

7.2.2 Social Capability Building-up and Institutional Development Plan

1) Participatory Approach Plan

Plans must be made locally by those who will implement them and benefit from them. It is therefore necessary, that the beneficiaries of the Project are involved in all phases of the development process, from conception, planning and implementation stage for the Project to become sustainable.

The plan shall at the beneficiary level where at the initial stage, problems, needs and interest are identified, prioritized and consolidated. During this period, recommendations and strategies for countering the identified needs and problems are discussed by the beneficiary themselves. Then, whatever is identified, discussed and recommended is put into an action plan that the beneficiary can use for the development of their community. The plan is then presented to concerned agencies and other institutions at the local, provincial, regional or central level, for appropriate action, depending on the magnitude of the proposed action plan.

This exercise/activity shall be undertaken initially with the assistance and supervision of the concerned Community Development Worker, for this Project, by the DAR Development Facilitator and/or NGO (if available in the Area).

For the participatory approach, the following activities shall be undertaken in all phases of the development process:

Barangay Consultations

- Need analysis of the community through participatory discussion. This activity shall be undertaken through public meetings, small discussion groups, home visits, interviews, etc. The needs and problems of the community shall be identified, listed and discussed and through consensus, shall be prioritized and action plan developed. This activity may be undertaken more than once as the need arises,
- Presentation of the development plan that was elicited from the community in a formal assembly followed by in-formal discussion to identify gaps, other solutions/recommendations and to determine willingness of the community to provide counterpart contributions,
- Formalization of community participation and commitment. This participation will be their equity or share in terms of labor (voluntary or reduced labor cost), participation in meetings, discussions or training; right-of-way for road or irrigation facilities or canals, provision of lot for multipurpose center or solar pavements or nursery, use of farm area for demonstration purposes, etc., and

- Presentation of the plan to concerned agencies and/or institutions from the local to the central level, if necessary, for implementation.

Local Government and Local Agency Level Consultations

- Participatory approach shall also include the involvement of all units/groups in the development of the community. This includes the outer community, such, as the local government unit, the other concerned agencies, the NGOs, the business group, etc.,
- Involvement of the LGU, the other government agencies and institutions concerned in the preparation of the plan, in terms of assistance to but not limited to the following: provision of data and information required; assistance in the undertaking of surveys, interviews; field work reconnaissance; discussions on their plans, programs, activities, problems and constraints in the development and implementation of projects, etc. in Sappaac Area. During this stage, the support and commitment of all concerned will have to be initially solicited,
- Presentation of the development plan by DAR to the LGU and other agencies concerned in a formal assembly to initiate mutual consultation and or dialogue among them towards consolidation of the identified/proposed projects or programs. During this formal meeting, the DAR will also solicit and confirm their participation in terms' of facilities, resources, manpower, support and time to be provided for the development of the ARC area. The output of this local level consultation are: (i) awareness of all agencies concerned on the plans and development proposed for the area; (ii) agreement of the proposed plan and inclusion into their own plans and programs; (iii) endorsement of the program/project through the Sanggunian; (iv) initial commitment and agreement forged for the support to be provided for the ARC area; (v) assignment of personnel for the Local Technical Working Group (LTWG); and (vi) allocation and inclusion of budget for the committed counterpart support, and
- After the assembly, series of discussions will have to be undertaken between and among agencies. This will be initiated and coordinated by DAR provincial office. During this period, Memorandum of Agreements, budget preparations, sanggunian resolutions, endorsement, etc. will have to be completed.

2) Institutional and Social Capability Building Plan

The following activities/programs shall be undertaken for the development of the institutional and social capability of the community and the key implementors for Sappaac Area.

a) Social Preparation of the Community

The levels of social preparation of the organizations in Sappaac Area are still at the low level stage. Membership in the cooperative organization is very low and economic activity is very limited (consumer store only). There is a high rate of repayment delinquency with the cooperative having a total uncollected debt of about 200,000 pesos. The members and leaders have undergone only limited training and exposure, etc. The other existing associations are very informal organizations with compulsory membership as in the PTA and women's group.

There is a need to undertake intensive social preparation in the community to prepare them to manage their organization and eventually their resources. The people in the community shall be adequately trained to understand the nature of rural associations and their roles in them. Social preparation through community organization and training will help improve the management capabilities of associations and organizations. Through proper education and training, members of the organization may understand the principles of cooperativism as a way of life and better understanding of their roles and responsibilities to the organization and the community.

Earlier training conducted in the ARC area was inadequate and, therefore, more social preparation will solve the problems being faced by the organization. However, training and seminar are not enough to make the organization successful. It is necessary that during the social preparation phase, the community organizer and/or DF would instil into the members the need to identify with the organization. This identification with the organization or association can be gazed by the positive attitude of the members toward the organization. This positive attitude of members to their organizations is strongly associated with attainment of benefits, good working relationship with other members and officers and good prospects of association (Dumagat, 1982).

The following activities shall be undertaken for the social preparation of the community and Figure 7.2-1 shows the implementation plan of social preparation and institutional strengthening works;

Community Capability Building-Up

The level of social preparation of the local communities, particularly the organizations in the Area are still at the low level stage. There is a need therefore to build-up and strengthen community capability for attaining self-sufficiency and management of their resources.

The DAR, therefore, together with the NGO, LGU and other agencies and institutions shall provide the sustained support to attain social preparation of the community. This can be achieved by providing the necessary training, supervision and materials needed until the community becomes self-reliant.

FIGURE 7.2-1 IMPLEMENTATION PLAN OF SOCIAL PREPARATION AND INSTITUTIONAL STRENGTHENING

Work Item	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year
1. Barangay Consultation	█						
2. LGU & Other Local Agency Consultation	█						
3. Formation of Technical Working Group (TWG) Training/Workshop (TWG)	█						
4. Strengthening of Institution	█	█					
- DAR	█	█					
- Other Local Agency	█	█					
5. Selection & Contracting of NGO	█						
6. Social Preparation of the Community	█	█	█	█	█	█	█
7. Community Development Program							

The initial step to be undertaken is the contracting of NGO by DAR to undertake the social preparation and community development activities. The first task of the NGO community development worker is to undertake a need assessment of the community and to validate the institutional capacity of the existing organizations within the Project Area through participatory approach. The next step is to make an inventory of existing resources (people, services and resources), formal and indigenous technology, practices, beliefs, values within the community. Also to be considered is the identification of available outside community resources and technology applicable to community needs. Considering the findings, a program of implementation for the social preparation aspect of the beneficiary shall be undertaken.

Specifically, the social preparation shall include but not limited to the following:

- Need analysis of the community through participatory approach,
- Strengthening of the people's organization through value formation. This can be done by slowly eradicating negative traditional values towards work and life. Some examples of this are the need to pay debts, "Bahala Na" system attitude, luck, destiny, the importance of group work and cooperativism, social hygiene and sanitation, etc. This can be realized through education, seminars, cross visits, etc.,
- Involving the farmer members in group/community activities through the initiation of low-level and costless projects (at the first stage) such as community sanitation, beautification, health related activities, waste recycling for bio-fertilizer production, etc.,
- Initiation of low-financed projects with assistance from outside community (ex. backyard vegetable farming, planting of herbals' garden, poultry and pig raising, community mobilization, through assistance in the repair or maintenance of water system in the community, road clearing and cleaning, repair of day care center or barangay center, etc.),
- Trust and confidence building among members of the organization and within the community. This aspect is very important for any organization to succeed especially in cooperative organizations where material investments are involved. This can be undertaken by providing venue for building trust. This can be done through initiation of low or medium financed projects with a larger portion of the fund coming from organization through group trading business (as buy and sell of crops/products, consumer store, fund drives for capital mobilization) or group buying of farm inputs, seeds, others, acquisition of income generating equipment or machinery or working animals. The farmers could be encouraged to form into small work groups with responsibilities given to as many persons as possible. Responsibilities should be rotated and every member should be given the

chance to participate in all aspects of the activity. This would help develop trust and confidence among members.

- Development of reliance among members of the community and organization through savings mobilization (self-reliance in capitalization), regular training (which could develop local leaders, managers, local trainers for transfer of technology) through initiation of costless, low-level to medium or high level projects, etc., networking with GOs, NGOs, private/business groups for relevant assistance and other support services,
- Development of leaders and improvement of leadership pattern by eradicating traditional leadership pattern vested on formal authorities, by initiating consultation and decision-making by majority, formation of functional work committees or small working groups to assist each other through labor exchange, development of local trainers to transfer technology, identification and involvement of indigenous leaders and farmers with special skills and technology in the initiation and implementation of projects,
- Provision of technical and farm management skills necessary to the farmers, specifically related to the proposed development plan, such as, but not limited to the following: soil conservation-based farming systems, land use, soil survey, soil and crop management, SALT technology (A-frame, preparation of contour lines, contour ditches, silt trap, drainage canal, etc.), mechanisms for the availment of credit and related facilities, production and marketing plan to improve the potentials of farm produce, etc., and
- Provision of technical and other skills to the other sectors of the community, (women, youth and the elderly) on income generating skills (handicraft, fruits and crop preservation, etc.), informal health activities, population and education, health and material care, etc.

