

construct toilets in their farm households. Improper disposal of human excreta of individuals affected with Schistosomiasis will contribute to the spread of the disease. Improving the facilities and basic equipment of the Barangay Health Station to respond to the two major threats to public health should be a priority.

j) Environmental Monitoring and Evaluation

The community-based monitoring evaluation team for the implementation of the various components of the Project should monitor the environmental impacts of the project activities. This team is composed of the representatives of the farmer beneficiaries selected by the community, Sangguniang Barangay, MARO Office, Municipal Government, and NGO.

The changes in the physical, biological, social, and economic environmental indicators must be established and this would require the establishment of the baseline environmental data before the project implementation. Training of the monitoring and evaluation team is needed to identify and quantify the parameter including the methodology and the interpretation of the results. The results of the monitoring and evaluation must be presented to the farmer beneficiaries for action particularly the negative impacts. The commonly agreed management options will be part of the implementation in the following year.

10.2.4 Farming and Institutional Development Plan

1) Proposed Crop Selection and Cropping Pattern

In irrigated rice land, double cropping of wet and dry season paddy rice and short maturing diversified crops like mungbean will be selected. In the existing upland, not only corn but also beans like peanut and mungbean will be planted to have crop rotation among corn and leguminous crops. In the area with slope of 8 to 18 percent, fruit tree-based farming will be developed. Fruit trees as durian, marang and lanzones may be introduced. Taking durian as representative crop, planting design for fruit tree-based farm is shown in Figure F.2-47. Nurse trees as kakawate and hedgerows will be planted to protect the land from soil erosion and to improve soils. In these farms, upland crops as corn and beans (peanut and mungbean) can be intercropped especially during establishment period of fruit trees.

In the area with slope of 18 to 30 percent, forest trees as mahogany (*Swietenia macrophylla*) and bagras (*Eucalyptus deglupta*) would be planted as climax and nurse trees, respectively (refer to Figure F.2-47). In the related area, ten percent will be allotted for forest to protect the land from land sliding as well as forest fire.

The overall proposed cropping intensity will be 194 percent of the total cultivation land as shown in Table 10.2-2.

Table 10.2-2 Proposed Cropping Area in Silae Area (Case-3)

Kind of Land	Land Area (ha)	Cropping Intensity (%)	Crop	Season	Area
1. Rice Land					
- Irrigated	30	100	Paddy Rice	Wet	30
		37	Paddy Rice	Dry	11
		47	Mungbean	Dry	14
			Subtotal		55
2. Upland	45				
- Rainfed		80	Corn	Wet	36
		20	Beans (Mungbean)	Wet	9
		80	Corn	Dry	36
		20	Beans (Peanut)	Dry	9
			Subtotal		90
3. 8-18% Slope Land	10	20	Corn	Wet	2
		5	Beans (Mungbean)	Wet	1
		20	Corn	Dry	2
		5	Beans (Peanut)	Dry	1
		80	Fruit trees (Durian*1)		8
		20	Nurse trees (Kakawate)		2
		10	Hedgerow plants (Flemingia)		1
		10	Fast growing trees (Gmelina)		1
			Subtotal		18
4. 18-30% Slope Land	38	100	Climax trees (Mahogany*2)		38
		100	Nurse trees (Bagras)		38
			Subtotal		76
5. More than 30% Slope Land	29				
6. Other Land	12				
Total	164				239

Overall cropping intensity = $239\text{ha} / (164\text{ha} - 29\text{ha} - 12\text{ha}) \times 100 = 194.3\%$

Note: The crops in the parenthesis show the respective representative crops.

*1 . including marang, lanzones, rambutan and mango

*2 . including Bagras to be intercropped

Source: JICA Study Team

2) Proposed Farming Systems

Establishment of soil conservation-based farming systems is also important in Silae Area. Therefore, besides the improvement of the existing farming systems of the rice-based and corn-based farming systems, fruit tree-based farming system and production/protection forest shall be established. These farming system and production/protection forest shall work systematically to increase agricultural production and to raise and sustain land productivity. The nurse trees and hedgerows will protect the land from soil erosion. Moreover, these will improve the soils directly and supply the materials for organic fertilizer.

Basic soil improvement technology including application of sufficient phosphate and organic fertilizer shall be developed. Moreover, it is necessary to improve farming practices, which may include use of quality seeds and adequate farm inputs. The recommended seed rates and the requirement of farm input as well as package of farming practices for the respective crops are estimated and shown in Table F.2-30 and Figure F.2-48 to F.2-5.

The unit yield and crop production with project for respective crops are estimated and shown in Table 10.2-3.

To supply quality seedlings for fruit, nurse, and forest trees and other seedlings, it is proposed to establish a nursery station at the barangay level. The proposed layout of the nursery is indicated in Figure F.2-59, Annex F. Furthermore, a demonstration farm shall be established to introduce the respective farming system technologies in the Area. The facilities and items required to establish the nursery and demonstration farms are shown together with the estimated costs in Table F.2-31, F.2-32, and Annex F.

The fruit tree-based farm and the production/protection forest shall be established within four years as shown in Figure 10.2-4.

3) Animal Husbandry and Inland Fishery Plan

From the study of the present situation and projections in the Area, the following possible projects are identified:

(a) Carabao Development Plan

This program is a joint undertaking of the Project Area (DAR) and the Philippine Carabao Center (PCC). The PCC network will support the dispersal program, training of farmers and establishment of community organization and cooperative. The PCC will also assist in addressing the control and eradication of diseases.

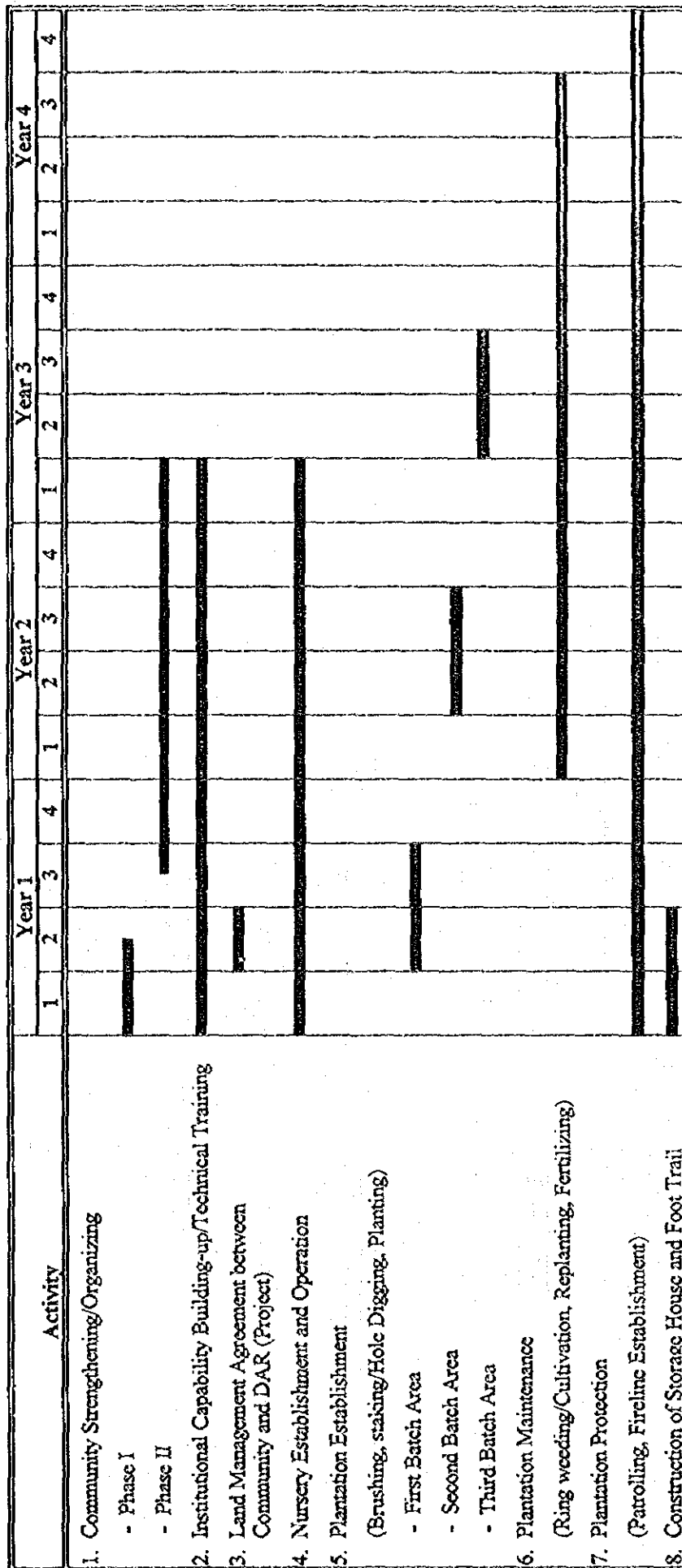
Table 10.2-3 Crop Production With Project (Case-3)

Crop	Area (ha)	Unit Yield (ton/ha)	Production (ton)	Remarks
1. Rice land, Irrigated				
Wet season				
- Paddy Rice	30	4.9	147	
Dry season				
- Paddy Rice	11	5.5	61	
- Mungbean	14	0.9	13	
Sub-total	55			
2. Upland				
Wet season				
- Corn	36	3.5	126	
- Beans (Mungbean)	9	0.9	8	
Dry season				
- Corn	36	3.5	126	
- Beans (Peanut)	9	0.9	8	
Sub-total	90			
3. Contour Farming & Agroforestry				
- Fruit trees (Durian)	8	6.0	48	13th Year
- Corn, Wet Season	2	3.5	7	
- Beans (Mungbean), Wet Season	1	0.9	1	
- Corn, Dry Season	2	3.5	7	
- Beans (Peanut), Dry Season	1	0.9	1	
- Nurse trees (Kakawate)	2			
Fuelwood		9.0 cu.m	18	4th Year
- Fast growing trees (Gmelina)	1			
Fuelwood		10.8 cu.m	11	7th Year
Poles		20.8 cu.m	21	10th Year
Sawlog		51.7 cu.m	52	
- Climax trees (Mahogany)	38			
Fuelwood		7.0 cu.m	266	7th Year
Poles		8.2 cu.m	312	15th Year
		77.9 cu.m	2,960	25th Year
- Nurse trees (Bagras)	38			
Fuelwood		11.6 cu.m	441	6th Year
Poles		25.0 cu.m	950	10th Year
Sawlog		64.4 cu.m	2,447	14th Year
- Hedgerow (Flemingia)	1			
Sub-total	94			
Total	239			

Note: The crops in the parenthesis show the representative crops.

Source: JICA Study Team

FIGURE 10.2-4 SCHEDULE OF ESTABLISHMENT FOR CONTOUR FARMS



Carabao Dispersal

Female pregnant F1 carabaos will be distributed to qualified and interested farmer beneficiaries, that will be selected based on proper criteria. These carabaos shall be introduced from PCC at Central Mindanao State University (CMSU). Training of farmers in this Area is also supported by the PCC at Central Mindanao State University (CMSU).

As an alternative plan of animal breeding in the Area, raising of pigs is considered. However, raising of pigs will be undertaken by only a few beneficiaries. This situation does not meet the overall requirement of the Project plan. Therefore, carabao dispersal plan will be recommended. Furthermore, carabao dispersal is vigorously being promoted by PCC. Hence, the plan is considered to be expanded in the Area.

Carabao Mini-Breeding Station (Bull Camp)

Heat or weak estrus is a serious constraint in carabao breeding. It is necessary (i) to build a mini-breeding station, (ii) that females be one of group and better still, (iii) teaser bulls be provided. A bull keeper will be trained at PCC and be responsible for feeding the bull. The Bull will also be introduced from PCC at CLSU. The use of natural breeding might be the best alternative in upgrading the native carabaos.

The maintenance and management costs of the breeding station will be shouldered by the beneficiary farmers' organization.

(b) Poultry Development

Native chickens have been raised for meat and eggs for centuries. It is an invaluable source of protein food for rural people. It is adaptable to rural conditions, generally much hardier and more resistant to diseases and high temperatures than the exotic breeds. Furthermore, their meat and eggs are generally regarded as of better flavor. At present, consumer demand is becoming more diverse and has a great potential in the market. However, the rural people still rely on natural incubation, since they do not have artificial incubation. Provision of mini-incubators (kerosene operated) does not need special techniques, therefore, farmers can easily produce significant number of chicks.

