriculture + Main Crop (Upland and Tree Crops)

The following table presents the classification results of the 12 Model Areas by project development type.

Classification of Model Areas by Project Development Type

12 Model Areas	Classification of Develop. Plan
Sappaac ARC (Reg.-CAR)	I, II
Talugtog ARC (Reg.-I)	I
Cofcaville ARC (Reg.-II)	III
Montilla ARC (Reg.-III)	III
Maulawin ARC (Reg.-IV)	III
Pag-asa ARC (Reg.-V)	III
Abiera Estate (Reg.-VI)	IV
San Vicente ARC (Reg.-VII)	III
Marangog ARC (Reg.-VIII)	IV
Silae ARC (Reg.-X)	IV
Kipalili ARC (Reg.-XI)	IV
Mat-i ARC (Reg.-XIII)	IV

The major features of the classified four Model Areas are given below:

Development Type - I

- The Development Type-I ARCs are located in Northern Luzon region. Climate conditions are clearly divided into wet and dry seasons. Rainfalls are mostly concentrated during the wet season from May to October. No rainfall is observed during the dry season,
- Since the ratio of cultivation and cultivable areas, which are located in the topographic slope of less than 30 and 18 percent, respectively, are high, effective land-use plan could be expected. Also, land slope is relatively gentle as a whole. Hence, countermeasures for environmental conservation, such as, soil erosion and watershed management would not be needed,
- Irrigation water sources are available in and around the ARCs. Therefore, irrigated agriculture using these available water resources would be implemented with the provision of necessary and minimum agricultural infrastructure, such as, intakes, small-scale impounding dams, and diversion canals,
- The main crops to be introduced in the Areas are wet season paddy rice. Stable paddy production could be expected by the above mentioned irrigation water supply. However, during the dry season, upland crop cultivation of corn will be undertaken on a limited area with the available water sources stored in the impounding dam, and
- With the provision of adequate agricultural and rural infrastructures such as rural and farm roads, post-harvest facilities, rural water supply, school, rural health and communication centers, increase in agricultural

production and improvement of standard of rural living and environment would be expected to occur.

Development Type-II

- The Development Type-II ARCs are also located in North Luzon region. Climate conditions around the Areas are quite similar to that of Development Type-I,
- Other development styles are mostly similar to that of Development Type-I. However, rainfed agriculture would be undertaken, due to no available water sources in the vicinity of the Area, and
- With the provision of adequate agricultural and rural infrastructures such as rural and farm roads, post-harvest facilities, rural water supply, school, rural health and communication centers, increase in agricultural production and improvement of the standards of rural living and environment would be expected to take place.

Development Type-III

- The Development Type-III ARCs are mostly located in Central and South Luzon regions. Hence, two types of rainfall pattern are observed; wet season rainfall type observed from May to October, and whole season type observed throughout year,
- Since the ratio of cultivation and cultivable areas are relatively high, effective land-use plan could be expected. Also, land slope is relatively gentle as a whole, so that countermeasures for environmental conservation such as soil erosion and water-shed management would not be needed,
- No water sources for irrigation purposes are available. Rainfed agriculture would be mainly implemented for upland crops like vegetable and corn, and also tree crops such as, banana, mango, citrus, coconut, etc. and
- With the provision of adequate agricultural and rural infrastructures, such as, rural and farm roads, post-harvest facilities, rural water supply, school, rural health and communication centers, increase in agricultural production and improvement of the standards rural living and environment would likely happen.

Development Type-IV

- The Development Type-IV ARCs are mostly located in Visayas and Mindanao regions, so that rainfall is observed throughout year. Specifically, the ARCs located on the eastern parts of the Philippines have rainfall concentrated from November to April,

- Since the ratio of cultivation and cultivable areas are low, effective land-use plan would be difficult in these Areas. Tree crops, such as, banana, mango and coconut would be planted more widely as compared with upland crops like vegetables and corns. Furthermore, sloping agriculture would be unavoidably introduced in the Areas, due to steep slope of the topography. Under the situation, necessary countermeasures for environmental conservation, such as, soil erosion and water-shed management would be needed,
- No water sources for irrigation are available. Rainfed agriculture would be mainly implemented, and
- With an adequate provision of agricultural and rural infrastructures such as rural and farm roads, post-harvest facilities, rural water supply, school, rural health and communication centers, increase in agricultural production and improvement of rural living environments would be expected.