The ultimate objective of the social preparation is the implementation of the proposed community framework plan with the active participation of the members of the community. Outside support and assistance from DAR, LGU, DA and other government services will be provided initially with the eventual turnover after the beneficiaries have become self-sufficient and capable to successfully sustain projects with very minimal support and intervention.

Deployment of NGO

The NGO shall be tapped and deployed in the ARC site to undertake the social preparation of the community and the cooperatives. The NGO shall undertake the community organizing work to assist the DAR to form viable farmer's organization. The DAR provincial office shall select the NGO to work in the community. The NGO shall provide a full time community organizer in the ARC area who will stay in the community most of the time. The community

organizer shall be backed up and supported by other members of the NGO group, the DAR, other concerned agencies and institutions. The NGO shall provide the necessary training for the strengthening of the organizations, specifically but not limited to: (i) value formation on self-help, self-responsibility, solidarity, cooperation, etc.; (ii) leadership training; (iii) organization management; (iv) marketing and financial management; (v) accounting/bookkeeping; (vi) savings mobilization; (vii) credit management; (viii) others, as needed.

The NGO to be selected will be a local NGO who has substantial experience in the field of participatory approach in community organizing, institutional organizing and agricultural development. The basis of the selection of the NGO would be as follows: (i) the NGOs orientation towards grassroots community development, (ii) capability to undertake community organizing and development work, (iii) knowledgeable in agricultural development, cooperatives, primary health care commitment, integrity and reliability, etc.

Tap of Existing Organizations funded under DAR undertaking Social Preparation Assistance Activities

At present, the DAR is a recipient of ODA for the development of ARCs. The profiles of DAR ODA are attached in Annex Q. One of the existing ODA assistance to support ARCs, is the Technical Support to Agrarian Reform and Rural Development (TSARRD) under the World Bank. Two of its programs can be applied to the marginal areas in terms of their programs: on agribusiness linkages for agrarian reform beneficiaries and other skills development and enhancement training not only for farmers but also to the other support agencies such as the LGU, the DAR directly involved with the community, etc. The DAR through special arrangements with the TSARRD Project and other related projects shall provide part of their investment to undertake the above mentioned activities for the identified marginal areas.

Institutional Mechanism for the Social Preparation

For the implementation of the social preparation of the ARC area, it is proposed that a Local Technical Working Group (LTWG) be organized by DAR at the provincial and municipal level. The LTWG shall be composed of DAR-MARO as chairman, the local government unit, MAO, CENRO, state university in the province, MHO, MSDW, DTI, DOST, Land Bank, ROS and NGO as members. The objective of the formation of the LTWG is to form a team that would assist in the social preparation of the organizations in the community before implementation of the infrastructure Projects. The assignment of the team members to the LTWG shall be permanent until the duration of the Project. The formation of the LTWG shall be undertaken when the development plan is approved.

After the formal presentation and the acceptance of the development plan at the local level, the DAR will initiate the formation of the LTWG. This group will initially undergo a workshop to be conducted by DAR (Central and Regional

Office). The purposes of the seminar/workshop are: (i) to prepare a team to work collectively in the social preparation of the community by providing their expertise for the duration of the activity; and (ii) detailed briefing on the development plans for the ARC area. The output of the workshop shall be: workplan for each agency/institution for the ARC area for activities to be undertaken, implementation schedule and cost estimates for the activity plan. However, the programs and activities prepared may be changed from time to time depending on the need and progress of the overall activity in the marginal area.

The LTWG will function as the agency/institution representative in all activities to be undertaken in the community in coordination with the DF and NGO community organizer assigned in the area. The LTWG will also be consulted by the DF and NGO from time to time and be requested to provide technical assistance, training and/or extension activities as need arises.

The LTWG shall document all activities undertaken in the area for monitoring and evaluation purposes, to determine the progress of activity, to assess the impact of the activity on the community and would serve as a basis for future work in other areas.

The LTWG shall meet regularly on a monthly basis. The meeting shall be presided by the DAR-MARO. During this meeting, progress, problems, needs, resolutions, etc. will have to be discussed. Issues and problems that cannot be resolved at this level will be presented to the PPMO for decision making and possible resolutions.

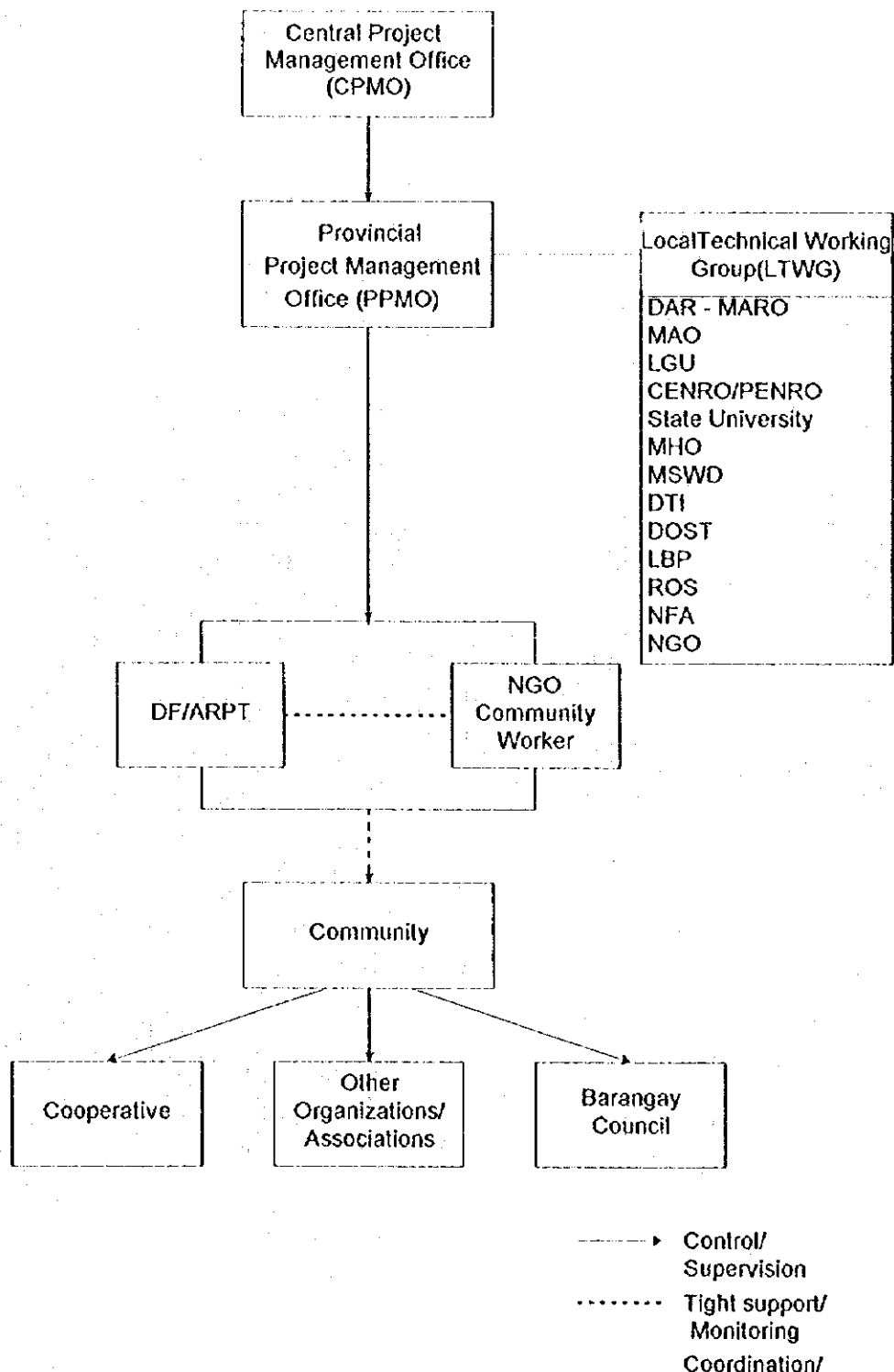
The structure of the institutional mechanism for the social preparation activity is presented in Figure 7.2-2.

b) Strengthening of the DAR Field Offices

The DAR is the lead implementing agency for the development of the ARC marginal lands. It is therefore necessary that the implementors, specifically those at the provincial and municipal, be provided additional and necessary skills to keep up with the task of assistance in the development of the area. The capability building of the DAR field offices shall be prepared and programmed by the Bureau of Agrarian Reform Beneficiaries Development (BARBD). The BARBD will be assisted by the Bureau of Agrarian Reform Information and Education (BARIE) and the DAR Regional Office. Priority for training shall be provided in Areas covered by the Project. Specialized training shall also be provided such as, upland development technology, farm management, etc. This specialized training can be provided by existing agencies and institutions within the Project Area. Training and seminar shall be backed-up by on site visits of successful on-going projects of similar nature implemented by government, NGOs, private and business groups.