4) Post-Harvest Plan and Agro-Industry Plan

Post-harvest plan in the Project Area should be based on the solution and reduction of the present problems and constraints. It must be formulated on the premise that necessary infrastructure and farming system development plan should be properly implemented and the production of crops be increased. The present farming and institutional development process and post-harvest conditions should be considered. Since the development of post-harvest may

depend on the development of farming technology, it is difficult to introduce full-scale development at one time. It should be conducted gradually, not promoted everything simultaneously. Therefore, the plan of post-harvest was formulated as shown below:

(a) Primary Stage (one to three years)

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 buy 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, costs of farm inputs are drastically lowered adding to farmer's income.

Some Hard Infrastructure Measures

The aim to accelerate farmer's income and ultimately sustain some hard infrastructure measures are suggested in the above Chapters.

- All-weather farm-to-market roads,
- Conduct continuous organizational, managerial, and technical training programs, and
- With all these 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.

(b) Secondary Stage (four to five years)

Organizational Consolidation

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

Economic Integration

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

- Establishment of central processing facility, and

- Area-specific production activities, for example, one to three ARCs producing the same high value crops either to create a demand or respond to market demands.

As the proposed major crops in the Area are rice and corn, the farming plan should be formulated considering the post-harvest equipment and facilities, which are popular near the Area.

Pre and Post-Harvest Plan

Since the production volume of rice and corn will be increased by 207.5 and 304 ton/year, respectively, based on the farming development plan (Case-3) (refer to Table K.2-8), and also lack of man-power for harvesting seasons may become more severe, the introduction of harvesting equipment and facilities might solve the deficiency problem.

Harvesting, threshing and drying facilities will be effective for improvement of quality and reduction of harvesting and processing losses. One multi-purpose dryer will be provided in the warehouse for storage of input, to get better input, to obtain better selling prices and to store emergency food. The plan of multi-purpose dryer and warehouse with multi-purpose dryer with the same size as the rice or corn agro-industry center, are shown in Figures K.2-1 and K.2-2. Simple mechanical dryer will be introduced to obtain high quality seeds by farmers themselves. Moreover, agricultural machines will be introduced corresponding to the initial farming development plan. These machines are animal-drawing type and are more suitable for developing farming systems.

Agro-Industry and Processing

Production volume of corn in the Project Area will be increased by the project with infrastructure and farming technology. It will have a sufficient volume for an introduction of corn agro-industry center, such as small-scale corn milling plant with quality control equipment.

These plans were made based on the selection criteria for post-harvest and agro-industry facilities as shown in Table K.1-5 and confirmed based on further study considering the farmers' intentions and present conditions.

In these development plans, multi-purpose dryer, warehouse and agro-industry center will require installation places. Selection of suitable places for the plan was made based on the following consideration:

- Better access for collecting and forwarding the produce,
- Flat land and sufficient space for installation,
- Near production area and residence, and
- Preferable idle or public land.

However, further confirmation will be required at the detailed design and implementation stages. Especially it is essential to obtain the legality of land ownership.

Plans for other farming and institutional development of agro-industry and processing such as handicraft making should be considered in the future according to the farming development. This development should be carried out by using the farmers' spare time and by means of the activities of WID. Initial stage of the development requires training and instructions by government related agencies. Such training should be conducted periodically. Special equipment and facilities will not be required, except for the meeting and demonstration room (inside the barangay hall) at the first development stage. However, the farmers' intention for development and cooperation will be required.

5) Marketing Plan of Agricultural Products

With the implementation of the Project, it is envisioned that agricultural productivity and production at Sifae Area will increase substantially, both in volumes and varieties of the commodities. Besides having more agricultural commodities to sufficiently meet the home consumption requirements of all households in the Project Area, a much larger marketable surplus of both the traditional and new commodities is expected. This requires a good and efficient marketing plan by and for the farmers without which the project's objectives of increased income and quality of life of the people in the marginal areas may not be realized.

The integration of rural roads in the Project has its merits in facilitating the transportation of this large volume of production surplus to the market at preferable prices to the producers. The rural roads also open doors for more traders from both inside and outside the Project Area to venture more in marketing the increased farm products. The post harvest and agro-industry components of the Project are expected to help improve the qualities of the various produces while creating new ones out of the produce which in turn open new markets not earlier existing.

To cope with the expected large increases in the marketable surplus, the foremost plan already included as part of the project is institutional development. The program envisages the establishment of a strong and efficient farmers' organization to facilitate or directly take action in moving much, the increased agricultural production to the market at reasonable prices. Support services in the forms of training, information, and other technical assistance are already incorporated in the Project.

The existence of Barangay officers along with the cooperative in the Project Area will help expedite the successful implementation of this institutional development of the Project. Once the cooperatives or any other forms of less

formal groupings of farmers are ready to take up the marketing function, how they will work it out should totally be left to their discretion. DAR and other public institutions should only play facilitative role in this regard.

This institutionalization movement, particularly among the rural poor, has been known to be time-consuming and subject to strong resistance from those who have benefited from the unorganized poor. In many cases in the past, efforts toward creating such efficient people's organizations failed to create sufficient impact within a foreseeable time. Apart from the need for strong commitments from all concerned, supplementary measures to help work out some marketing activities in the Project Area before the full fledged operations of a strong people's organization have to be put in place.

The supplementary measures that may be initiated along with the rural institutionalization program of the Project are the following:

- The establishment of a farmers market in the Project Area where the buyers and the producers are invited to meet, negotiate and bargain on the prices as well as other marketing options acceptable to both,
- The creation of a program to promote collective ownership of selected marketing facilities, as scales, dryers, shellers, small trucks, etc., and
- The local functionaries of DAR, DA and other related departments are to regularly provide all price and market information to the villagers. They, together with other LGUs and NGOs, may serve as technical advisors to the people's organization on any marketing problems of their produce.

6) Farmers' Organization Plan

a) Silae United Farmers Multi-purpose Cooperative

Present status of the Silae United Farmers Multi-purpose Cooperative is in its immediate takeoff stage. The activities of the cooperative are operating consumer store, group buying of production materials, livestock dispersal and corn production by LBP loan. However sales of products are still done individually. The share capital is P1,000 per member, but has not yet been paid by all members at present. The cooperative has own solar dryer and one hectare of land. The cooperative has future plan to own transportation, tractor for pre-and post-harvest and additional one solar dryer. In consideration of such situations, the five year plan for the cooperative was devised as shown in the table below:

b) Development Plan of The Cooperative

To attain the above aims, the five year development plan of the cooperatives is prepared was made and presented below:

Five Years Development Plan of the Cooperative

Year	Aims	Activities
1st to 5th year	Increase in production and introduction of cash crops	The cooperatives concentrate their energies on increase in production of crops and introduction of cash crops (durian and marang, lanzones) with improved technology and expanded area by project. The production increase with project is expected at 9.6 times for rice, 1.4 times for corn, 135 tons for carrot and 22 ha of area for durian plantation.
	Strengthening of group activities	(i) Group purchase of agricultural production materials such as improved seeds/ seedlings, fertilizer, agricultural chemicals and agricultural implements/machinery through cooperative. (ii) Group sale of agricultural products through cooperative.
	Accumulation of cooperative capital and recruitment of new members	Cooperative promotes accumulation of capital through collection of share capital from the members, thrift and saving of money, group activities and management of consumer store and acquisition of own property for increased productivity.
3rd to 5th year	Acquire own property for increased productivity	(i) Solar dryer, (ii) Warehouse for storing products and production materials, (iii) transportation (iv) Tractor for pre and post-harvest operations.
	Development of market	Development of market for carrot and durian

The above five-year development plan of the cooperative can be achieved first through the social preparation activity that will be undertaken in the community by the DAR, NGO and the other concerned agencies and institutions. However, the following activities based on experiences should also be considered to achieve relative success and sustainability:

(1) On Education and Training

- Pre-membership training (PMT) should be provided to all prospective members within the community by DAR,
- A thorough re-orientation and intensive membership expansion campaign must be undertaken for inactive and new members to encourage them to actively participate in the activities of the cooperative,
- A continuous and intensive education program/sessions should be conducted to improve the management and entrepreneurial skills and capability of the members/officers. Program and conduct training activities based on the needs and resources of the community,
- Education and training programs should consider the availability of farmer-members, hence, proper scheduling and timing is necessary to get good attendance.

- Since women play important roles in the family and community, the women should be equipped with the skills necessary for their various roles in the family, the cooperative and the community. The women should be provided training on (but not limited to) consumer education, savings and thrift, household planning, family budgeting, livelihood skill's development, business planning, introduce gender-issues to motivate them to initiate women specific projects.

(2) Financial and Management

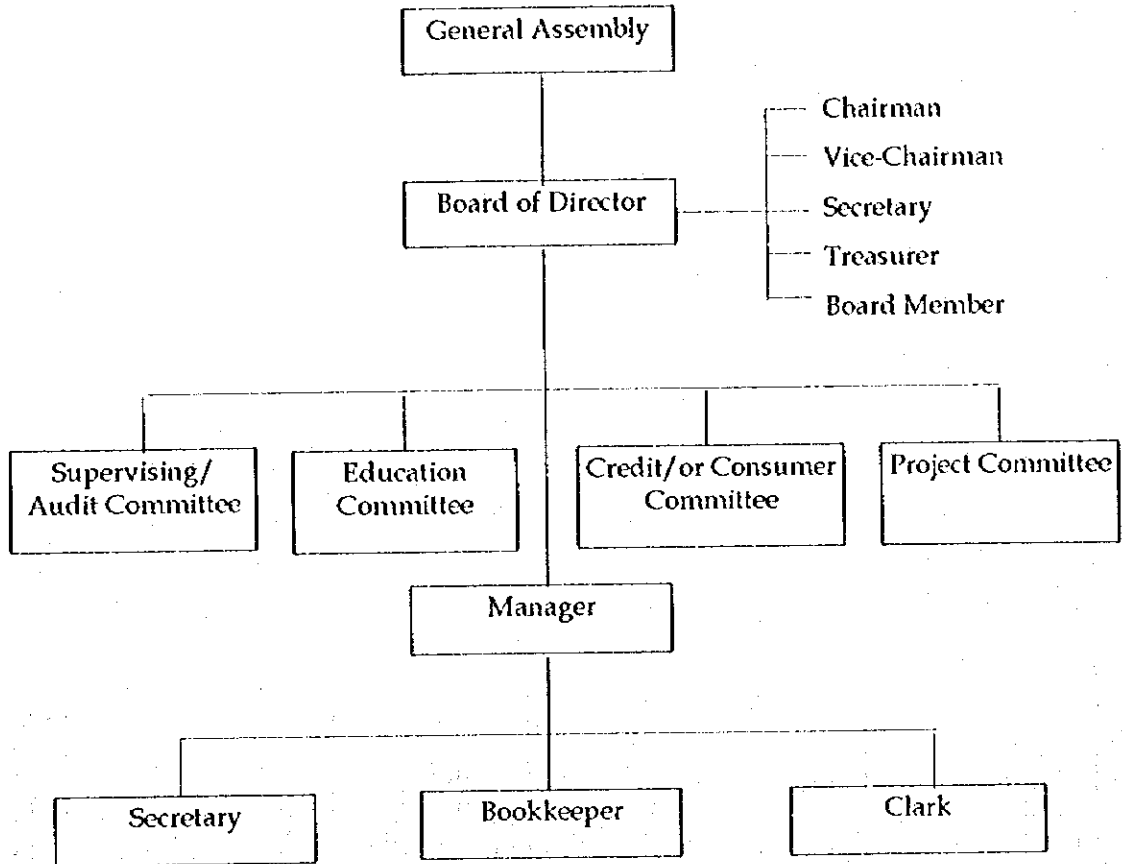
- Management style should be participative. Members and officers should be encouraged to participate in the planning, problem solving and decision making of the organization,
- Projects and activities should be responsive to the needs of the members to gain complete support,
- Financial reports should be prepared consistently, if not monthly, at least quarterly with complete audit and inventory,
- Accounting and bookkeeping systems should be simplified,
- Increase capital build-up by pursuing saving's mobilization schemes to develop self-reliance and independence,
- There should be planning and budgeting every year by specialized groups within the organization,
- Specified meetings should be regularly held to stir up membership interest,
- Organize the group into smaller groups by functions and/or by geographical location, and
- Continuous and regular monitoring and evaluation even after the turn-over of the project facilities should be undertaken by DAR.