Based on the results of both cases of classification, relations of the classification between both cases are generally identified. Cluster-1 has Development Type-I, II and III, Cluster-2 has Development Type-I and III, and Cluster-3 has Development Type-III and IV, as shown below:

Classification of 12 Model Areas

12 Model Areas	Principal Component and Cluster Analyses			Type of Develop. Plan
	Cluster-1	Cluster-2	Cluster-3	
Sappaac ARC (Reg.-CAR)	○			I, II
Talugtog ARC (Reg.-I)		○		I
Cofcaville ARC (Reg.-II)		○		III
Montilla ARC (Reg.-III)	○			III
Maulawin ARC (Reg.-IV)	○			III
Pag-asa ARC (Reg.-V)		○		III
Abiera Estate (Reg.-VI)			○	IV
San Vicente ARC (Reg.-VII)			○	III
Marangog ARC (Reg.-VIII)			○	IV
Silae ARC (Reg.-X)			○	IV
Kipalili ARC (Reg.-XI)			○	IV
Mat-i ARC (Reg.-XIII)			○	IV

6.2 Selection of Typical Model Areas

6.2.1 Criteria for Selecting Typical Model Areas

This paragraph deals with the selection of Typical Model Areas, based on the study results of classified Model Areas. For the selected Typical Model Areas, Feasibility Study on the Development of Agrarian Reform Communities in Marginal Areas will be undertaken during the Phase-II Study period.

The criteria for selecting the Typical Model Areas are itemized as shown below:

- **Representative of Classified Model Areas**
The Areas should be one of the models representing the classified groups,
- **Development Potential**
The Areas should have development potentials for land, water, and human resources, and also institutional development capacity,
- **Income Increase and Employment Generating Effects**
To rectify provincial income disparity and socio-economic conditions, Areas with the most possibility of raising income level and employment opportunities for the beneficiary farmers should be selected as high priority,
- **Activity of Farmers' Organization**
Farmers' organization should already be established, and their activities are presently observed,
- **Project Economy**
Preliminary economic evaluation of the project has been made using initial project costs and benefit estimations. The Area with relatively high economic index for the project should be given high priority, and
- **Accessibility of the Areas**
The Areas selected should be accessible from the main roads, to expect effective field work during the Feasibility Study stage.

Evaluation results of the 12 Model Areas on the basis of the classified group and the above mentioned criteria are tabulated in Table L.1-17.

6.2.2 Selection of Typical Model Areas

The Typical Model Areas were selected taking into account the classified Model Areas and selection criteria mentioned above. The basic concepts for selecting the Typical Model Areas are as follows:

- As a result of the classification analyses of the 12 Model Areas by Principal Components/Cluster methods and by project development plan, the areas categorized into Cluster-1 correspond to Development Types I, II, and III. However, when considering the aforementioned characteristic and similar features of Cluster-1, the areas are mainly located in Northern and Central Luzon. Paddy cultivation area under irrigation water supply is relatively large with the lesser upland areas. This fact would indicate that Cluster-1 area has relation with Development Types I and II,
- The areas categorized into Cluster-2 correspond to Development Types I and III. These areas are also located in Northern and Central Luzon similar to that of Cluster-1. Upland crop cultivation under rainfed conditions is predominant at present, which would lead to Development Type III,
- The areas categorized as Cluster-3 correspond to Development Types III and IV. These areas are mainly located in the Visayas and Mindanao areas. Upland crop cultivation under rainfed conditions is predominant at present. The introduction of SALT due to a limited suitable agricultural land situated in lands with slope of less than 18 percent will lead to Development Type IV,
- The relation, therefore, between Cluster and Development Type could be concluded as follows; Development Type-I and II ARCs will be selected from Cluster-1, Development Type-III ARC from Cluster-2, and Development Type-IV ARC from Cluster-3. In case of Cluster-3, two Model Areas will be selected, since the Cluster has six ARCs,
- Beneficiary farmers in the Montilla (Reg.-III) and Talugtog ARCs (Reg.-I) earn relatively higher annual income, compared with those of other ARCs, because of their favorable situation. Therefore, low priority will be given to these ARCs in the selection of Typical Model Areas,
- Beneficiary farmers in both the ARCs of Montilla (Reg.-III) and Mati (Reg.-XIII) live outside the marginal land, owing to unavoidable circumstances around the Areas. These Areas can not be selected as the Typical Model Areas from the viewpoint of farming activities,
- Maulawin ARC (Reg.-IV) classified in Cluster-1, which has generally the features of paddy cultivation, is located on a hilly area mainly suitable

for perennial crops such as fruits. This factor will result in the selection of the Area as low priority in Cluster-1,