FIGURE 7.2-2

INSTITUTIONAL MECHANISM FOR SOCIAL PREPARATION



c) Institutional Strengthening of the LGUs

The enactment of the Local Government Code in 1991 was aimed at the improvement of local public service delivery and public investment resource allocation. However, with the devolvement of the functions and institutions to the LGU, the expertise and efficiency in many areas has been lost and became weak. The main problem now affecting the LGUs is their build-up capacity and responsiveness to their constituents and their planning and implementation capacity. Considering the information and data gathered, the main problems of the LGUs are lack of funds and consequently, lack of personnel, equipment and field operation facilities to plan and implement programs and activities.

The development of the ARCs in marginal areas will need the support and assistance of the LGUs. It is therefore necessary that the local capabilities must be tapped and developed. LGUs directly involved, such as, the MAO, the MEO, MHO, MWSD, etc. must be strengthened and mobilized as a guarantee for continuity and sustainability. The LGUs must, therefore, acquire necessary expertise that will to support them in the implementation of the ARC projects.

The strengthening of the LGUs shall be the responsibility of the national government (NG), specifically DILG and other support national agencies for providing necessary skills and competence to help support project implementation. Specifically, the NG will need to provide the following:

- Provide training on value/moral development for participatory coordination among concerned agencies,
- Provide incentives to which the LGUs can improve their ability to raise revenues locally,
- Provide services to LGU, specifically assistance to planning, budgeting, project monitoring and implementation,
- Provide technical support, e.g., project development, contracting and procurement, and
- Help provide access to credit for the LGUs machinery and equipment build-up,

The strategies proposed for the program are:

- Access to formal training activities conducted by the NGs, specifically the Local Government Academy of the DILG, institutions, state colleges and universities, etc.,
- Skills competence through upgrading and continuous training, and
- LGU and NG concerned prepare plan and corresponding budget allocation for the capability building-up component.

d) Training and Seminars

Training and seminars will be provided to the community organization or associations on continuous and regular basis to update and enhance skills and management capabilities. The NGO development worker will make an inventory of indigenous technology on farming systems within the Project Area and available technologies outside which are applicable to community needs. Substantial ideas on farming systems will be provided and how these systems are applied at the field level followed by implementation of the approach at the field. Farm trials identified in the program shall be conducted, monitored and evaluated by the researchers (DA, PAO, MAO, others) and community members. Training and seminar will be backed-up by on-site training and cross farm visits and by information education campaign through public forum, distribution of information materials and radio broadcast to imbue awareness. Initially, the training to be provided will be undertaken by the NGO, assisted and supplemented by the Local Technical Working Group (LTWG).

Pre-membership training shall be given to all prospective members in the community. Regular meetings/seminars shall be conducted not only for the members of the association or organization but also to non-members so that they will see the advantages of joining organizations.

After completion of basic training on value formation and others mentioned beforehand, the NGO and DF assigned in the area shall consult and discuss with the organizations in the community, to determine the other specific skills and training needed by the organizations. Considering the identified training needs, the NGO together with the DF shall identify and source out agencies or groups who will provide the necessary skills training.

Training shall be provided after determining the needs of the community and shall focus on but not limited to the following.

- Value formation, particularly on self-reliance through collective efforts,
- Training on leadership and managerial skills,
- Skills on networking and diplomacy for market sourcing, credit accessing for internal and external resource mobilization,
- Skills on communication and negotiation where the participants will learn how to deal with the government and about who or what agency to talk to about specific issue,
- Project proposal making for farming and community projects,
- Training and exposure to health, sanitation, livelihood, responsible parenthood, especially for women,

- Farm management technology, integrated pest management, crops and cropping system,
- Land use plan at plot level through participation of the beneficiary,
- Soil survey to provide adequate information on land use and soil improvement,
- Investment plan and implementation on land development and soil improvement, and
- Resource mobilization to increase capital built-up, expand activity for organizations and generate income generating activities.

e) **Equipment and Facility Support**

In the self-assessment of support agencies, they have identified the lack of facilities, equipment and transportation as the constraints in the implementation of the project in the area. It is, therefore, necessary that facilities and equipment be provided to the support agencies, specifically, the DAR, the MAO and the municipal government. Also, some basic equipment support will have to be provided to the communities, specifically in the proposed barangay center where major activities of the community will be undertaken, (such as venue for meetings, seminars, forum, training, etc.). Motorcycles for mobility, computers, typewriters, projectors, television, video equipment for the barangay community are needed for the training support and information campaign.

f) **Partnership with Business Community**

The LGU or NG shall tap the corporate community to provide financial support and encouragement for the program. The business partners can also assist by encouraging their employees to visit the area and/or organize field trips among the employees and planting trees from time to time. They can also assist by adopting a particular program of the community and provide the necessary support and logistic to implement this program for a specified time.

Considering the above-mentioned participatory approach and social and institutional capability plan, the development scenario expected of the rural community are measured by the following indicators (refer to Table 7.2-1).

Table 7.2-1 Measuring Indicator for Rural Community Development

Indicators	Year 4 (After Social Preparation)	Year 6 (Community Development Program: NGO phase-out)
1. Status of Organization	Organization units/ committees are functional; cooperative activity has expanded to include activities other than consumer services and re-lending schemes	Self-reliant organizations with multi-purpose functions (retailing of basic household needs; provision of credit; rental & sale of farm input, seeds, implements, post harvest facilities; marketing services to rice, corn, vegetable, fruit farmers; small scale- processing of farm products; alternative livelihood activities bakery products, hollow-block making)
2. Member Participation in Group/Community Activities	Participation has expanded to community mobilization and self-help activities	Full & active participation in organizations & in solution of community problems & needs.
3. Attitude of the Community	Gradual break from negative traditional values (luck, destiny, faith)	Positive attitude towards work & life (enthusiasm for work, attitude towards new & innovative ideas, payment of debt)
4. Trust and Confidence	Members of PO have grasp the importance of group work & endeavor; the importance of PO & how members depend on one another for success; there is less or minimum trust;	Full understanding & commitment to PO goals & objectives; there is cooperation & harmony though at times' conflict cannot be avoided, there is distribution of functions & responsibilities.
5. Leadership Pattern	Planning and decision-making by majority; existence of functional working committees	Planning & decision-making by majority; existence of functional working committee; emergence of new & indigenous leaders, local trainers.
6. Initiation of Organizational Projects	Initiation of low-financed projects with assistance from outside communities	Initiation of medium & high financed projects w/ minimum or no assistance from outside resources; networking w/ GOs, NGOs, private groups for relevant assistance & other services
7. Financial Status of Organizations	Medium level of financial viability	Self-reliance in capitalization hence can engaged in multiple income generating activities
8. Viability of PO or Community to Sustain Project Activity	Some viability; capable to sustain successfully small scale projects	Economically viable; capable of loan payment; capable to sustain medium & big-scale projects
9. Organizational Stability	Organizationally stable but still needs guidance	Very stable; has already established political presence as already recognized by the LGU and others; may have representations in LGU and other entities.
10. Technical and Farm Management Skills of Members	Medium technical and farm management skills through training	Functional farm-management and technical skill

7.2.3 Land Use and Environmental Management Plan

1) Land-Use Plan

There is no uniformity of lands in the Area. The topographic conditions of lands, the physical conditions of soils, as well as available soil moistures are different by location. Moreover, the soils in most of the area are of Ultisol and Alfisol order, which are infertile. Besides, studies on proper land use have just started in the Philippines. However, based on data on area of slope and the results of simple soil survey, the following five cases of land use patterns are formulated.