(3) Linkages

- Linkages initially should be developed with government agencies and institutions, non-government institutions, other cooperative groups within outside the Project Area and business group.

The expected organization structures of the cooperatives in the Project Area by the end of the plan period after the cooperatives have become self-reliant is shown in Figure 10.2-5.

FIGURE 10.2-5 PROPOSED COOPERATIVE STRUCTURE



As the cooperatives expand its activity, it is expected that the numbers of committees are increased. Also managers and/or officer-in-charge with support staff is appointed or employed by the cooperative. With the expansion of the organization, additional training and seminar to enhance skills to improve specific functions will have to be undertaken.

Detailed presentation of the development of cooperatives in the Philippines, the reasons for its success and failures and presentation of how to develop and organize cooperatives are presented in Annex H.

7) Institutional Development Plan

a) Institutional Support System

To attain success of the agricultural development plan for the Silae ARC, establishment of an institutional support system comprising relevant support agencies of the central and the local government units are indispensable.

DAR plays the roles of a coordinator and facilitator of the support activities to be carried out by the agencies concerned. For every specific activity to be undertaken, Memorandum of Agreement (MOA) will have to be executed to assure that activities as personnel component, time and necessary logistics are provided. Example is a MOA between DAR and PAO concerning support to be provided by PAO for the project (provision of training for farmers in the Area, specific number of seedlings, budget for experiments, or demonstration farms in the Project Area, etc.).

b) Plan of Support Activities

(1) Formulation of Land-Use Plan

Land-use plan will be formulated in consultation with RIARC, ROS, DENR, MAO and farmers in the Project Area, considering soil, meteorological condition, irrigation condition, topography and farming conditions, etc. The joint work will be coordinated by the DAR Development Facilitator.

(2) Technology Support

The main crops to be introduced in Silae ARC are rice, corn, peanut, mungbean, durian, flemingia, gmelina and mahogany. The technologies to be introduced, such as, suitable variety, proper time of seeding/transplanting, necessary input, yield expected, crop rotation, farming and farming income expected, etc. will be supported by NOMIARC, Claveria ROS, Kibawe ROS and Malitbog ROS. Regarding the livestock technology, PCC will support the carabao program while Malitbog ROS will support the cattle, goats, sheep and pasture and forage crops' program. On the technology of fresh water fish culture, Kicharao ROS will provide support for tilapia.

(3) Provision of Agricultural Input Materials

Before farming, DAR Development Facilitator (DF) and NGO will identify the necessary amounts of agricultural input materials (seeds, seedlings, livestock, fries, fertilizer and agricultural chemicals) needed through discussions with farmers to be provided by the agencies. On the fruit seedlings, the number of seedlings to be provided by each agency should be arranged taking their production capacities into account. The fruit seedlings to be used have to be grafted with the best variety to survive in the market competition in the future. The price of the production materials should be production cost price.

The main production materials planned to be introduced in the Silae Area and their respective suppliers are shown in Table H.2-6.

To diffuse the advanced technology, it is proposed that DAR advances to the farmers the costs of seeds of improved variety and fertilizer necessary for the improved technology on rice and corn crops. This advance payment shall be paid by the farmers within five years after the commencement of the Project.

(4) Extension and Training

Technology transfer activity has been carried out by the Regional DA, PAO, MAO, ATI, RIARC and its ROSs in their close linkage. This technology developed at the research and development agencies are directly or indirectly transferred by the Regional DA, PAO, MAO, ATI, RIARC and its ROSs to farmers through techno-demo farms and training.

Establishment of Techno-Demo Farms

The PAO and MAO provide advanced techno-demo farms on lowland and upland farming with SALT in the Project Area as shown in Table H.2-7.

Farmers' Training

The training details are shown in Table H.2-8.

(5) Provision of Farm Funds

LBP and CDA are the support agencies for farm funds. Before financing activities, the cooperative members need to receive training on cooperative management and improvement of their knowledge for application of farming loan from NGO, LBP and CDA.

(6) Development of Markets

The provincial CDA and DTI shall support development of markets for cooperatives through the introduction of buyers, price information, guidance for

engaging in the supply of production materials to members and sale of their products.

(7) Strengthening of Farmers Organization

DTI, CDA and LBP shall support the strengthening of the Cooperative through the above training.

8) Agricultural Credit System Plan

For the Silae Area to produce additional agricultural production and income at the rate of return shown in paragraph 10.5.1, "Economic Justification," it is estimated that about 2.16 million pesos will be required as loanable fund to the ARBs.

Among the proposed measures toward mobilizing enough funds to meet the aforementioned credit demand are as follows:

- All credit institutions with available outreach branches in or near the Project Area should be contacted and invited to participate and consider providing production and marketing loans to the ARBs,
- While the present policy of the Government and LBP to promote viable and bankable people's organizations will be duly observed, LBP and other banks should at least consider providing loans to the good members of the cooperatives earlier blacklisted by them,
- DAR, DENR or other related agencies should look for a special fund for providing interest-free loans to any ARBs agreeing to grow forest trees which either do not provide them enough financial returns (kakawate, flemingia), or take long years to do so (bagras, gmelina, mahogany),
- People's fund mobilization efforts should be motivated and assisted, and
- Selected informal creditors in the Project Area may be invited to provide low-interest credits to the ARBs under the technical assistance of DAR and other related departments.

10.2.5 Water Resources Development Plan

1) Development of Surface Water Resources

As a potential water resource for the Project Area, small creek waters are available as indicated in paragraph 10.1.5, "Irrigation Water Resources." However, to expect a more effective utilization of these creek waters, some adequate facilities such as creek intake and small-scale farm pond will be needed to store the water.

In the Project, creek intake and small-scale farm pond are proposed. Available water sources will be used for paddy cultivation during the wet season.

2) Development of Groundwater Resources

According to the field survey for the Area, the potential for groundwater source development for irrigation purpose is considered as be low. This is due to the Areas' heavy soil textures consisting of clay and relative high elevation with hilly topography.

10.2.6 Irrigation and Drainage Plan

1) Irrigation Plan

The Sitae Area is located in hilly and undulating topography with scarce water resources for irrigation. Hence, large-scale irrigation plan could not be expected in the Project. However, small amounts of water resources from creeks are presently available. Irrigation plan using these resources is formulated paying due attention to low investment cost.

a) Calculation of Irrigation Water Requirement

(1) Proposed Cropping Pattern

The proposed cropping pattern is one of the basic data for the calculation of irrigation water requirement for the Area. The proposed cropping is prepared after due consideration of the prevailing condition in the Area, such as, climate, topography, soil, marketability of crop, etc.

Paddy Rice + Paddy Rice + Mungbean

The detailed description of the proposed cropping pattern is referred to in paragraph of 10.2.4 "Farming and Institutional Development Plan."

(2) Calculation of Reference Crop Evapotranspiration (ET_o)

Calculation Methods

The reference crop evapotranspiration(ET_o), generally recognized as fairly reliable index in calculating consumptive use, can be determined by a number of methods. These are the evaporation measurement with evaporation pan and the application of empirical formula based on the climatological data. Since the ET_o values used by NIA, however, has been calculated applying Modified Penman method, the same method is applied for the Project.

Modified Penman method is the complete theoretical approach, showing that consumptive use is inseparably connected to incoming solar energy. The formula representing the ETo is shown below:

$$E_{To} = C \times [W \times R_n + (1-W) \times f(u) \times (e_a - e_d)]$$

where;

- ETo = reference crop evapotranspiration (mm/day)
- Rn = net radiation in equivalent evaporation (mm/day)
- (e_a - e_d) = difference between saturation vapor pressure at mean air temperature and mean actual vapor pressure of the air (mbar)
- C = adjustment factor to compensate for effect of day and night weather conditions.

Necessary Data and Calculation of ETo

As the basic data for calculation of the ETo, the following climatological data are collected on the monthly basis;

- Mean temperature (°C)
- Mean relative humidity (%)
- Wind speed (km/day)
- Dewpoint (°C)
- Cloudiness
- Uday/Unight

Detailed calculation procedure of the ETo is based on NIAs' Guidebook for the calculation of ETo. Table J.2-1(4) shows the calculated ETo for the Silae Area.

(3) Calculation of Crop Evapotranspiration (ET_{crop})

The crop evapotranspiration (ET_{crop}), is calculated by multiplying the estimated ETo value by the crop coefficient (K_c), which express the relation between reference and actual evapotranspiration during distinct vegetative stage of the crop.

The crop coefficient (K_c) of paddy rice is assumed to be one (1) throughout the growing season. Since the K_c values of upland crops are generally not available, the values are estimated at 10-day interval according to NIA's Guidebook. Table J.2-2(4) shows the procedures to obtain the K_c values of the proposed upland crops for the Area.

(4) Calculation of Irrigation Water Requirement

Two types of irrigation water requirement are estimated; irrigation water requirement without effective rainfall and with effective rainfall. The maximum water requirement in the former case will be used for the design of irrigation

facilities such as canal and its related structures. The latter one being equivalent to actual water demand will be used for the reservoir operation study.

In the estimation of the irrigation water requirement at 10 day interval, the following are taken into account:

- Effective rainfall
- Percolation in paddy field
- Crop water requirement
- Irrigation water requirement
- Diversion water requirement

Effective Rainfall

As a first step in the estimation of effective rainfall, the design rainfall is selected based on the annual rainfall of 34 years' data (1961-1994) observed at the Malaybalay station in Bukidnon Province. In the Project, design rainfall with return period of 1/2-year is adopted considering the following characteristics: size of area, topography and scarce water resources.

Two year's rainfall equivalent to a return period of 1/2-year, 1972 with 2,526.0 mm and 1993 with 2,519.0 mm is thus selected. About 80 percent of the selected two years average rainfall is assumed as the effective rainfall for crops.

Percolation of Paddy Field

The percolation rate of paddy field is assumed at 1.0 mm/day.

Crop Water Requirement

The crop water requirement is estimated by adding percolation rates to the crop evapotranspiration (ET_{crop}) mentioned above.

Irrigation Water Requirement

The irrigation water requirement is estimated by subtracting the effective rainfall from the estimated crop water requirement (ET_{crop}).

Diversion Water Requirement

The diversion water requirement is estimated by dividing irrigation water requirement by irrigation efficiencies. The irrigation efficiencies are determined based on the "FAO Irrigation and Drainage Paper 24." Conveyance efficiency is decided at 90 percent because irrigation canal will be made by concrete flume.

The following irrigation efficiencies are adopted for the the Project:

Irrigation Efficiency

Irrigation Efficiency	Paddy Field (%)	Upland Crops (%)
Application Efficiency	70	60
Conveyance Efficiency	90	90
Operation Efficiency	90	90
Overall Efficiency	56.7	48.6

Table J.2-3(4) and Table J.2-4(4) show the estimated irrigation water requirements in cases of without and with effective rainfalls for the Area. The maximum diversion water requirement is calculated at $q=0.84$ lit./sec./ha. (refer to Table J.2-3(4)).

b) Reservoir Operation Study

A small-scale farm pond (reservoir) is proposed in the Project for the effective utilization of available water resources. Hence, reservoir operation study at 10-day interval is analyzed to decide the most optimum irrigable areas during wet and dry seasons.

Table J.2-5 (4) shows the reservoir operation study in case of Silae Area. In the analysis the following are taken into account:

- Inflow to reservoir
- Diversion requirement
- Irrigation area
- Irrigation requirement
- Total outflow of water (release water from reservoir and losses)
- Effective storage of reservoir
- Water level of reservoir
- Spillage water from reservoir
- Shortage of water in reservoir

Inflow to Reservoir (Q_i)

Since the Area has limited water resources for irrigation, water source outside the Area is planned to be diverted to the proposed reservoir through diversion canal. This diverted amount of water is estimated as 13 lit./sec for wet season from end of May to end of October, and 6.5 lit./sec for the remaining dry season. The estimations are derived from actual observation at the site.

Diversion Requirement

Refer to the diversion water requirement mentioned above in consideration of effective rainfall.

Irrigation Area

The potential cultivation area is 75 ha, delineated in the land-use plan. The irrigation area is estimated through trial calculation of reservoir operation study on the following assumption and procedure. Initially, irrigation area is assumed. Then the frequency of water shortage is checked. If water shortage will occur at the frequency of more than two times a year, the assumed area is reduced. In the above trial calculation, the shortage of water less than 15 cu.m/day is considered to be negligibly small.