- Pag-asa (Reg.-V) and Abiera Estate (Reg.-VI) are evaluated with low project economy, based on the preliminary analysis made using initial project costs and benefits estimation. Therefore, their priorities as Typical Model Areas are low,
- Accessibility to both the ARCs of Pag-asa and Mat-i is presently very difficult, due to poor maintenance or no provision of rural roads. Under the situations, no effective implementation of Feasibility Study will be expected in the course of Phase-II Study stage. Consequently, these ARCs are deemed to be difficult to be selected as Typical Model Areas,
- In Bohol Province, where San Vicente ARC (Reg.-VII) is located, there are various assistance provided up to present by other related agencies concerned, including JICA, so that the priority for San Vicente ARC will be low, and
- According to the information obtained from DAR, Kipalili ARC (Reg.-XI) would be included in the World Bank Project to be started in 1997. Under the situation, Kipalili ARC could not be recommended as Typical Model Area.

As a result, the following four Model Areas were selected as the Typical Model Areas:

- i) Sappaac ARC (Reg.-CAR)
- ii) Cofcaville ARC (Reg.-II)
- iii) Marangog ARC (Reg.-VIII)
- iv) Silae ARC (Reg.-X)

Major features of these Typical Model Areas are described below;

Sappaac ARC (Reg.-CAR)

- According to the classification of Model Areas, this ARC belongs to Cluster-1 in the item of present elements and Type-I and II in the item of project development plan,
- The ratio of cultivation and cultivable areas are high, 83 percent of whole areas and 71 percent of cultivation areas, respectively, so that effective land-use could be planned. Although proposed agricultural farming would be rainfed cultivation during wet season, irrigated rice cultivation would also be introduced on small areas during wet season with the provision of small-scale water resources and irrigation facilities,

- Together with the provision of agricultural and rural infrastructure facilities, strengthening of farmers' organization through participatory approach of beneficiary farmers and enhancement of institutional capacity would be needed, and
- Talugtog ARC is a similar Model Area to Sappaac ARC.

Cofcaville ARC (Reg.-II)

- According to the classification of areas, this ARC belongs to Cluster-2 in the item of present elements and Type-III in the item of project development plan,
- The ratio of cultivation and cultivable areas are comparatively high, 87 percent of whole areas and 68 percent of cultivation areas, respectively, so that effective land-use could be planned. The proposed main crops are upland crop like corn and tree crop like banana under rainfed and sloping agricultural conditions,
- Countermeasures for environmental conservation, such as, soil erosion due to slopping agriculture would be essential in the Area,
- Strengthening of farmers' organization through participatory approach of beneficiary farmers and enhancement of institutional capacity would be needed in the Area, and
- Montilla, Maulawin, Pag-asa and San Vicente ARCs are similar Model Areas to Cofcaville ARC.

Marangog ARC (Reg.-VIII)

- According to the classification of areas, this ARC belongs to Cluster-3 in the item of present elements and Type-IV in the item of project development plan,
- The ratio of cultivation and cultivable areas are comparatively low, 64 percent of whole areas and 46 percent of cultivation areas, respectively, so that effective land-use could not be expected. Proposed main crops are tree crop like coconut and upland crop like corn under rainfed and sloping agricultural conditions. However, a part of area would be irrigated by irrigation water diverted from outside source,
- Countermeasures for environmental conservation, such as, soil erosion due to slopping agriculture would be essential in the Area,

- Rural electrification would be attained in the project,
- Strengthening of farmers' organization through the participatory approach of beneficiary farmers and enhancement of institutional capacity would also be required in this Area, and
- Abiera and Mat-i ARC are listed as similar Model Areas to Marangog ARC.

Silae ARC (Reg.-X)

- According to the classification of areas, this ARC belongs to Cluster-3 in the item of present elements and Type-IV in the item of project development plan,
- The ratio of cultivation and cultivable areas are comparatively low, 70 percent of whole areas and 55 percent of cultivation areas, respectively, so that effective land-use could not be expected. The proposed main crops are upland crops like corn and tree crop like mango under rainfed and sloping agricultural conditions,
- Countermeasures for environmental conservation, such as, soil erosion due to sloping agriculture would be essential in the Area,
- Strengthening of farmers' organization through the participatory approach of beneficiary farmers and enhancement of institutional capacity would also be needed in this Area, and
- Kipabili ARC is a similar Model Area to Silae ARC.