Case of Land Use

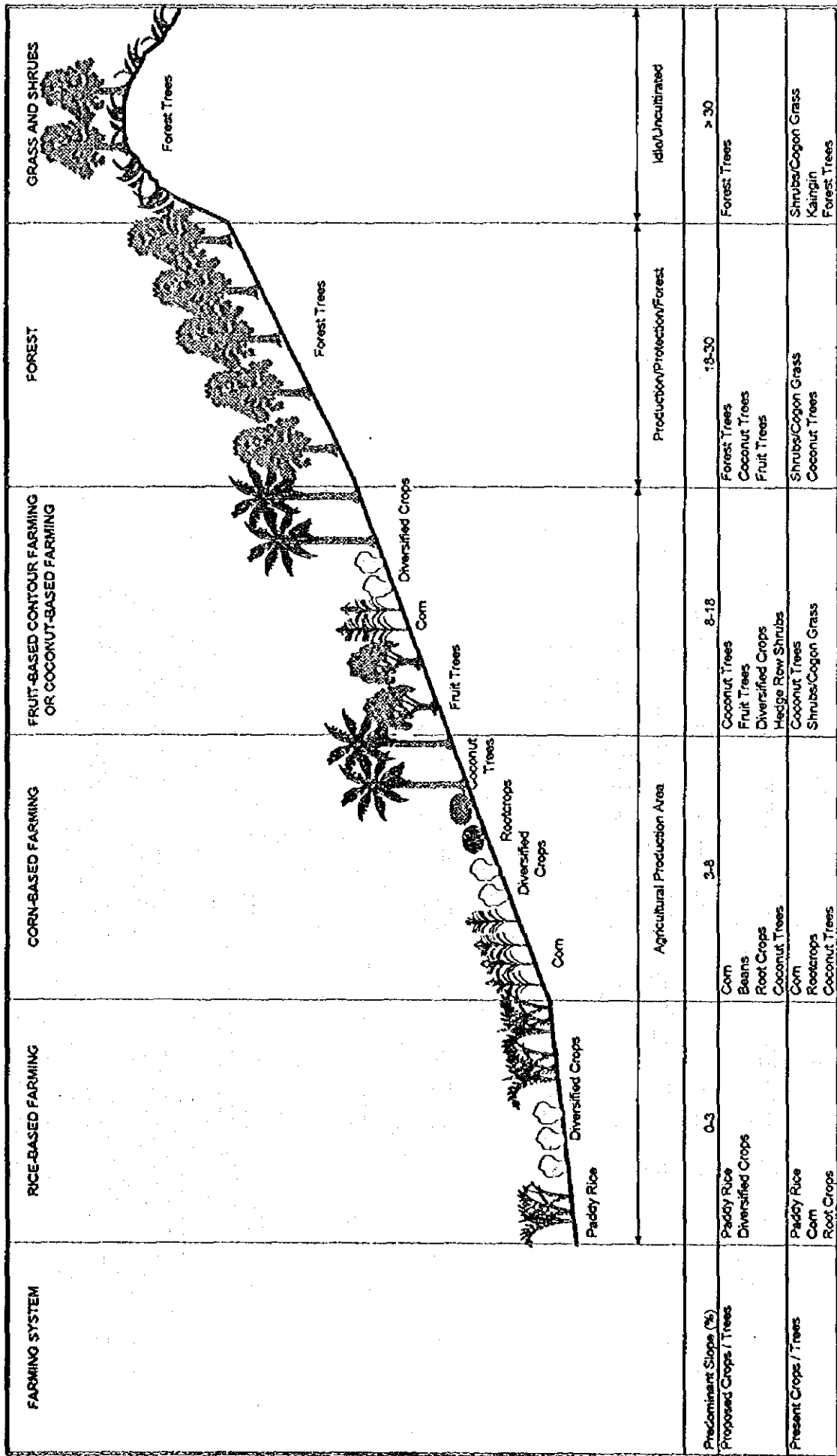
Case	Existing Cultivated Land	8 to 18 % Slope	18 to 30 % Slope	More than 30 % Slope
1	Crop	Retaining of Present Land Use	Retaining of Present Land Use	Retaining of Present Land Use
2	Crop	Crop (Contour Farming)	Retaining of Present Land Use	Present Land Use
3	Crop	Crop (Contour Farming)	Production/Protection Forest	Retaining of Present Land Use
4	Crop	Crop (Contour Farming)	Agroforestry	Retaining of Present Land Use
5	Crop	Crop (Contour Farming)	Agroforestry	Production/Protection Forest

Note: The details of land use plan in each case are shown in Annex F, Figure F.2-6 to F.2-10

Of the five cases, land use is limited to the presently cultivated land in Case-1, while that in Case-5 is of full development of land use. The land use in Case-3 is the intermediate of Case-1 and Case-5. This land use (Case-3) is selected, considering the following reasons (refer to Figure 7.2-3).

- The land use in Case-1 generates very limited crop benefits. Therefore, there is a need to use the idle/uncultivated land,
- To use the idle/uncultivated land, priority shall be given to the land with 8 to 18 percent slope,
- Small capital available for the farmers for proper operation and maintenance of the marginal land has to be take into account,
- From an environmental view point, the land with more than 30 percent slope shall be reserved without disturbing the soils, and
- Case 3 land use is justified as the most appropriate, because the larger crop benefits will provide smaller investment and better land and water

FIGURE 7.2-3 PROPOSED LAND USE PATTERN (CASE-3)



conservation to the lower area. Moreover, forest trees will provide not only timber but also organic matter to improve the soils in the land.

The proposed land use for Case-3 is indicated in Table 7.2-1. The supplemental irrigation to paddy rice during wet season and irrigation for high value crops other than paddy rice will be employed in rice land through development of a small water impounding dam.

In 60 percent of the area with 8 to 18 percent slope, fruit tree-based farming system shall be introduced. Upland crops like corn and beans will be grown especially during the establishment period of fruit tree plantation. In about ten percent of the Area, banana will be introduced. The nurse trees will be planted to protect the land from soil erosion and to improve soils. In the remaining area of this land category, about 30 percent of the area is not suitable to grow fruit trees because of shallow soils and many rock outcrops. Therefore, it is proposed to use these lands for production forest with fast growing trees. In the area with slope of 18 to 30 percent, forest trees will be planted for production of timber.

Formulation of appropriate land use plan at plot level is essential for the development in the marginal area. Considering the above general land use plan, individual farm designs shall be formulated through participation of beneficiaries, before any development is implemented. Such designs shall incorporate the appropriate crops and cropping pattern and soil conservation practices. Hence, survey on land development and management plan have to be carried out to provide farmers with basic information on soil and crop management.

2) Environmental Management Plan

All government agencies and private companies are required to prepare an environmental impact system (EIS) assessment for any project or activity that will affect the quality of the environment. These assessments that are systematic studies of the relationship between the project and activity and its surrounding environments are important in obtaining an Environmental Compliance Certificate (ECC) issued by the DENR. The ECC is needed to obtain permits and/or approval for project or activity implementation. The EIS is required only for projects/activities in environmentally critical areas that includes parks, tourist destinations, habitats for endangered species, areas of unique value and in large scale industry and infrastructure projects.

For the marginal area development, an EIS is not necessary for the scale of the proposed projects/activities does not belong to the above-mentioned restrictions. Besides, these environmental studies, environmental conservation measures shall be undertaken by farmers' self-effort.

a) Soil Conservation

Recommended soil conservation practice for the on-farm and off-farm, training of the beneficiaries, protection of the orchard or agroforestry establishment from grassland fire, establishment of nursery for the pasture grasses (Napier, Guinea grass, and Star grass) as vegetation cover of the riser and for kakawate to produce stem cuttings for the hedgerows, and establishment of demonstration farms for other soil conservation options to observe other types of hedgerow, and pasture grasses, legumes or combination on the riser are the components of the soil conservation plan. The on-farm soil conservation for various slope conditions shall be simple and cheap method of soil conservation-based farming system. The off-farm soil conservation structures will consist of grass water way and check dam made of rocks, branches of trees, and grasses.

Upland with Land Slope Less Than 8 %

On slopes less than eight percent, plowing along the contour instead of the traditional up and down the slope, intercropping, crop rotation and strip cropping of alternate row and creeping plants will be promoted. The runoff from the farmland will be disposed properly by construction of dike along the slope with ditch on the upper slope to convey the runoff water into the canal. The ditch shall have sediment traps along the channel made by digging about 80 cm deep and to avoid the concentrated surface flow.

Kakawate Contour Hedgerows

Contour hedgerows of Kakawate with Napier grass on the riser will be established for slopes of 8-30 percent. Guinea grass or Star grass shall be used instead of Napier grass or both. The vertical distance between contour hedgerows is one meter (3-5 m surface distance between contour hedgerows). The use of a "T-stick" with appropriate marking of the vertical distance will be very useful for setting the height of the riser. A-frame shall be used to establish the contour lines using bamboo sticks as the markers. With marked contour line as the midpoint, about one meter wide is thoroughly cultivated with a plow to form a raised bed. Two furrows spaced 0.5 m apart are prepared.

Kakawate stem cuttings of 2-cm diameter or seeds can be used as the planting materials for the hedgerows. Kakawate seeds will be collected during the dry season for wet season planting on the hedgerows at the start of the rain. Kakawate seeds are drilled in the furrow at the rate of two seeds per hill and 10 cm between hills. The Kwate seeds are inoculated with Rhizobium before planting. The seeds are firmly covered. When using the stem cuttings, the pointed end of the 30 cm long stem cutting is planted at a distance of 25 cm in the furrows of the hedgerows. The soil around the stem cuttings shall also be firmly covered. Gathering of stem cuttings will be done while the furrows are being prepared. Napier grass stem cutting, rootstocks of Guinea grass or stem cuttings of Star grass are planted on the riser at a distance of 30 cm.