Irrigation Requirement

The irrigation requirement is calculated by multiplying the diversion water requirement by irrigation area to be used for paddy rice and upland crops.

Total Outflow of Water Reservoir (Qo)

The total outflow of the reservoir consists of two items, that is, released water for irrigation mentioned above and reservoir losses. The reservoir loss is assumed at 0.5 percent of the reservoir storage capacity in previous 10-day decade.

Effective Storage of Reservoir (Se)

The effective storage capacity of the reservoir is net amount of water to be used for irrigation after subtracting the dead storage capacity from the total storage capacity.

Water Level of Reservoir (W-EL)

The water level of reservoir will be converted from the stored water using stage-storage capacity curve. The initial water level of the reservoir in the operation study will be normal water level (NWL) at full storage capacity (S_i) at the beginning of the wet season.

Spillage Water from Reservoir (Qs)

The spillage of water from reservoir is calculated on the following rule:

- If $(S_{e,1} + Q_i - Q_o) > S_i$, $S_{e,1} + Q_i - Q_o - S_e$
- If $(S_{e,1} + Q_i - Q_o) < S_i$, θ

where; $Se_{.1}$ = effective storage capacity of reservoir at 10-day previous decade.

Shortage of Water in Reservoir

The shortage of water in the reservoir is calculated on the following rule;

- If $(Se_{.1} + Qi - Qo) > S_t$, $S_t - (Se_{.1} + Qi - Qo)$
- If $(Se_{.1} + Qi - Qo) < S_t$, 0

Considering the results of the reservoir operation study, the irrigation area for the Silae Area is finally decided at 30 ha of wet season first paddy, 12 ha of second paddy and 14 ha of upland crop (mungbean), as shown in Table I.2-5(4).

c) Water Management Plan

The irrigation water distribution method, should be decided according to available water resources, size of rotation area, cropping pattern, growing stage of crops, crop water requirement, and irrigation facilities in the systems. However, in the case of marginal area project, rotational irrigation method should be practiced even at the growing stage, due to scarce water resources in the Area.

These water management works will be undertaken by the water user's association to be established by the Project. Major works of the water user's association are as follows:

- Decision of proposed crops and their cropping areas, and preparation of irrigation schedule,
- Preparation of water distribution ways at farm level under the rotational irrigation methods,
- Operation of diversion and distribution gates for water management,
- Maintenance of irrigation and drainage facilities, and
- Collection of necessary water charges for management of the water user's association.

2) Drainage Plan for Paddy Fields

The existing paddy fields located in low-lying and flat topographical areas, especially lower parts of the existing paddy fields are periodically inundated during the wet season. This result to low agricultural crop production and occurrence of water-born diseases such as diarrhea and malaria.

A drainage improvement plan is formulated in the Project Area.

a) Drainage Modulus for Paddy Fields

Design Rainfall

Before the formulation of a drainage plan, the design rainfall to analyze the drainage discharge is determined based on the daily maximum rainfall data observed at Malaybalay station for the period of 34 years (1961 to 1994).

The design rainfall with a return period of 1/5-years (one in five years) is determined by probability analysis as shown below:

Design Rainfall for Drainage Plan

Return Period	Design Rainfall (mm/day)
1/2	152.0
1/5	206.5
1/10	246.6
1/20	288.0
1/50	345.4

Design Drainage Modulus

The design drainage modulus for the Silae Area is determined on the assumption that the design rainfall will be drained within two days. Its modulus is calculated at $q = 9.4$ lit./sec/ha (3.4 mm/hr) as shown below:

$$q = R_{\max} \times C / (24 \text{ hr} \times 2 \text{ days})$$

where; C = run-off coefficient, 0.8

$$q = 206.5 \text{ mm/day} \times 0.8 \times 1.0 \text{ ha} \times 10^3 / (24 \text{ hr} \times 3,600 \text{ sec} \times 2 \text{ days})$$
$$= 9.4 \text{ lit/sec/ha}$$

10.3 Physical Plan and Cost Estimate

10.3.1 Agriculture and Social Infrastructure Plan

1) Agricultural Infrastructure Plan

a) Irrigation Plan

The physical features of the designs of the irrigation system proposed in the Project Area are as follows:

Dalacutan Area

- Creek intake
- Delivery canal
- Farm pond
- Distribution canals

Silae Area

- Creek intake
- Distribution canals

In the proposed irrigation system in Dalacutan Area, water is taken from Bagangan creek, then delivered by an open canal to the farm pond. The site of farm pond is considering topographic conditions. The purposes of farm pond are irrigation and fish culture, therefore, reservoir storage is allocated for irrigation and fishes culture. From the farm pond, irrigation water is conveyed to the service area of 8.2 ha through distribution canals.

At the Silae Area, water is diverted from the small creek, then distributed to the service area of 5.0 ha through distribution canals (refer to Figures 10.3-1 and 10.3-2).

All structural dimensions are computed based on the Technical Model and Standard of Small Water Impounding Project issued by the Bureau of Soils and Water Management (BSWM). Summary of the irrigation system are presented below. The details are presented in Annex-M.

Dalacutan Area

- Creek intake : 1 place
- Delivery canal : L=250m
Concrete block canal
- Farm pond
 - Dam type : Homogeneous earthfill
 - Dam height : 3.50 m
 - Crest width : 2.00 m

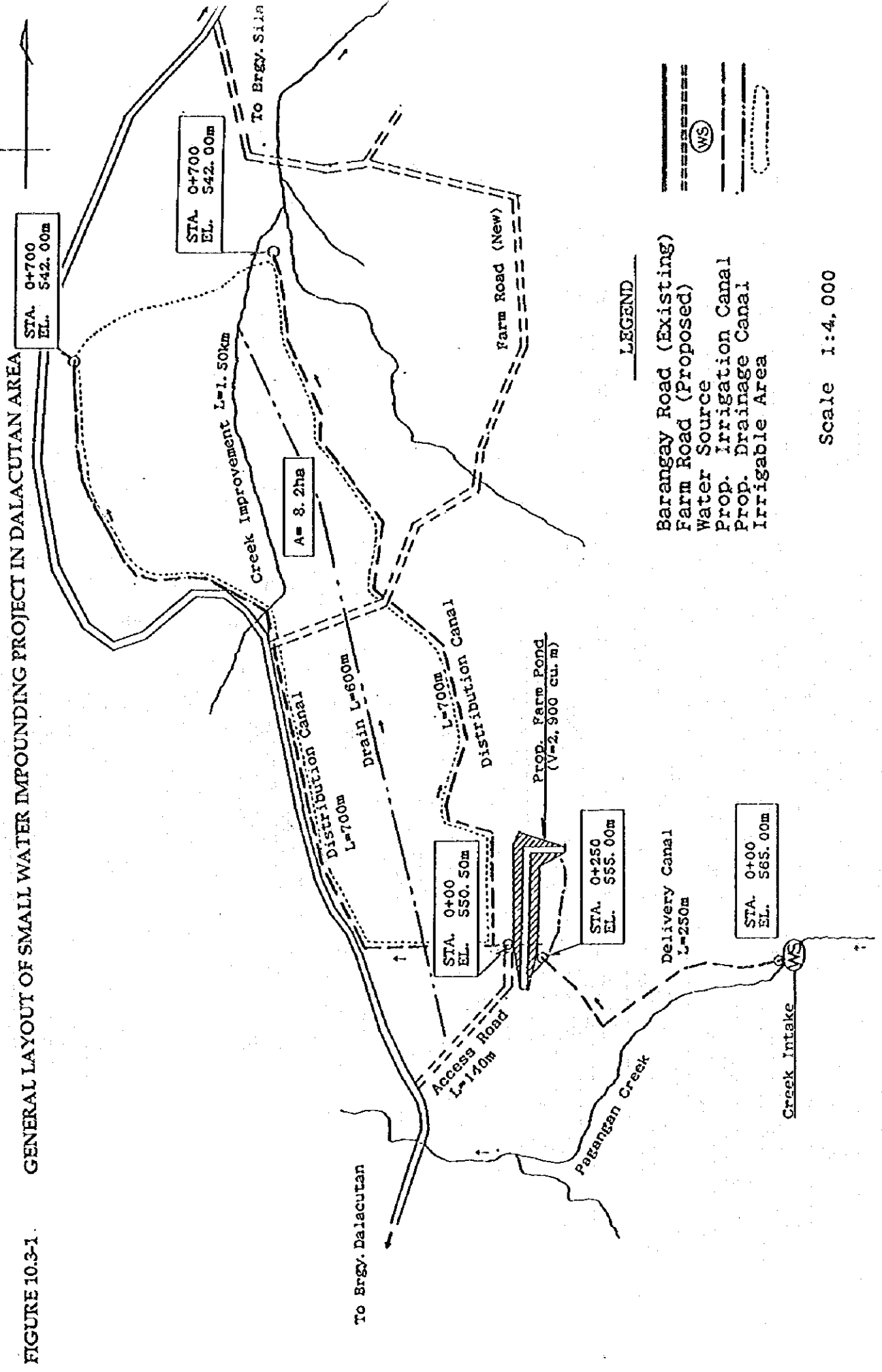
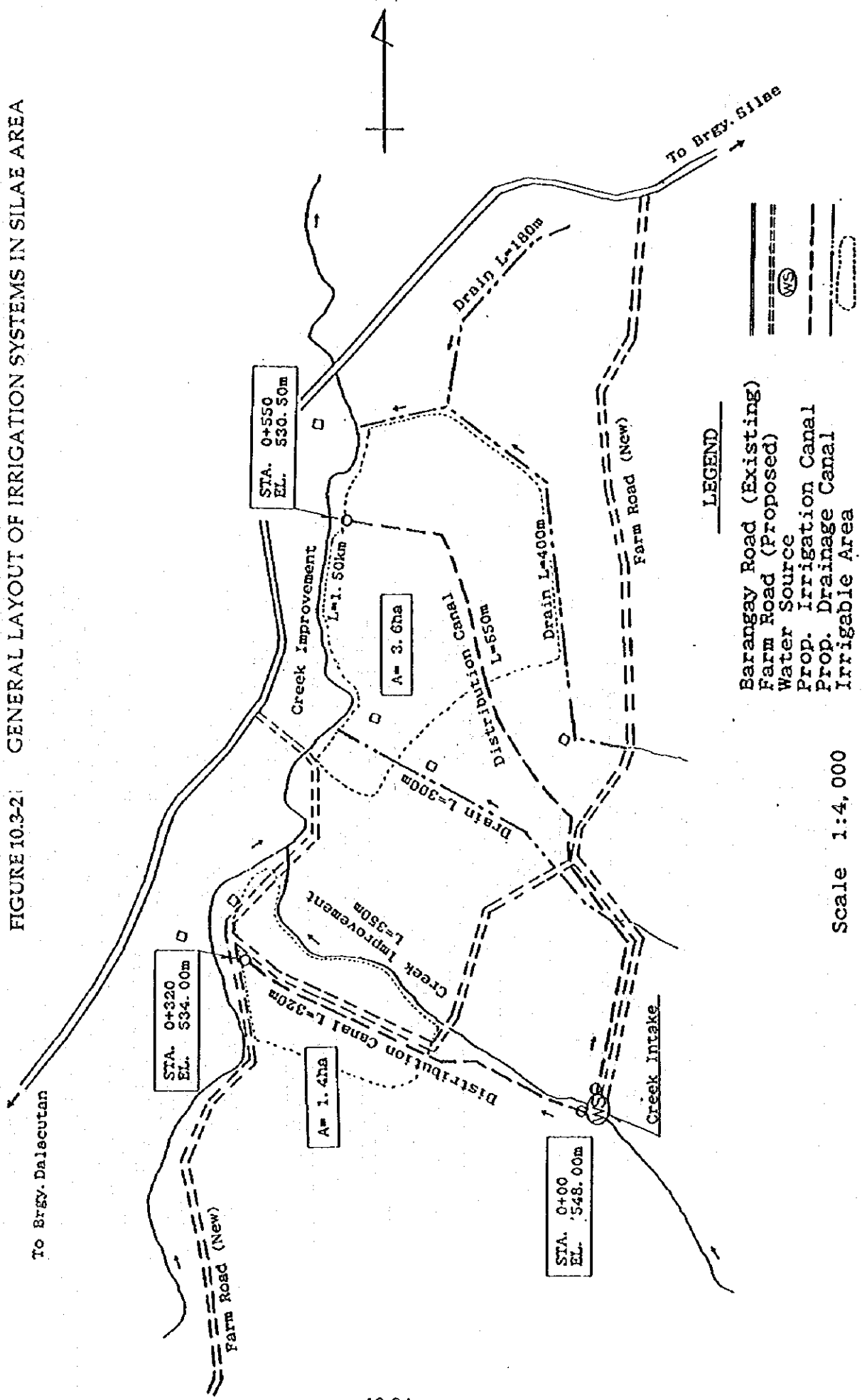


FIGURE 10.3-1. GENERAL LAYOUT OF SMALL WATER IMPOUNDING PROJECT IN DALACUTAN AREA

FIGURE 10.3-2: GENERAL LAYOUT OF IRRIGATION SYSTEMS IN SILAE AREA



LEGEND

- Barangay Road (Existing)
- Farm Road (Proposed)
- Water Source
- Prop. Irrigation Canal
- Prop. Drainage Canal
- Irrigable Area

Scale 1:4,000

- Crest length : 136.00 m
 - Effective storage capacity : 2,900 cu. m
 - Outlet pipe : \varnothing 150mm * 12.00 m
- Distribution canals : L=1,400m
Concrete block canal

Silae Area

- Creek intake : 1 place
- Distribution canals : L= 870 m (Concrete block canal)

b) Drainage Plan

Earth lined drainage canals are planned in the low land paddy field to improve drainage conditions and decrease schistosomiasis infection. Drainage culverts with R. C. pipes are also planned where roads and foot paths are crossing. Total length of drainage canal is 600m for Dalacutan Area and 880m for Silae Area.