Make contour canal below the riser that will convey the runoff water from the alley into the drainage canal. Soil trap of 0.8 m deep and one meter long is constructed in the drainage canal to retain the transported soil materials and to reduce the runoff velocity. Check dam is established to reduce flow velocity and the eroding power of the runoff water. This is placed in the drainage canal using big kakawate branches with 3 cm diameter. Bamboo split strips are weaned between peg. Boulders or cut shrubs and grasses are placed on the upper side of the dam. The check dam will be closely spaced on steeper channel. This should be maintained after the heavy rain.

The missing hills shall be replanted of hedgerows. The hedgerows shall be cut to one meter height from the ground when they begin to shade the field crops. The cutting shall be placed in the alley as mulch. To minimize competition with the food crops, the roots that spread into the alley shall be trimmed using a spade or plow. The Napier grass, Star grass, or Guinea grass shall be trimmed to 15 cm from the ground as fodder for cattle or carabao.

A contour ditch is established at the end of the upper most alley to collect the surface runoff from the upper part of the hilly area and divert the runoff into the drainage canal.

For annual food and cash crops, strip cropping and rotation of legume and non-legume shall be practised to maintain soil fertility and soil condition. Non-legume is planted on the strip previously planted to legume. The stover of the harvested crops shall be filed up on the hedgerows. No burning of farm residue shall be done.

If possible, cultivation of alternate strip shall be done till the kakawate is fully grown, so that the unplowed strip will retain the soil particles transported by runoff. Otherwise, the strips of kakawate are too small to retain the transported soil materials during the first cropping season.

Perennial crops shall be planted every third strip and borders of the farmlot. Only the spots for planting are cleared and dug. Only ring weeding is employed until the hedgerows are large enough to hold the transported soil. If the soil of the strip is bouldery, gravelly, or with no top soil, annual food crops are unsuitable. Permanent crops like fruit trees or forest tree species that are tolerant to drought condition is preferable. Short and medium term crops are planted between the strips of permanent crops as a source of food and regular income while waiting for the permanent crops to bear fruits. To avoid shading, short plants are planted away from the tall ones.

When the legumes on the hedgerows together with pasture grass are well established and properly maintained, it is expected that the soil erosion will be markedly reduced.

The cut grasses placed between the legume stem cuttings will retain the soil particles transported in the alley. The estimated soil loss is below the acceptable critical level, 10 ton/ha/yr. Assisted regeneration or reforestation together with good grassland fire control will significantly protect the soil.

b) Establishment of Napier Grass, Star Grass, and Guinea Grass Nursery

In the demonstration area, 0.25 ha of farmland is prepared by plowing and harrowing several times to have a fine seedbed. The existing weeds on the farmland shall be reduced if not eliminated by allowing the weed seeds to germinate and killed by harrowing. These are done twice or three times to reduce the weed population before furrowing at a distance of 75 cm. To plant the pasture grass divide the farmland into three subplots. Napier and star grass stem cuttings and rootstocks of guinea grass will be planted at 40 cm spacing between hills. When the plants are grown up, planting materials will be available for the hedgerows.

c) Contour Rock Walling

In the farmlots with abundant corral limestone rocks, contour rockwalling will be appropriate. After the contour lines have been established and the stakes are still on the ground, upslope side of the contour stakes is dug to a depth of at least 15 cm. This is to ensure firm anchorage on the ground so that during heavy rainfall the structure will not slip or collapse. Stones and boulders are piled with bigger ones on the base. If there are enough stones, the height of the rockwall level shall be at the midpoint of the vertical distance between two contour lines. Kakawate stem cuttings or seeds are planted at the base of the rockwall to stabilize it. The contour rockwalling is as efficient as the contour hedgerows.

d) Establishment of Kakawate Stem Cutting Production

All grown up kakawate in the ARC will be requested not be cut for fuelwood. These will be the source of kakawate stem cuttings for the hedgerows. At the same time, farmers will be requested to plant kakawate cuttings in the farm for stem cutting requirement for the next rainy season. They should also collect kakawate seeds during the dry season.

e) Farmers Training on Soil Conservation

Farmers training and cross visit to the SALT of other farmers will be done to develop the skills and knowledge on soil conservation. Farmers' beneficiaries that will require soil conservation establishment would be organized for cross visit to the farmers' fields with SALT in nearby areas. These activities will be undertaken as a part of multi-purpose cooperatives works. The cross visit to the farmers' fields will expose the farmers to the benefits of and other issues on SALT establishment. The training will include the use of A-frame to establish the contour lines of the hedgerow, to prepare the land along the marked contour line, planting of kakawate stem cuttings or seeds and napier, star, or guinea grass, construction of contour

ditches below the rise, silt trap, drainage canal, and check dams. Work group will be formed to assist each other through labor exchange in establishing SALT.

f) Soil Erosion Control from Infrastructure Projects

The drainage canal of the road must consider the size of the catchment above the road and the maximum rainfall intensity at 80 percent exceedance probability. Construction of the barangay road shall start toward the end of the rainy season. The spoils from the removal of the overburden shall not be disposed into the waterways or creek to prevent sedimentation of the creek. It shall be placed in an area free from runoff and protected by seeding grasses. The cut slope shall have 1V: 3H dimension to have a relatively stable surface. Check dam shall be established for safe disposal of the runoff from the drainage canal of the road. Ditches, culverts, and catch basins must be kept free from debris and obstruction. Shoulder and bank undercutting must be avoided. Seeding of grasses and planting of shrubs shall be done on the cutslope and backslope to control soil erosion and sedimentation of the canal.

During the operation of the barangay road, cleaning of the sediment in the channel and repair of the eroded channel, gully plug using vegetative method shall be done to minimize cumulative impact. Road signs shall be prepared and placed at visible location on the roadside to avoid traffic accidents.

g) Protection of the Agroforestry Establishment from Grassland Fire

Grassland fire is a major hazard during the dry months for the newly established agroforestry located on or near the cogonal area. Natural fire breaks, fire lines and counter fire are the most common fire control in the upland. Establishment of strip of banana hill around the agroforestry farmlots together with under brushing before the onset of the dry season will deter the spread of grassland fire. The various methods for controlling grassland fire to be carried out by LGUs are as follows:

Natural Fire Breaks

Any strip corridor free from vegetation like road, river and canals will deter the spread of fire. The removal/minimization of vegetation beside these natural firebreaks during dry season will increase their ability to contain fire.

Fire Lines

The 10 m wide vegetation-free strip needs to be established at the borders of the agroforestry and/or forestry establishment on the grassland and at 50 m interval inside the plantation. Fire lines at the borders can be established using tillage equipment or by controlled fire started at the early part of the dry season. The second option is quite risky and should be done by experience personnel. Fire lines and natural fire breaks are the first options to prevent the spread of fire from

the nearby areas. During the outbreak of grassland fire, the farmers shall stay outside the outermost fire lines to beat off the small fires being initiated by the sparks coming from the conflagration.

Counter-fire

A controlled counter fire is initiated outside the borders of the plantation when the major fire is detected early enough and the wind direction changes towards the fire. The counter fire will move towards the major fire. The spread of the fire can be stopped in this manner. It is also initiated on the upper slopes of a hill on the other side. It is the spreading fire that will move towards the major fire.

h) Watershed Rehabilitation and Protection

The vegetation cover of the watershed of the small impounding dam on the creek in South Sappaac Area shall be improved. This will enhance water yield to irrigate six hectares of rice field and to minimize sedimentation of the reservoir to prevent the loss in water storage capacity.

Tibig (*Ficus nota*) will be planted in the easement of the creek and the farmlands. This species is good for watershed protection but undesirable for fuelwood. Farmers shall be encouraged to adopt soil conservation based farming system together with agroforestry using narra, gmelina, and mahogany or any native forest species of importance to the community. Similar approach will be done to the existing small water impounding dam near the farm of the concurrent Barangay Chairman.

The area around the spring in sitios Pita (source of drinking water) and Parparia should be acquired by the Sangguniang Barangay by eminent domain and just compensation. The area should be at least 0.5 ha and should be reforested and fenced. This will protect the spring from pollution. Chlorinating of the water would be necessary to kill any microbial pollutants.

i) Environmental Education

Supplementary curricular material on Environmental Science for the Sappaac Area Elementary School will be developed to elucidate the basic concepts in ecology, environmental health, and nutrition using the development in the Model ARC as the example (Workbook in Science, Health, Nutrition, and Environment: the Case of Sappaac Area ARC in Marginal Area). This will help the children of the farmer beneficiaries to understand and appreciate the project components and the interrelationships of various activities of the project for the development of the community. The Abra State College, University of the Philippines Los Baños-Institute of Environmental Science and Management, and DECS-Bangued District will work together in the preparation of the curricular materials including teacher guide and the pilot testing in Sappaac Elementary

School. The pilot-tested materials would be used for the elementary schools in the marginal areas in the province and even in the region.

The environmental video tapes for training of the beneficiaries at the multi-purpose building will be made available to the pupils of Sappaac Area Elementary School DECS.

j) Rural Life

Production of Medicinal Plant

The Barangay Health Workers and the Midwife assigned in the community shall make an inventory of the available medicinal plants in the community. The Barangay Health Station shall establish nursery of medicinal plants in cooperation with the ARB Cooperative.