Besides the above, improvement of two existing creeks with total length of 1,850m shall be planned for drainage condition improvement.

c) Farm Road Plan

To improve accessibility from the sitio/household to the farm land, farm roads are planned in the following sections:

- Dalacutan area interior road : L=0.80km
(0.60 km with gravel and 0.20 km with concrete surface)
- Silae area interior road : L= 1.90 km
(1.60 km with gravel and 0.30 km with concrete surface)

Road surfacing materials are gravel in the normal section and concrete in the steep section more than eight percent gradient. The side road ditch with grouted riprap is the most necessary structure to minimize road erosion by rain water. The standard cross section is presented in Annex-M.

2) Social Infrastructure Plan

a) Rural Road and Transportation Plan

Since the existing barangay road was constructed last year and it is still in good condition, rural road plan is not necessary.

Road maintenance equipment such as dump truck, motor grader, road roller, payloader, etc. shall be provided to the municipal government to encourage road operation and maintenance activities.

Besides the above, transport vehicle shall be provided to the barangay unit to establish public transport system. Such vehicles shall be operated and managed by the transport cooperative that will be organized by the barangay unit with strong support from the municipal government.

b) Rural Water Supply Plan

Deep wells with level-I water supply system are planned to solve shortage of water supply in the Project Area. Deep wells shall have a depth of 20m - 30m. The location and number of deep wells required are shown below:

- Dalacutan area : 4 deep wells
- Silae area : 1 deep well

Facility designs of the deep well are made based on the Design Guideline Criteria and Standards issued by DPWH. The standard cross section of deep well is presented in Annex-M.

c) Rural Electrification Plan

Construction of single phase power line is planned in the section between barangay Silae and Dalacutan. Total length of power line plan is 3.50 km.

d) 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 improving primary health care and basic education and other facilities and services that 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 important 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 rehabilitated as in the case of Dalacutan Area. The construction programs must be supported by improvements on teachers, particularly preparedness for multi-grade teaching (a necessity in areas where school children's populations 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 that are usually located in center of the barangay or poblacion. 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 that is proposed to be provided to the Project 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 or multi-purpose centers, upgrading and rehabilitation activities shall be undertaken including provision of additional space and facilities

For the Silae Project Area, the following other social infrastructure plans are proposed; construction of the primary school in Dalacutan, construction of the barangay health station and day-care center in Dalacutan, provision of paramedical supplies/equipment and facilities for both Dalacutan and Silae and expansion of barangay hall to multi-purpose center to house the barangay center with provisions for facilities for training center, also in Dalacutan.

10.3.2 Cost Estimate and Disbursement Schedule

1) Conditions of Cost Estimate

Construction unit costs are based on September 1996 prices and divided into the foreign and local currency portions. The construction costs shall then be estimated on a contract basis for all sectoral project plans.

2) Associated Costs

As the associated costs, five percent of the construction cost is adapted for the pre-engineering cost and ten percent for the administration cost. The consulting service costs are estimated considering the project features. Also, ten percent of the construction cost is assumed as the physical contingency. The costs for institutional capability building and social preparation are included in the administration costs. The costs for land acquisition are also estimated.

3) Project Costs and Disbursement Schedule

The project costs consist of two categories; that is, construction costs and community development and support services costs. These costs are composed of the following items according to the sectoral plans:

Construction Costs

- Agricultural development
- Agricultural infrastructure development
- Rural infrastructure development
- Post-Harvest and agro-industry development
- Institutional development

Community Development and Support Services Costs

- Agricultural support services
- Institutional development

The total project cost is estimated at 52.9 million pesos. These costs are classified into responsible implementing agencies concerned depending on the project components, as shown in Table 10.3-1.

Furthermore, the estimated project costs should be disbursed based on the implementation schedule of the Project as described in paragraph 10.4.2 "Facility Construction and Equipment Supply" (refer to Table N.2-22).

Table 10.3-1 Summary of project Cost for Silae Area

Description	Total Project Costs			Related Implementing Agencies								
	F/C	L/C	Total	DAR	DA	DPWH	NIA	DTI	DOH	PCC	LGU	ARC
1. Construction Cost												
a. Agricultural Development	139	812	951		481					340	100	30
b. Agricultural Infrastructure Development	3,457	5,950	9,407				4,332				5,076	
c. Rural Infrastructure Development	17,469	1,811	19,280			1,920			560		16,800	
d. Post-Harvest Development	691	1,593	2,284		51			2,231				
e. Institutional Development	470	200	670								670	
Sub-total	22,226	10,366	32,592		532	1,920	4,332	2,231	560	340	22,646	30
2. Community Development & Support Service Cost												
a. Agricultural Support Services	0	2,047	2,047		2,047							
b. Institutional Development	0	1,795	1,795	898			897					
Sub-total	0	3,842	3,842	898	2,047		897					
3. Associated Cost												
a. Pre-Engineering Cost (5% of 1)	1,111	518	1,630		128	461	1,041					
b. Administration Cost (10% of 1 & 2)	2,222	1,420	3,642	90	258	192	523	223	56	34	2,265	3
c. Consulting Services (refer to Table N.2-16)	2,799	4,305	7,104	7,104								
Sub-total	6,132	6,243	12,376	7,194	386	653	1,563	223	56	34	2,265	3
4. Land Acquisition Cost	0	498	498	498								
5. Physical Contingency (10%)	2,223	1,421	3,643	90	258	192	523	223	56	34	2,265	3
Total Project Cost (1 - 5)	30,581	22,370	52,951	8,680	3,223	2,765	7,315	2,677	672	408	27,175	36

Note : Detailed estimation is given in Table N.2-17.

10.4 Project Implementation and Operation and Maintenance Plan

Implementation of the Project is divided into four stages. The implementation schedule of the Project is presented in Figure 10.4-1.

- Social preparation (SP)
- Support services stage for capability building-up
- Facility construction and equipment supply stage, and
- Community development and operation and maintenance stages.

10.4.1 Function of Multi-Purpose Cooperatives

The multi-purpose cooperative is expected to expand its activities. As the cooperatives expand its activities, additional committees, such as, education and training, operation and maintenance, post-harvest, production and marketing, consumer goods and credit lending and assistance, as created as shown in Figure 10.4-2 (refer to paragraph 10.1.8 and 10.2.2).

10.4.2 Support Services for Implemented Plans

1) Support Services for Capability Build-Up

Before the implementation of the Project, there is a need to prepare not only the beneficiaries but also the support agencies who will play important roles in the implementation and sustainability of the Project. An intensive institutional capability building-up of support agencies will have to be undertaken simultaneously with the social preparation of the beneficiary community.

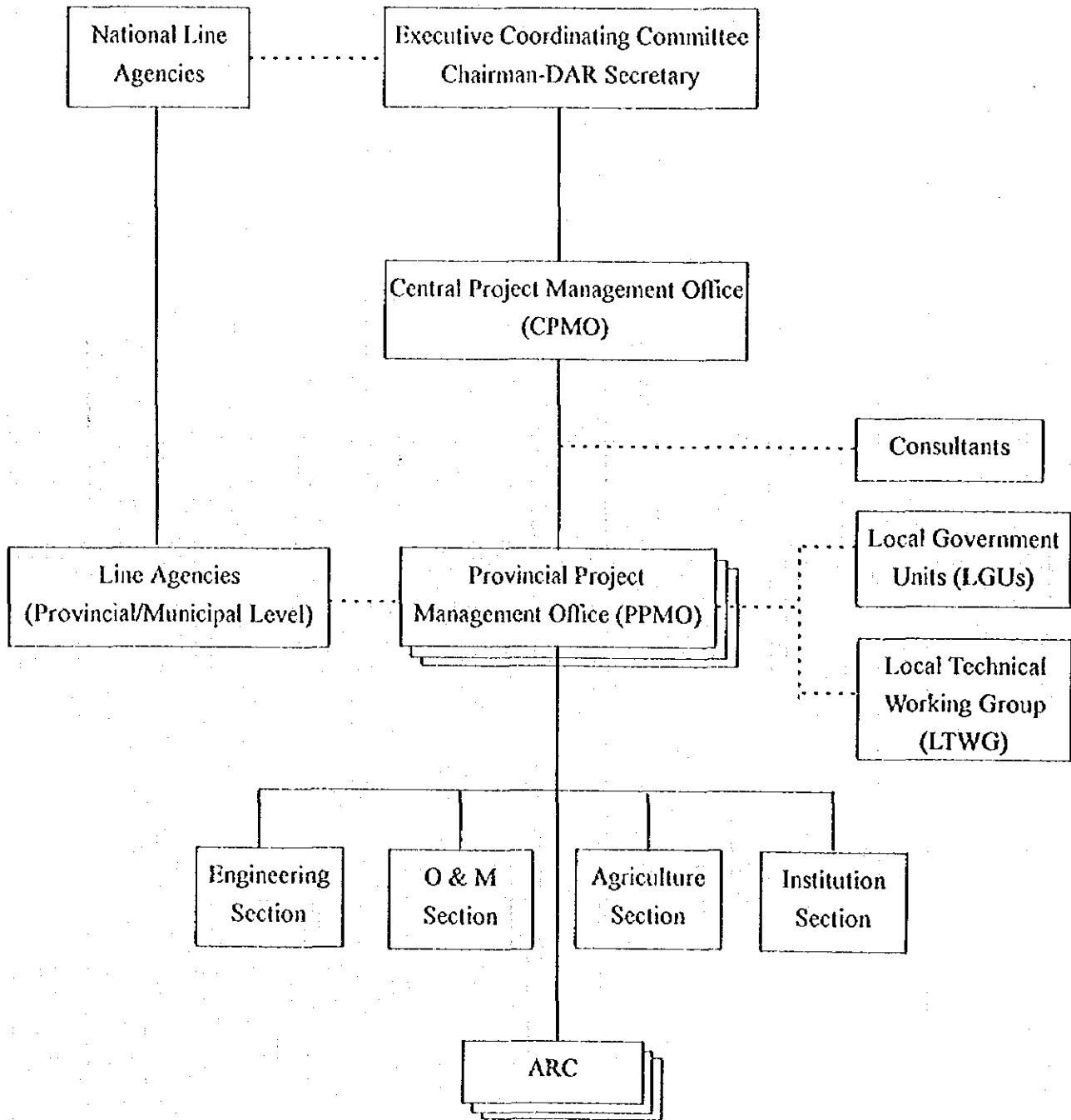
Initially, local government and local agency consultations should be undertaken to complete program implementation, support and commitments to the Project. The DAR as a lead implementing agency will spearhead the consultation process. The related support agencies and NGO will also undertake the support services for capability build-up as social preparation and institutional strengthening of the Project.

The capability building of the DAR field offices shall be prepared and programmed by the Bureau of Agrarian Reform Beneficiaries Development Division (BARBD) in DAR. The BARBD will be assisted by the Bureau of Agrarian Reform Information and Education (BARIE) and the DAR Regional Office.

The strengthening of the LGUs will be the responsibility of the Department of Interior and Local Government (DILG) and other national agencies providing necessary skills and competence to help support project implementation.

FIGUR 10.4-2

PROPOSED ORGANIZATION CHART FOR PROJECT IMPLEMENTATION



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

The Local Technical Working Group (LTWG) should be organized for the social preparation of beneficiary community. It will also act as the lead person of the agency or organization to support the Project. The LTWG will be working closely with the Provincial Project Management Office (PPMO). The chairman of the LTWG will be the Municipal Agrarian Reform Officer in DAR (DAR-MARO).

The responsibility of providing and coordinating the capability building-up and additional technical training of the LTWG is the main responsibility of DAR Central and Regional Office. The DAR shall assist and coordinate in facilitating the required technical assistance to be provided to the LTWG.

The general roles and responsibilities of the support agencies in the implemented plans are as follows:

- Department of Agrarian Reform (DAR), specifically the PDMS, BARBD, BARIE and the regional offices for DAR personnel directly involved in the Project on matters related to the proposed projects and programs,
- Department of Agriculture (DA), specifically the Cordillera Integrated Agricultural Research Center (CIARC) for the LGU, provincial and municipal agricultural technologist on all aspects related to agriculture,
- Department of Environment and Natural Resources (DENR) for the local government, provincial and municipal agricultural officers and technologist on all aspects related to agro-forestry and environmental conservation;
- Department of Interior and Local Government (DILG), particularly the Local Government Academy for the local government units; and
- Other institutions, such as the local state colleges and universities, particularly the Central Mindanao University in Musuan.

For the effective and smooth implementation of the support service during the preparation stage, Consultants will be hired preferably through international tendering. The detailed consulting services to be required for the Project are shown in Table N.2-13 and Figure N.2-1.

Regarding the required periods of the main support services such as institutional capability build-up and social preparation works, two years will be needed as indicated in Figure 10.4-1.

2) Related Agencies for Support Services to ARBs

- Training courses and research on crop production, livestock raising and fisheries, including courses on integrated pest management and setting-up/management of small-scale agri-based income generating activities:
 - Department of Agriculture (DA)

- Department of Environmental and Natural Resources (DENR)
 - Mindanao State University (MSU)
 - Research Outreach Center in Bukidnon
 - Provincial Agricultural Office (PAO)
 - Municipal Agricultural Office (MAO)
- Extension services, crop technology, production and distribution of seedlings and planting materials:
 - Bureau of Plant Industry (BPI)
 - Provincial Agriculture Office (PAO)
 - Municipal Agriculture Office (MAO)
 - Provincial Environment and Natural Resources Office (PENRO)
 - Research Outreach Center (ROC) in Bukidnon
- Community development and organization, cooperative training, value formation:
 - Department of Agrarian Reform (DAR)
 - Cooperative Development Authority (CDA)
 - Land Bank of the Philippines (LBP)
 - Municipal Social Welfare Development Office (MSDO)
 - Local or Barangay Schools
 - Non-Government Organization (NGO)
- Basic skill's development, industrial and entrepreneurial training:
 - Department of Trade and Industry (DTI)
 - Municipal Social Welfare and Development Office (MSWDO)
 - Department of Science and Technology (DOST)
- Credit and employment assistance:
 - Land Bank of the Philippines (LBP)
 - Cooperative Development Authority (CDA)
 - Department of Trade and Industry (DTI)
 - Municipal Social Welfare Development Office (MSWDO)
 - Local Government Units (LGUs)
 - QUEDAN COR
- Market support, post-harvest support and other institutional support:
 - Department of Agriculture (DA)
 - National Food Authority (NFA)
 - Local Government Units (LGUs)

10.4.3 Facility Construction and Equipment Supply

1) Implementing and Supervising Agencies of the Project

The Project shall be a joint undertaking of the national, the concerned provincial and local governments and the private sector located in the Project Area. As indicated in Figure 10.4-2, the lead implementing agency for the implementation of the Project is the Department of Agrarian Reform (DAR).

The implementation of project components will adopt the CARP institutional arrangements where the agencies involved will implement the sub-components according to their competence.

The existing organizational structure mechanisms for CARP projects already operating in DAR will be adopted for the Project. Agencies concerned will mobilize its CARP Implementing Units and taps the other regular units of their respective agencies.

The highest policy making body for the Project shall be the Executive Coordination Committee (ECC). It shall be organized with DAR Secretary as the chairman. The ECC provides overall policy, direction and support. It shall also undertake linking and networking with other national and international agencies for the resources and technical assistance requirement of the Project. The other members of the ECC shall be the other concerned agencies, such as DA, DENR, NIA, DPWH, etc.

The ECC shall be supported by a Central Project Management Office (CPMO) composed of a Project Manager and other staff from DAR Central Office. The Project Manager shall be appointed by the Secretary of DAR. The responsibility of the CPMO is the overall supervision and coordination of the Project Areas. It shall also provide support and direction to project implementation and undertake linking and networking at the national level.

At the provincial level, the Provincial Project Management Office (PPMO) shall be organized composed of DAR (regional, provincial, municipal), LGUs, representatives of other line agencies. The PPMO shall be chaired by the Provincial Agrarian Reform Officer (PARO). The PPMO shall be responsible for the operation and management of the Project. The PPMO shall be supported by technical group/staff composed of the Engineering, O&M, Agricultural and Institutional Sections. The responsibility of the support staff is to assist the PPMO in the implementation of the Project. The support staff shall be selected from the regular technical staff pool of the regional, provincial, or municipal DAR and other agency offices.

A Local Technical Working Group (LTWG) at the provincial/municipal level shall be organized. The members of the LTWG shall be composed of the designated senior LGU officials and technical staff of designated line agencies. The

LTWG shall assist in the social preparation of the community, provide technical assistance to the PPMO and shall also serve as the project focal persons in their respective municipalities and provinces for coordination mechanisms.

2) Implementation Mode for Facility Construction

Implementation mode for facility constructions shall be on contract basis. General contractor(s) will be selected preferably through international tendering.

3) Administration Office

The PPMO mentioned above shall be the administration office of the actual project implementation.

4) Preparatory Works

Major preparatory works for facility construction to be conducted prior to the commencement of the detailed design are as follows:

- Land acquisition for facilities such as nursery, demonstration farm, animal breeding center, irrigation and drainage canals, farm pond, farm roads, deep wells, various social facilities, and so on,
- Topographic survey for major facilities, and
- Route survey for roads and canals.

5) Consulting Services

Consulting services to be hired through the same manners as the support service stage shall be required for the detailed design, preparation of the tender documents and supervision of the construction works.

6) Land Acquisition and Compensation

The land acquisition and compensation for facility construction, which will be made before the commencement of the detailed design, are always key factors for smooth implementation. Intense efforts on land acquisition shall be made by the DAR-PPMO.

7) Implementation Schedule

All facility constructions and procurement of equipment formulated under the Project can be completed within two years inclusive of the detailed design, as indicated in Figure 10.4-1.

10.4.4 Community Development and O & M Plans of the Project

1) Community Development Plan

In parallel with the works during facility construction and equipment supply stage mentioned above, community development with agricultural support services and institutional development shall be made by LGUs and NGOs. In the Project, four years inclusive of a part of social preparation for the community development works are proposed as indicated in Figure 10.4-1.

2) Operation and Maintenance Plan

a) Operation and Maintenance Organization

Operation and maintenance of the implemented project facilities will be conducted by the Provincial Project Management Office (PPMO). The PPMO will be in charge of planning and management for the implemented project. The local government units (LGUs) and farmers' organizations to be also established or strengthen shall carry out the actual operation and maintenance works under the jurisdiction of the PPMO. The PPMO shall also execute the monitoring and evaluation works as well as operation and maintenance of the implemented project. Different people's organization, such as, farmer's organization, multi-purpose cooperatives, and water user's association (WUA) will be established.

Furthermore, the Local Technical Working Group (LTWG), that will be organized before project implementation to promote social capability of the beneficiary communities in the Area, will also function as an operation and maintenance organization.

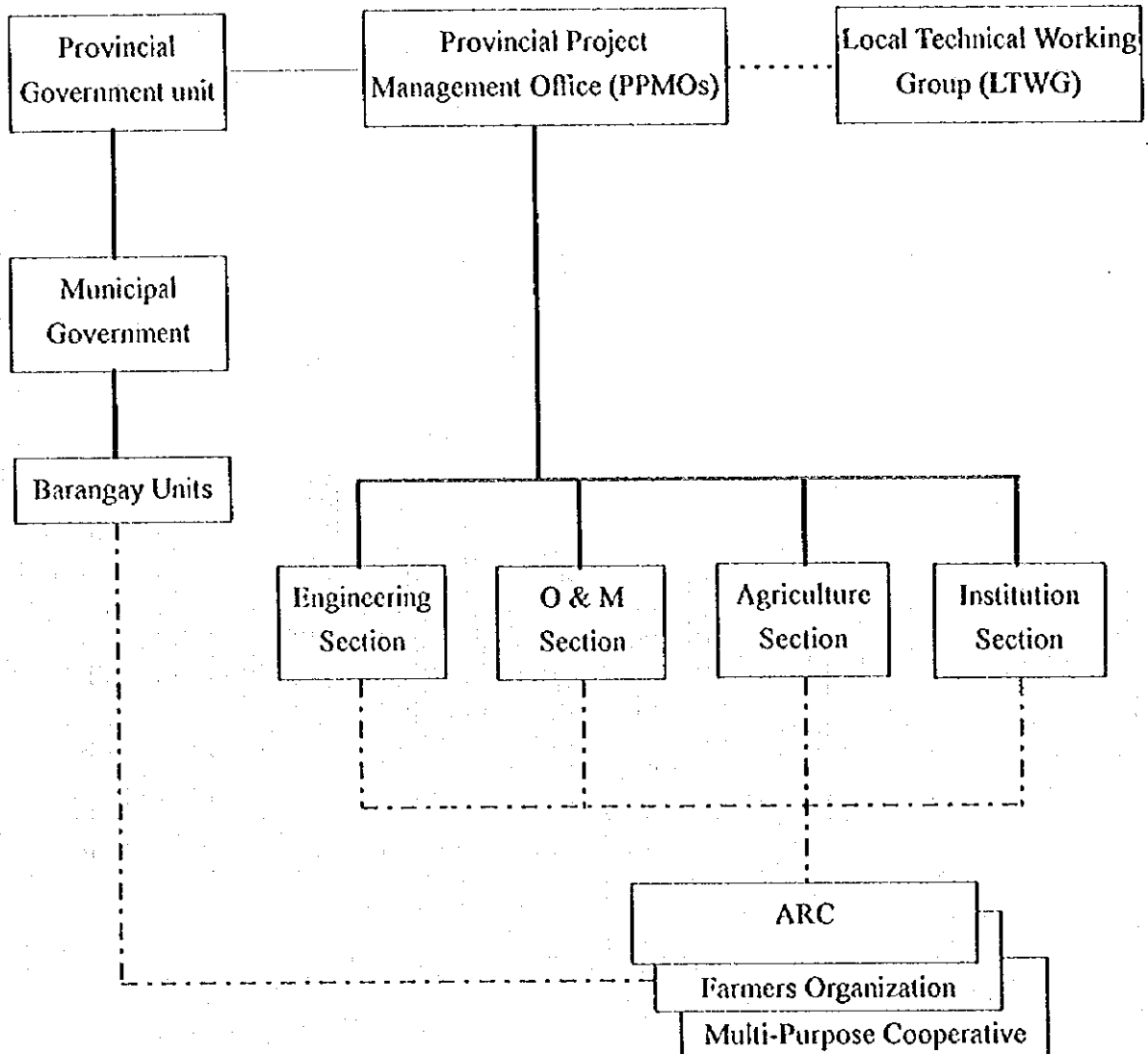
The proposed operation and maintenance organization chart is shown in Figure 10.4-3.