Mother plants of the uncommon medicinal plants will be acquired and propagated in the main nursery of the ARC and in the medicinal garden. Training workshop for the housewives on the use of the medical plants shall be conducted.

Public Health and Nutrition

Home garden will be improved by growing varieties of vegetables like lima bean, winged bean, ampalaya, and patola will use the fences or the trees around the house as the trellis. If the backyard has enough sunlight, basket composting, using animal waste of pig, carabao, cattle or goat will be recommended. The biodegradable kitchen wastes are separated from the non-biodegradable ones. The former is mixed with the dry leaves found in the backyard and animal waste and placed in the basket that is buried in the garden plot. Seedlings of vegetables are planted around the compost basket. Compostable materials are added continuously while the crops are growing around the compost baskets. Vegetables can be grown throughout the year.

Daily health, nutrition, and population education must be conducted continuously for all members of the community to be able to influence the attitude of the community on basic health care. Construction of toilet for each household would minimize the pollution of the sources of drinking water and the occurrence of water borne-disease. The implementation of the existing barangay regulation of the penalty for the stray animals is needed. Family planning program should be also a continuing program for the farmers.

The facilities of the Barangay Health Station must be upgraded and the basic medical tools and equipment should be acquired to keep the vaccine in the Health Center and to provide the first aid or paramedic treatment for the patient. Portable communication equipment for the station would help to notify the Municipal Health Center or the nearest hospital in case of emergency.

k) Environmental Monitoring and Evaluation

The community-based monitoring evaluation team for the implementation of the components of the project shall monitor the environmental impacts of the project activities. The team is composed of representatives of the farmer beneficiaries selected by the community, Sangguniang Barangay, MARO Office, Municipal Government, and NGO assisting the project. The changes in the physical, biological, social, and economic environmental indicators must be established and they would require the establishment of the baseline environmental data before 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 data. The results of the monitoring and evaluation must be presented to the farmer beneficiaries for decision and action particularly against negative impacts. The selected management options will be part of the implementation program in the following year.

7.2.4 Farming and Institutional Development Plan

1) Proposed Crop Selection and Cropping Pattern

In rice land with supplemental irrigation water, paddy rice during wet season and high value crops will be grown. The high yielding improved varieties of paddy rice like IR 60 and BPI Ri 10 and such high value crops as garlic and vegetables will be selected for this cropping pattern. In the rainfed rice land, upland, and orchard, representative crops with same cropping pattern for each kind of land will be grown.

In 60 percent of the area with slope of 8 to 18 percent, fruit based contour farming with intercropping of upland crops including corn and beans (mungbean and peanut) will be introduced (refer to Table F.2-5). The climate in the Area is mostly suitable to produce high quality mango. It is grown as one of the main cash crops at present. Therefore, the most promising fruit is mango. The drafted improved varieties shall be planted. Other fruit trees like jackfruit, pomelo and papaya will also be grown. In the ten percent of this land category, the estimated transition area between the valleys and hills in favorable moisture could be used for banana production. For both areas, nurse trees or hedgerows will be planted along the contour to protect the land from soil erosion and to improve soils. In the remaining ten percent of this land category, fast growing trees as bagras (*Eucalyptus deglupta*), which are resistant to long dry period will be grown. The planting design of fruit tree-based farming is indicated in Figure F.2-41 and F.2-42.

In the area with of slope of 18 to 30 percent, species of forest trees as mahogany, eucalyptus and acacia could be grown. The production forest will be established by planting climax (mahogany) and nurse trees (bagras) in combination (refer to Figure F.2-41). In the proposed cropping pattern for

production forest tree, ten percent of this land category is allocated for non-productive protection forest and fireline.

The overall cropping intensity in the proposed cropping pattern is 150 percent to total cultivation area for Case-3 as shown in Table 7.2-2.

2) Proposed Farming Systems

The Area has rolling and hilly topography. It has inadequate fertile soils, subject to erosion every year. Therefore, establishment of soil conservation-based farming system is essential in agricultural development. Improved rice-based farming system for the irrigated and rainfed rice land and upland farming system for the existing upland and fruit tree based contour farming and production or protection forest in the rolling and hilly land shall be introduced.

The Sloping Agriculture Land Technology (SALT) shall be employed for the fruit tree-base contour farming systems, where fruit and nurse trees and hedgerows will be planted along the contour. In the establishment of production/protection forest, soil conservation shall be considered. The small scale irrigation system will improve rice-based farming. It will also supply water for maintenance of nursery stations, carabao and cattle raising and emergency water supply for domestic use and establishment of orchard and production forest in the initial stage.

The unit yield and production with project for Case-3 are estimated in Table 7.2-3. The farming practices of representative crops shall be improved with adequate supply of farm input as shown in Table 2-27, Figure F.2-48 to F.2-57.

To supply quality seedlings of fruit, nurse and forest trees and hedgerows, a nursery station at the barangay level is proposed. The proposed nursery is indicated in Figure F.2-59. Furthermore, a demonstration farm will be required to demonstrate farming system for low-lying land, fruit tree-based farming and production/protection forest systems. The necessary facilities and items needed to establish the nursery and demonstration farms together with the estimated cost are indicated in Table F.2-31 and F.2-32.

It is proposed that the plantation for the fruit based contour farming and production/protection forest will be implemented within four years according to the schedule in Figure 7.2-4.

Table 7.2-2 Proposed Cropping Area in Sappaac Area(Case-3)

Kind of Land	Land Area (ha)	Cropping Intensity (%)	Crop	Season	Area (ha)
1. Rice Land					
- Irrigated	30	100	Paddy Rice	Wet	30
		20	Diversified Crops (Garlic*1)	Dry	6
			Subtotal		36
- Rainfed	58	100	Paddy Rice	Wet	58
		40	Diversified Crops (Corn)	Dry	23
			Subtotal		81
Total	88				117
2. Upland	30				
- Rainfed		30	Corn	Wet	9
		70	Root Crops (Sweet Potato*2)	Wet	21
		40	Mungbean	Dry	12
			Subtotal		42
3. Orchard	8	60	Mango		5
		40	Banana		3
			Subtotal		8
4. 8-18% Slope Land	110	15	Corn	Wet	17
		9	Beans (Peanut)	Wet	10
		9	Beans (Mungbean)	Dry	10
		9	Banana		10
		54	Cashewnut		59
		6	Hedgerow plants (Flemingia)		7
		13	Nurse trees (Kakawate)		14
		27	Forest Trees (Bagras)		30
			Subtotal		157
6. 18-30% Slope Land	60	90	Forest Trees (Mahogany*3)		62
			Forest Trees (Bagras)		62
			Subtotal		124
7. More than 30% *5	45				
8. Other Land	32				
Grand total	375				448

Overall cropping intensity = $448 \text{ ha} / (375 \text{ ha} - 45 \text{ ha} - 32 \text{ ha}) \times 100 = 150.1\%$

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

*1 including such vegetables as squash, cabbage, and eggplant

*2 including cassava

*4 including dalalupta to be intercropped

*5 including 7ha of the land for fireline in 18-30% slope landSource: JICA Study Team