The general roles and responsibilities for the operation and maintenance of the implemented facilities are as follows:

Related Agencies for O & M of Infrastructure Facilities

- Rural roads and bridges, barangay roads and farm-to-market roads
 - Department of Public Works and Highways (DPWH)
 - Provincial Engineering Office (PEO)
 - Municipal Engineering Office (MEO)
- Agricultural infrastructure facilities like a small-scale irrigation system, and a water impounding dam
 - National Irrigation Administration (NIA)
 - Provincial Irrigation Office (PIO)
 - Department of Agriculture (DA)

FIGURE 10.4-3 ORGANIZATION CHART FOR O&M



- Control/Supervisor
- - - - - Tight Support/Monitoring
- · - · - Coordination/Participation/Extension

- Rural water supply, school buildings, barangay health stations and other social infrastructures
 - Department of Public Works and Highways (DPWH)
 - Local Government Units (LGUs)
 - Municipal Health Office (MHO)
 - Department of Education, Culture and Sports (DECS)

b) Operation and Maintenance Plan of the Project

The actual operation and maintenance of the project facilities will be undertaken by the LGUs and farmers' organization under the jurisdiction of the Provincial Project Management Office (PPMO).

Agriculture Development

■ **Nursery**

A nursery station will be established to improve the rate of the planted seedlings at the barangay level. It will be operated and managed by the beneficiary farmers' organization. Development Workers will be assigned by the cooperatives' organization to manage the nursery station. The LTWG, the municipal agricultural office and CENRO will assist in the development of the nursery station. During the project implementation stage, the nursery shall supply adequate seedlings according to the establishment schedule of fruit tree-based farms and production/protection forest.

■ **Demonstration Farm**

To demonstrate a set of technology at farm level, one demonstration farm will be proposed. This demonstration farm will be composed of almost contiguous plots for improvement of existing farming system and introduction of new farming system as fruit tree-based farming and production/protection forest. The farm lots may belong to the above mentioned Development Workers. It will be operated and maintained mainly by these Development Workers under the technical assistance provided by LTWG.

■ **Livestock and Poultry**

Dispersal of pregnant carabao will be done under the Project to increase qualified carabaos. The respondent farmers will be provided with necessary technical services on breeding and reproduction of carabao. Also, a mini-carabao bull camp will be provided. This mini-carabao bull camp shall be operated and maintained by the beneficiaries' organization, especially the development worker for livestock and poultry. The mini-incubators for the hatching of native chicks will be provided to farmers who will be identified by the beneficiaries' organization. The operation and maintenance of the incubators will also be undertaken by the organization.

Agricultural Infrastructures

■ Irrigation Systems

The provided farm pond and irrigation canal systems will be operated and maintained by the water users' association (WUA) to be established by the beneficial farmers. The WUA will be organized by DAR- PPMO after irrigable boundary and its areas are clearly defined. The training program for the WUA, particularly key persons in various aspects like leadership training, water management, operation and maintenance, gate operation, etc., will be started before the implementation of the Project. The NIA will be tapped by DAR in the development of the WUA, since NIA has enough experience to establish and develop such water users' association.

The WUA will operate and maintain the irrigation facilities, supervise the distribution of water, and collect the necessary irrigation fees or charges.

■ Farm Roads

Farm roads categorized into barangay roads will be periodically maintained by the beneficiary cooperatives after the construction of roads, which will be implemented under the supervision of LGUs. However, when heavy equipment will be needed for repairing the roads, the beneficiary cooperatives can borrow the equipment from the municipal office by paying necessary charges.

■ Farm Land Conservation

Most of the seeds, seedling or cutting to be used for contour planting to protect soil erosion can be propagated from seeds or branch cutting by farmers themselves. However, some original seeds and seedling should be introduced at the nursery station provided at the barangay. The seeds and seedling mentioned above will be propagated in this nursery. Necessary technical assistance on the selection of species and propagation will be provided by DA and DENR.

Also, adequate farm drains along and across the contour lines to collect and convey excess rain water at fields will be essential to prevent soil erosion. The maintenance works of these drains will also be undertaken by farmers themselves. In the drain systems, a small-scale silting basin will be provided at the terminal of the drain systems.

Rural Infrastructures

■ Rural Roads

Rural roads playing important roles as communication among villages, hauling of agricultural crops and production materials, etc., will be improved. The operation and maintenance of these rural roads will be under the responsibility of provincial DPWH.

■ Rural Water Supply

Rural water users' association (WUA) will be established with the participation of households to be directly benefited by the rural water supply. The association will be organized by DAR-PPMO at the construction stage with an assistance of the Local Water Works and Utilities Administration (LWUA) and/or LGUs. The WUA will operate and maintain the systems, collect the necessary water dues, and prepare the plan for the upgrading of the water supply systems.

■ Rural Infrastructures

The social and other rural facilities such as, barangay school, barangay health center, barangay center, etc. shall be maintained by the community through the initiative of the barangay officers/council. For general maintenance work like cleaning and clearing, the community as a whole and some specific organizations shall be tapped to do work on a regular basis to instill participatory work and responsibility among members of the community. Contributions for maintenance works may be for materials, equipment or tools, labor and food. For major rehabilitation and/or repair works, the LGU and/or other governmental agencies shall be tapped to undertake work. Example of operation and maintenance works which can be applied to the Project Area are as follows:

- Elementary school:
 - Major rehabilitation/construction
 - Repair/rehabilitation work
 - Repair work w/o major replacement
 - Regular maintenance like minor repairs, cleaning and clearing
 - Health Station/Center:
 - Major rehabilitation/construction
 - Repair/rehabilitation work
- DECS/DPWH
 - LGU, CDF
 - Barangay IRA fund for materials and barangay community for labor and food
 - PTA, barangay council
 - MOH/DPWH
 - LGU, CDF

- Repair work w/o major replacement - Barangay IRA fund for materials and barangay community for labor and food
- Regular maintenance like minor repairs, cleaning and clearing - Barangay council, midwife, barangay health worker
- Barangay Center/Multi-Purpose Center:
 - Major rehabilitation/construction - LGU, CDF
 - Repair/rehabilitation work - LGU, Barangay IRA
 - Repair work w/o major replacement - Barangay IRA fund for materials and barangay community for labor and food
 - Regular maintenance like minor repairs, cleaning and clearing - Barangay council, barangay community, youth or women's group.

Post-Harvest and Agro-Industry

The actual operation and maintenance of post-harvest and agro-industry facilities will be conducted by municipal LGUs. However, the beneficiary organization will be requested to do daily and periodic maintenance for the provided equipment and facilities. Since operation and maintenance method for different types of equipment and facilities differ, it is necessary to prepare a practical operation schedule to expect effective operation or to employ an operator nearby or to be undertaken by the beneficiary members themselves with sufficient experience for operation and maintenance.

Operation fee will be collected from the users of the equipment. Operators' pay will be paid from these sources. Management of this fee collection and payment will be conducted by the PPMO.

c) Operation and Maintenance Costs

The operation and maintenance costs for the implemented projects involve the following items; i) agricultural development, ii) agricultural infrastructure development, iii) rural infrastructure development, iv) post-harvest development, and v) institutional development.

Total operation and maintenance costs is estimated to be about 542 thousand pesos per annum, as shown below:

Annual O&M Costs

Items	O&M Costs (peso/year)
- Agricultural Development	9,510
- Agricultural Infrastructure Development	94,070
- Rural Infrastructure Development	192,800
- Post-Harvest and Rural Industry Dev.	239,300
- Institutional Development	6,700
Total	542,380

The detailed estimation of O&M costs classified into the related implementing line agencies are given in Table N.2-26. According to the estimation, the required O&M costs for the LGU is 226 thousand pesos, which is equivalent to 0.6 percent of the annual budget of 40.8 million pesos for the municipality of Malaybalay in 1995.

10.5 Project Evaluation

10.5.1 Economic Justification

1) Method of Economic Evaluation

The Project is evaluated or analyzed in two dimensions, the financial analysis and the economic analysis. The financial analysis is conducted to arrive at the financial internal rate of return (FIRR) for the project beneficiaries of the entire ARC. The economic analysis, on the other hand, is conducted to arrive at the economic internal rate of return (EIRR) which is meant to measure the project viability for the Philippine economy as a whole.

The major difference between the two analyses is the prices used in calculating the values of both the Projects' inputs and outputs.

Incremental benefits or the cash flows which are the streams of differences between the net production values (NPV) of the With-Project case and NPV of the Without-Project case are derived before applying the discount factors to arrive at the net present values of the cash flows and hence, the FIRR and EIRR.

2) Prices of Commodities

In financial analysis, farmgate prices collected from both the primary and secondary sources relating to each project are used.

In economic analysis, shadow prices are used through their derivation in the following manners:

- All values of foreign costs are multiplied by the factor of 1.20 to reflect the shadow foreign exchange rate that is believed to be 1.2 times of the official exchange rate (OER), and
- All values of unskilled labor are discounted by 0.60 to reflect the shadow wage rates that are believed to be that much lower than the market wage rates. All others remained unchanged are multiplied by the factor of 1.0.

The financial and economic prices used in the analysis of FIRR and EIRR at Silae are shown in Tables 10.5-1 and 10.5-2:

Table 10.5-1 Financial and Economic Prices of Output for Silae Area

Crop			Financial Prices		Economic Price	
	Product	Unit	Silae	Average	SCF	Peso/unit
Field Crops						
Paddy		kg	7.60	8.26	1/	6.50
Corn		kg	5.02	6.20	2/	4.90
Peanut		kg	13.95	13.89	0.80	11.11
Mungbean		kg	19.14	20.74	0.80	16.59
Sweet Potato		kg		5.35	0.80	4.28
Garlic		kg		60.00	0.80	48.00
Squash		kg	5.27	5.27	0.80	4.22
Cassava		kg		2.58	0.80	2.06
Fruit Trees						
Coconut	Copra	kg	6.92	8.99	0.80	7.19
	Charcoal	kg	2.50	2.50	0.80	2.00
Mango	/3	kg	16.23	13.93	1.00	13.93
Banana		kg	3.32	3.32	0.80	2.66
Abaca		kg	21.87	21.22	0.80	16.98
Cashew		kg	18.00	18.00	0.80	14.40
Rambutan		kg	18.40	15.91	0.80	12.73
Durian		kg	34.95	30.22	0.80	24.18
Jackfruit		kg	5.00	5.00	0.80	4.00
Forest Products						
Fuelwood	All	cu.m	75	80.00	0.80	64.00
Poles	All	cu.m	994	1069.00	0.80	855.20
Pulpwood	Falcata	cu.m	1,794	2064.00	0.80	1651.20
Sawlog	Bagalunga	cu.m	1,794	1265.00	0.80	1012.00
Sawlog	Bagras	cu.m	1,100	1401.00	0.80	1120.80
Sawlog	Gmelina	cu.m	2,228	2562.00	0.80	2049.60
Sawlog	Mahogany	cu.m	3,218	3701.50	0.80	2961.20
Livestock						
Carabao	Milk		35	35.00	0.80	28.00
	Cow/Bull	ea	9,140	6710.00	0.80	5368.00
Chicken	Meat	ea	57.98	62.95	0.80	50.36
	Eggs	ea	2.66	2.89	0.80	2.31

Note: 1/ Based on 100% rice, fob. Bangkok

Note: 2/ Based on US No.2 corn, fob Gulf Port

Note: 3/ Regarded as world commercial crop with financial = economic prices

Table 10.5-2 Financial and Economic Prices of Inputs for Silae Area

Inputs	Unit	Financial Prices		Economic Prices		
		Silae	Average	SCF	Peso	
Seed/Planting Material						
Rice	kg	8.50	8.50	1.00	8.50	
Corn	kg	60.00	60.00	1.00	60.00	
Corn	kg	20.00	20.00	1.00	20.00	
Peanut	kg	40.00	40.00	1.00	40.00	
Mungbean	kg	30.00	30.00	1.00	30.00	
Squash	kg	300	300.00	1.00	300.00	
Fruit Tree Seedlings						
Coconut	ea	12.00	12.00	1.00	12.00	
Mango	ea	20.00	20.00	1.00	20.00	
Banana	ea	2.00	2.00	1.00	2.00	
Abaca	ea		3.00	1.00		
Cashew	ea	2.50	2.50	1.00	2.50	
Rambutan	ea	30.00	30.00	1.00	30.00	
Durian	ea	30.00	30.00	1.00	30.00	
Jackfruit	ea	30.00	30.00	1.00	30.00	
Forest Tree Seedlings						
Any	each	2.50	2.50	1.00	2.50	
Animal Stock						
Carabao	Cow	each	15,000	15,000	1.00	15,000
	Bull	each	13,000	13,000	1.00	13,000
Chicken	Fertilized egg		2.50	2.89	1.00	2.50
Fertilizer						
Urea (46-0-0)	kg	7.50	7.75	1.20	9.00	
Muriate of Potash (0-0-60)	kg	4.48	4.63	1.20	5.38	
Ammophos (16-20-0)-kg	kg	6.60	6.68	1.20	7.92	
Complete (14-14-14) - kg	kg	6.80	6.84	1.20	8.16	
Zinc Phosphate	kg	6.67	6.67	1.20	8.00	
Pesticides						
Basudin 400EC	L1.0 lt.	278	279.90	1.20	333.60	
Furadan 3G	G 34g	60	60.00	1.20	72.00	
Decis	L1.0 lt.	430	447.25	1.20	516.00	
Azodrin 202R	L3.0 lt.	303	315.00	1.20	363.60	
Lannate EC	L1.0 lt.	400	411.25	1.20	480.00	
Malathion	L2.0 lt.	242	248.29	1.20	290.40	
Trigograamma	card	1.50	1.50	1.20	1.80	
Herbicides						
2.4D-Amine EC	L2.0 lt.	450	462.69	1.20	540	
Others						
* Apply the Standard Conversion Rate to obtain economic prices						
Labor						
Land Preparation	mad	140	130.00	0.60	84	
Others	md	70	65.00	0.60	42	

Note: */ 10 % is removed from the financial prices for local tax before applying SCF.

3) Project Benefits

The major project benefits to be incorporated into the analysis are the increased production of crops and livestock proposed to be produced in the project, measured for their financial and economic values. In arriving at such benefits, alternative plan of land use for the Project Area is developed. All technical and economic parameters are considered in modeling the alternative plan. The technical parameters include altitudes, land topography, soil structure, availability of inputs, yields, historical production in the area, soil conservation as well as the social consideration of environmental protection. Five cases are modeled from which one is selected for the derivation of the overall financial and economic returns. These five cases are constructed from the base case that has all enterprises included at the same time from the first year of the project. Cases-1 and 2 divide the planting areas of selected crops during the first three years of the Project. Finally, only Case-3 is selected for the overall analysis based on its relevance to the actual situation.

The direct benefits from the selected Case-3 are incremental agricultural production and employment in the Project Area and are summarized below:

- 213 tons per year of incremental field crop production from paddy, corn, peanut, mungbean, squash and sweet potato
- 39 tons per year of incremental fruit crop production from durian
- 7,490 cu.m of forestry products including firewood, poles, and sawlog for a period of 25 years
- 18.9 tons of caramilk, 126 heads of young carabulls/caracows, 0.5 million dozens of native chicken eggs and 88 tons of chicken meat for 25 years
- 4,696 mandays of incremental employment of family labor in crop production

Other benefits included are the values of tilapia production and labor saved from long travelling and hauling due to the presence of the rural roads, rural water and post-harvest including agro-industry components of the project.

Considering the above modelling of the land use plan, the financial and economic analyses of the Project Area are estimated. The major outcomes of the analysis are the economic viability of the project with its FIRR and EIRR.

Details of inputs, outputs, costs and benefits of individual enterprises included in the financial and economic analysis are presented in Annex 0-2.

In addition to all the direct benefits which are quantifiable and valued in monetary terms for computing the Financial Internal Rate of Return (FIRR),

Economic Internal Rate of Return (EIRR) and Net Present Worth (NPW), there exist a number of non-quantifiable benefits which are also worthy of mentioning, though not included in the analysis due to the lack of data and appropriate analytical methodology at present.

The non-quantifiable benefits from the project exist in both indirect and intangible forms. Examples are the improved environments as a result of contour farming and agro-forestry production recommended in the selected case of the land use plan. Such benefits, which may later be quantifiable with improved data and analytical techniques, are savings of costs on fertilizers from less occurrence of soil erosions; savings of irrigation costs due to more soil moisture and regular rainfalls; savings of road repairing costs resulting from fewer landslides, etc.

All above together with the indirect and intangible benefits from improved incomes and more household expenditures on education, health and other social reforms, do exist and could make the rate of return to the project much higher than presently shown, if included.

4) Economic Project Costs

The project costs used in the analysis are of different forms. First is the production costs of the various agricultural enterprises included in the land use plan for the Project Area. Next is the production foregone or the net value of production of the Without Project Case that represents the value of land used for agricultural production in the Project. Project development costs and their close associated operation and maintenance (O&M) costs and physical contingencies are the major cost items incurred from project implementation.

Also, the cost of capital (money) is automatically taken care of in the process of analysis that values all economic items with their present values. The conventional depreciation costs of capital items are also automatically taken care of by their present values. Inflation is also assumed considering that it would equally affect both the benefit and cost streams of the Project.

What are not shown as direct costs to the Project are those related to the growing of forest trees accrue some income after a few years against yearly expense, or do not provide any nominal income other than environmental protection values. Kakawate and Flemingia are the forest tree proposed for the latter case. Their negative financial benefits may be regarded as costs to all other agricultural production, as well as other economic and social activities that benefit from the protected environment caused by planting the said forest trees. Considering this reasoning, it is suggested that interest-free loans be provided to all ARBs who agree to plant any forest trees in the Project Area.

The production costs of each crop and livestock of the Without-Project and With-Project Cases as well as the project development and O&M costs at Silae Area are given in Annex O.2.

5) **Financial and Economic Internal Rate of Return**

FIRR and EIRR are calculated for both individual enterprises included in the land use plan and for the entire Project Area. Detailed analyses are shown in Table 10.5-3 and Table 10.5-4.

The analysis indicates an FIRR of 26 percent and an EIRR of 19 percent for the project at Silae Area.

6) **Sensitivity Analysis**

To cope with the negative outcomes due to uncontrollable variations in any physical, economic and social factors that reduce the rate of return of the project through increasing its costs or reduction of its benefits, both the FIRR and EIRR are analyzed in terms of their sensitivity to the said variations. A summary of the analysis is shown below.

Summary of A Sensitivity Test

Reduction in Agr. Income (%)	Increase in Agr. Costs (%)	FIRR (%)	EIRR (%)
0	0	26	19
10	0	24	18
37	0	18	15
50	0	15	13
0	10	25	19
0	50	22	16
26	26	18	15
36	36	15	13
Switching Values(15%)			
Income	(-)	50 %	37 %
Costs	(+)	>50 %	>50%

Table 10.5-3 Financial Analysis for Silae Area

Enterprise	Type	Area	Year																									
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Field Crops			370.62	471.33	542.07	612.78	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49	683.49
Paddy	1		11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Maize	2		11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Others	3		11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Plantation			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Forest			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Others			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Plantation			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Forest			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Others			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Plantation			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Forest			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Others			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Plantation			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Forest			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Others			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Plantation			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Forest			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Others			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Plantation			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Forest			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Others			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Table 10.5-4 Economic Analysis for Silae Area

Subcategory	Year 1	Year										19	20	21	22	23	24	25									
		2	3	4	5	6	7	8	9	10	11								12	13	14	15	16	17	18		
Table 10.5-4 Economic Analysis: SILAE (Area \$/ha)																											
Subcategory	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
Field Crops																											
Wheat	10	-211.06	-26.13	-28.63	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65	
Ready to Plant	11	185.07	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	
Wheat	12	213.99	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	210.26	
Wheat	13	-506.19	-507.51	-509.08	-510.49	-511.66	-512.59	-513.32	-513.88	-514.29	-514.57	-514.74	-514.82	-514.86	-514.88	-514.89	-514.89	-514.89	-514.89	-514.89	-514.89	-514.89	-514.89	-514.89	-514.89	-514.89	-514.89
Wheat	14	-24.44	2.57	10.90	19.22	27.54	35.86	44.18	52.50	60.82	69.14	77.46	85.78	94.10	102.42	110.74	119.06	127.38	135.70	144.02	152.34	160.66	168.98	177.30	185.62	193.94	
Wheat	15	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73	208.73
Wheat	16	-2.64	-0.00	-0.54	-1.08	-1.62	-2.16	-2.70	-3.24	-3.78	-4.32	-4.86	-5.40	-5.94	-6.48	-7.02	-7.56	-8.10	-8.64	-9.18	-9.72	-10.26	-10.80	-11.34	-11.88	-12.42	
Wheat	17	-100.13	-24.36	-11.32	-4.42	1.48	7.42	12.42	17.42	22.42	27.42	32.42	37.42	42.42	47.42	52.42	57.42	62.42	67.42	72.42	77.42	82.42	87.42	92.42	97.42	102.42	
Wheat	18	-109.13	-24.36	-11.32	-4.42	1.48	7.42	12.42	17.42	22.42	27.42	32.42	37.42	42.42	47.42	52.42	57.42	62.42	67.42	72.42	77.42	82.42	87.42	92.42	97.42	102.42	
Wheat	19	-1.70	-1.87	-0.87	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	-0.96	
Wheat	20	-119.70	-28.03	-10.70	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	
Wheat	21	-119.70	-28.03	-10.70	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	-16.32	
Wheat	22	-3.42	-0.29																								
Livestock																											
Carabao	50	148.1500	279.3659	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	368.7899	
Others																											
Rural Roads																											
Rural Water																											
Fish Culture																											
Post-Harvest & Agro-Industry																											
SW/With																											
SW/No																											
Cash Flow Less Project Inv.																											
Project Investment																											
Annual O&M																											
Financial cash flow																											
SW/With																											
SW/No																											
Cash Flow Less Project Inv.																											
Project Investment																											
Annual O&M																											
Financial cash flow																											

168K
NW/15
6,979

10.5.2 Financial Analysis of Typical Farmers

As earlier mentioned, the alternative land use plan used in the financial and economic analysis of the project is derived and modeled based on a number of considerations and cases. The five cases simulated before arriving at the final one (Case-3), when reduced to the size of a farm at Silae Area would represent the model for a typical farm.

With the view to providing agricultural land to the landless and the poor farmers to minimize income disparities, what would finally be the cases in the future are farmers of approximately equal landholdings. The existence of farms of different sizes, be they large, medium or small, is not expected in the Project Area. In other words, the typical farm in the Project Area would only be of one size.

To show what would likely be the net farm income of a typical household in the Project Area, the annual and average returns to family labor and management per farm and per hectare are derived as shown in Table 10.5-5. The analysis indicates the average annual return to family labor and management of 45,381 pesos per farm, and 22,466 pesos per hectare, of a typical farm at Silae Area having an average landholding of 2.02 ha.

10.5.3 Project Monitoring and Evaluation

The project analysis as shown above is only the beginning of the story. After the decision to launch the project, the successful implementation of the project and the attainment of its objectives are yet to be ascertained. All these require an effective and efficient process of Project Monitoring and Evaluation. For a successful implementation of the Project, a project work plan needs to be chalked out to prevent delays in implementation and cost overrun. All the concerned officers from related Departments both from the national and the LGUs, as well as NGOs and people's organizations in the Project Area will be assigned to help monitor the activities, jobs and tasks to be undertaken during project implementation. Disbursements of project funds, procurement of project inputs, realization of project outputs at the various stages of project implementation need to be properly recorded, reported and corrected.

To ascertain the attainment of project general (development, long-term) objectives and its specific (immediate) objectives, a base-line or benchmark survey needs to be conducted before the actual start of project implementation. This will be supplemented and compared with additional surveys conducted annually or at mid-term of the project implementation, as well as at the end and some years after project implementation. Indicators for measurements of the attainment of the project immediate objectives (effects) and development objectives (impact) will be needed.

In practice, DAR would be the most relevant agency to plan and organize project monitoring through its officers in the national and local units. Other related agencies as DA, LBP, NGOs and people's organizations in the Project Area should also be included in the monitoring process.

For the evaluation of the attainment of project's objectives, DAR should only facilitate or participate as one among other parties assigned to jointly conduct it. NEDA, being the Central Economic Planning agency of the Government should be another party involved in evaluating the project impact. Others may include representatives from agencies as universities and other related institutions. Recently, effort toward supplementing Project Evaluation with the process of Self Assessment by the implementing agency (in this case, DAR) has been experimented and found successful largely. It, therefore, may be incorporated into the project monitoring and evaluation plan of the Project.

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