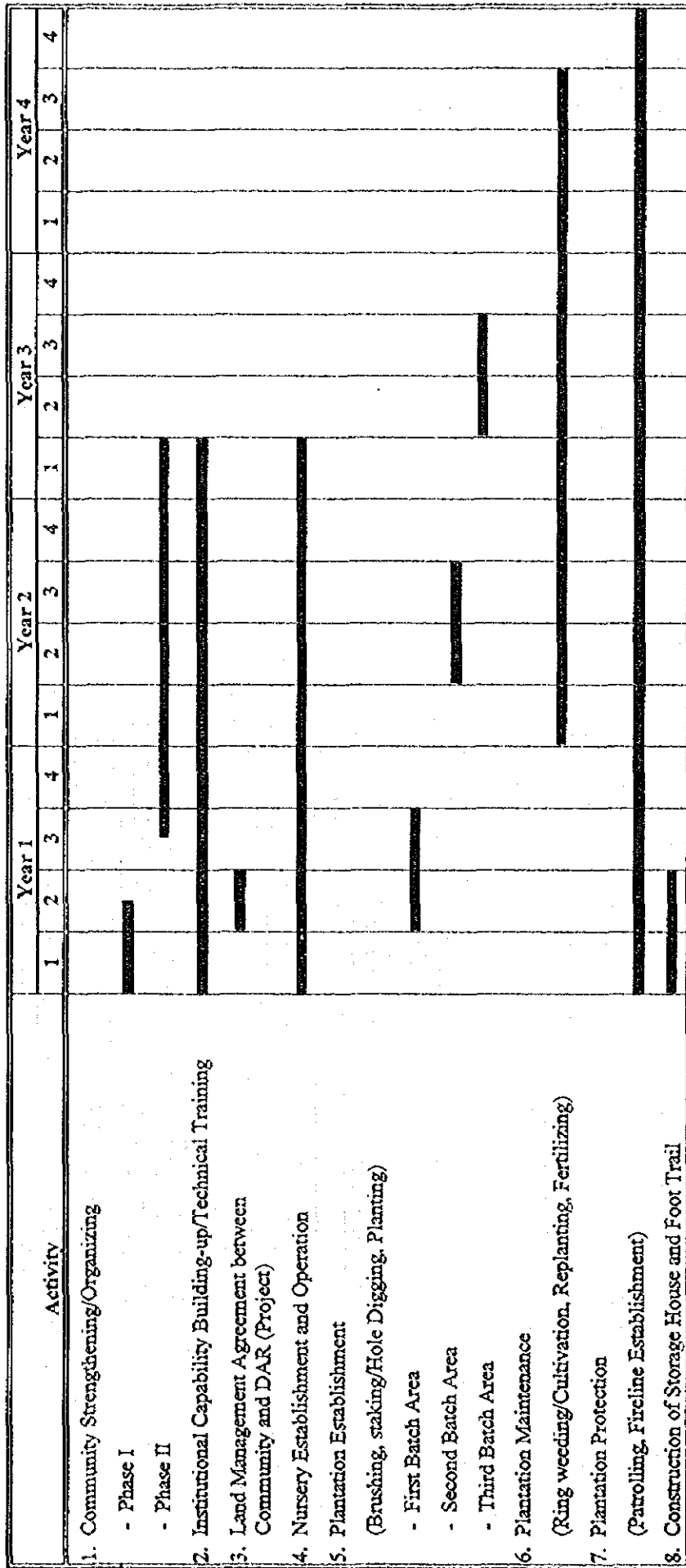
Table 7.2-3 Crop Production With Project (Case-3)

Crop	Area (ha)	Unit Yield (ton/ha)	Production (ton)	Remarks
1. Rice land, Irrigated				
Wet season				
- Paddy Rice	30	4.4	132	
Dry season				
- Diversified Crops (Garlic)	6	1.0	6	
Sub-total	36			
2. Rice land, Rainfed				
Wet season				
- Paddy Rice	58	3.1	180	
Dry season				
- Diversified Crops (Garlic)	23	3.0	69	
Sub-total	81			
3. Upland				
Wet season				
- Corn	9	3.0	27	
- Root Crops (Sweet Potato)	21	6.8	143	
Dry Season				
- Mungbean	12	0.9	11	
Sub-total	42			
4. Orchard				
- Mango	5	17.9	90	
- Banana	3	10.0	30	
Sub-total	8			
5. Contour Farming and Forest				
- Cashew Nut	59	20.0	118	15th Year
- Banana	10	10.0	120	3rd Year
- Corn, Wet Season	17	3.0	51	
- Beans (Peanut), Wet Season	10	0.9	9	
- Beans (Mungbean), Dry Season	10	0.9	9	
- Nurse trees (Kakawate)	14			
Fuelwood		9.0 cu.m	126	4th Year
- Forest Trees (Bagras)	92			
Fuelwood		11.6 cu.m	1,067	6th Year
Poles		25.0 cu.m	184	10th Year
Sawlog		64.4 cu.m	5,925	14th Year
- Forest Trees (Bagras)	62			
Fuelwood		7.0 cu.m	434	6th Year
Poles		8.2 cu.m	508	15th Year
Sawlog		77.9 cu.m	4,830	25th Year
- Hedgerow (Flemingia)	7			
Sub-total	281			
Total	448			

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

Source: JICA Study Team

FIGURE 7.2-4 SCHEDULE OF ESTABLISHMENT FOR CONTOUR FARMS



3) Animal Husbandry and Inland Fishery Plan

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

(a) Carabao Development Plan

This program will be 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.

Carabao Dispersal

There will be female pregnant F1 carabaos to be distributed to qualified and interested farmers' beneficiaries, which are selected based on proper criteria. These carabaos shall be introduced from PCC at Central Luzon State University (CLSU). Training of farmers in the Area is also supported by the PCC at Mariano Marcos State University (MMSU).

As an alternative plan of animal breeding, raising of pigs is considered. However, this will be carried out for only a part of beneficiaries, and this situation does not meet the overall requirement of the Project plan. Therefore, the carabao dispersal plan will be recommendable. Furthermore, carabao dispersal is vigorously being promoted by PCC, so that the plan is being considered to be expanded in the Area.

Carabao Mini-Breeding Station (Bull Camp)

Since 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 of one of group and better still, and (iii) teaser bulls be provided. A bull keeper will be trained at PCC and will be responsible for feeding the bull. 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 harder and more resistant to diseases and high temperatures than the exotic breeds. Furthermore, their meat and eggs are generally regarded as of better flavor. Consumer demand is increasing 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 technique. With the incubator, the farmers can easily produce significant number of chicks.

4) Post-Harvest and Rural-Industry Plan

Post-harvest plan in the Project Area should be made based on the solution and reduction of the present problems and constraints, and be formulated on the premise that necessary infrastructure and farming system development plan should be properly implemented and the production of crops should be increased. The present farming and institutional development process and post-harvest conditions should be considered. As the development of post-harvest may depend on the development of farming technology, it is difficult to introduce full-scale development at one time, and it should be conducted gradually, not promoted everything simultaneously. Therefore, the post-harvest plan for the Area 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 farmers' income.

Some Hard Infrastructure Measures

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

- All-weather farm-to-market roads,
- Conduct continuous organizational, managerial, and technical training programs, and
- With all the 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, that is, one to three ARCs producing the same high value crops either to create a demand or respond to market demands.

As the major crops to be introduced in the Area are rice and corn, the farming plan should consider the post-harvest equipment and facilities popular or available nearby the Area.

Pre and Post-Harvest Plan

The production volume of rice and corn will be increased by about three times as compared with the present production (312 ton/year of rice and 147 ton/year of corn) concurring with farming development plan (Case-3). With this development, the availability of work force for harvesting seasons may become a problem. The introduction of harvesting equipment and facilities might solve these deficiency problems. (refer to Table K.2-5)

Harvesting, threshing and drying facilities will be efficient for improvement of quality and reduction of harvesting and processing losses. The number of manual thresher for rice to be proposed in the plan will be increased, according to the farmers' intention and considering present farmers' skills and conditions. One multi-purpose drier 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 for the multi-purpose dryer and warehouse in the same size as rice or corn agro-industry center, are shown in Figure K.2-1 and K.2-2. Simple mechanical dryer will be introduced to obtain high quality seeds by farmers themselves. Moreover, agricultural machines introduced shall correspond to the initial farming development plan. These equipment are animal-drawing type machines and are more suitable for developing farming system.

Agro-Industry and Processing

Production volume of rice in the Area will be increased by this development plan of infrastructure and farming technology. It will produce sufficient volume for the introduction of rice agro-industry center, such as small scale rice milling plant with quality control equipment. However, since two units of privately owned small scale rice mills are already available in the area, only quality control equipment is proposed.

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

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

- Better access for collecting and forwarding the production,
- Flat and enough space for installation of equipment,
- Near the production area and farm residence, and
- Preferable idle or public land,

However, further confirmations will be needed at the detailed design and implementation stages. It is also necessary to obtain the legality of land ownership.

Plans for other farming and institutional development of agro-industry and processing, such as, bamboo furniture making, bamboo shoots processing and dry mango processing shall be considered in the future, according to the farming development. However, since development shall be conducted step by step, bamboo handicraft and dry mango processing should now be started considering the future expansion of home made and cottage industry.

This development should be carried out by using the farmers' extra time and by means of the activities of WID. Initial stage of development requires training and instructions by government and related agencies concerned. This training should be conducted periodically. Special equipment and facilities are not required, except for small meeting and demonstration rooms (possibly inside the barangay hall) at the first development stage. The farmers' intention of development and cooperation are required initially.

The proposed development plan is shown in Table K.2-9.

5) Marketing Plan of Agricultural Products

The agricultural productivity and production at Sappaac Area will increase substantially, both in volumes and varieties with the proposed development plan. Besides having more agricultural commodities to sufficiently meet the home

consumption requirements of all households in the Project Areas, a much larger marketable surplus of both the traditional and new commodities is expected. This requires a good and efficient marketing plan wherein the objectives of increased income and improved qualities of life are realized.

The rural roads in the Project will facilitate the transportation of large volume of production surplus to the market at more favorable prices to the producers. The rural roads will provide opportunity for more traders from both inside and outside the Project Area to venture 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 product markets not earlier existing.

To cope with this expected large increases in the marketable surplus of agricultural and related products from the Project Area, 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 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 cooperatives in the Project Areas will help expedite the successful implementation of this institutionalization 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 a 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 period. Apart from the need for strong commitments from all concerned, supplementary measures on marketing activities, before 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 such as weighing scales, grain 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) Present Status of the Sappaac Area Agrarian Reform Beneficiaries Multi-Purpose Cooperative

The Sappaac Area Agrarian Reform Beneficiaries Multi-Purpose Cooperative is in pre-takeoff stage. Their activities are limited to operating consumer stores, lending money to the members and construction of small impounding dam in cooperation with DAR and DOST. At present, there is a problem of non-payment of debt by non-members and members in the consumer stores. Also, the program of lending money has been stopped. The membership ratio is 23 percent of the total farm households in the barangay. Considering such conditions, the cooperative needs organization and management capabilities strengthening, development of consciousness among the cooperative members and accumulation of cooperative's capital to widen business activities.

b) Development Plan of the Cooperative

To attain the above aims, five years development plan of the cooperative was made as shown in the following table:

Five Years Development Plan of the Cooperative

Year	Aims	Activities
1st and 2 nd year	<p>Strengthening of organization and management of cooperative</p> <p>Increase in production and introduction of cash crops</p>	<p>Education and training of cooperative members, officers and employees are needed to understand the aim of cooperative, the principles of cooperative, the right and the duty of the cooperative members and management of cooperative, etc.</p> <p>The cooperative concentrates their energies on increase production of crops and introduction of cash crops (cashewnuts) with improved technology and expanded area by project. The expected production increase with the project is 2.6 times in the lowland, 2.7 times in the upland and 9.0 times in orchard (cashewnut and banana).</p>
1st to 5 th year	<p>Promotion of group activities</p> <p>Fullness of consumer store</p>	<p>Group purchase of agricultural production materials such as improved seeds/ seedlings, fertilizer, agricultural chemicals and agricultural implement or machinery through cooperative, and group sale of agricultural products through cooperative.</p> <p>Kind of goods sold at consumer store should be expanded to the consumer needs.</p>
3rd to 5 th year	<p>Accumulation of cooperative capital</p> <p>Introduction of farming loan</p> <p>Fullness of own facilities for increased productivity and new business</p> <p>Development of market</p>	<p>Cooperatives promote accumulation of capital through collection of share capital from the members, recruitment of new members, thrift and saving of money, group activities and fullness of consumer store for the application of loans from the LBP/CDA.</p> <p>After completion of the cooperative's conditions for the granting of loans from the LBP/CDA, the cooperative will be introduced the granting of loan for improved farming.</p> <p>(i) Solar drier (ii) Warehouse for storing products and production materials (iii) Cashewnut processing facilities (iv) transportation (v) Tractor for pre and post-harvest operations.</p> <p>Development of market for the increased production such as cash crops, cashewnuts.</p>

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 and NGO and the assistance and support of other concerned agencies and institutions. However, the following activities based on experiences shall also be considered to achieve relative success and sustainability:

(I) 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 are necessary to get good attendance, and
- Since women play important roles in the family and community as a whole, 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 skills' development, business planning, and 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 savings' 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 (through the assistance of DAR, LGU and NGO assigned in the Project Area) 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 7.2-5.

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 are 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 a presentation of how to develop and organized cooperatives are presented in Annex H.

7) Institutional Development Plan

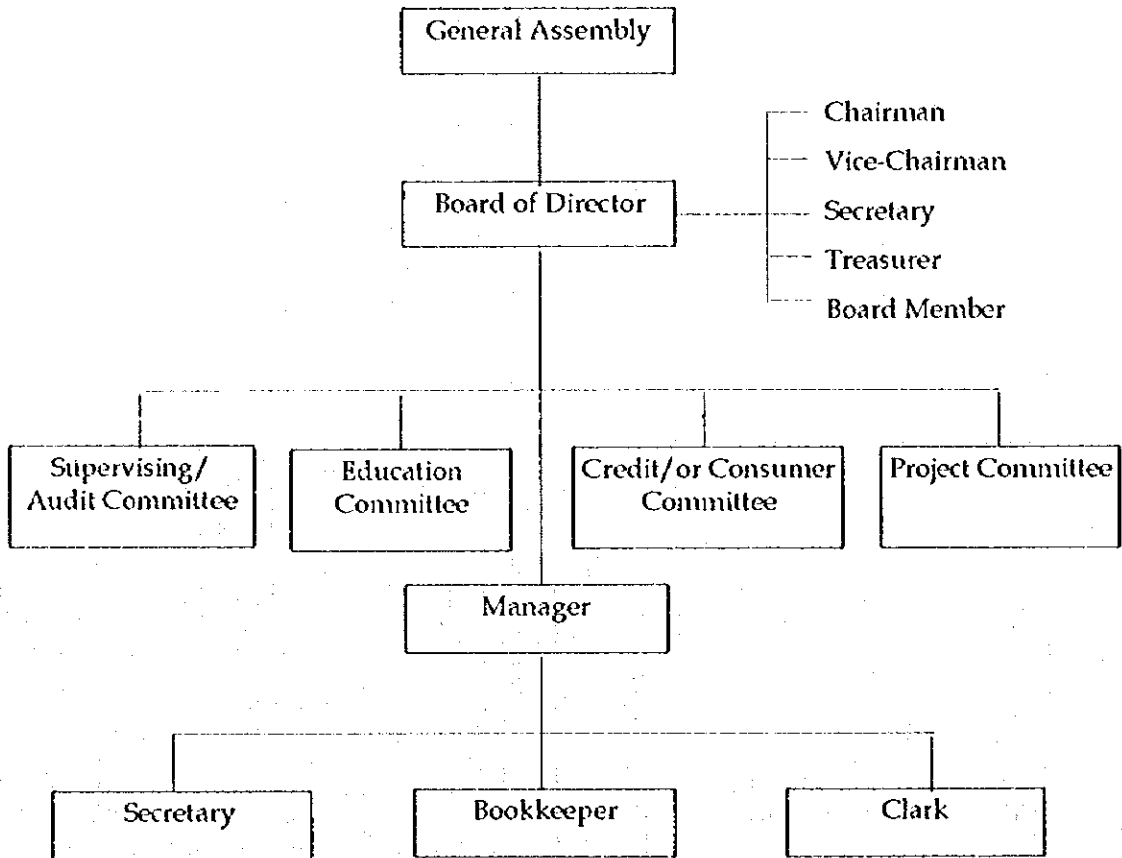
a) Institutional Support System

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

DAR plays the roles of coordinator and facilitator of the support activities that is to be carried out by the agencies concerned. For every specific activity to be undertaken, Memorandum of Agreement (MOA) will have to be executed. This will assure that activities for personnel component, time and necessary logistics are provided. An 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.). To serve the above purpose, DAR assigns one project officer to each office of Central DAR, DAR Region-CAR, PARO of Abra province and MARO of Bangued who is responsible for the implementation of the projects. The development facilitator (DF) and MARO of Bangued will become key person for the Projects (refer to 7.2.2).

FIGURE 7.2-5

PROPOSED COOPERATIVE STRUCTURE



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 MARO and development facilitator (DF).

(2) Technology Support

The main crops/trees to be introduced in Sappaac Area are rice, corn, garlic, sweet potato, mango, peanut, mungbean, banana, madre de cacao, acacia, cashew and mahogany. Technologies such as suitable variety selection, proper time of seeding and transplanting, necessary input, yield expected, crop rotation, farming and farming income expected, etc., will be supported by Baguio NRDC, CIARC and the ROSs of Ifugao, Luna, Rizal and Tayum. For carabao raising technology, PCC has the responsibility.

(3) Agricultural Input Materials

Before the start of farming, the DAR development facilitator (DF) shall discuss with the farmers the amount of agricultural input materials to be provided by the agencies (seeds, seedlings, amounts of fertilizer and agricultural chemicals, etc.). On the fruit seedlings, the number of seedlings to be provided by each agency shall be arranged taking their production capacities into account. The fruit seedlings must be grafted, virus free seedlings and the best variety to survive in the market competition in the future. The price of the production materials should be the cost price of production. The main agricultural materials to be introduced in the Project Area and their respective suppliers are shown in Table II.2-6.

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

(4) Extension and Training

Technology transfer is being carried out by the Regional DA, PAO, MAO, ATI, RIARC and its ROSs in their close linkage. Hence, technology developed at research and development agencies are directly or indirectly transferred by 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 shall provide techno-demo farms on advanced lowland and upland farmings with SALT in the Project Area as shown in Table H.2-6.

Farmer's Training

The training on cooperative management is needed because the activities of the Sappaac Area Agrarian Reform Beneficiaries' Multi-Purpose Cooperative are dull. The training details are given in Table H.2-8.

(5) Provision of Farm Funds

LBP and CDA are the support agencies for farm funds. Before financing, however, the cooperative members need to receive training on cooperative management from LBP, CDA and others.

(6) Development of Markets

Provincial CDA and DTI shall support development of markets for cooperative through introduction of buyers, price information, guidance for supply of production inputs to members and the sale of their products.

(7) Strengthening of Farmers Organization

At present, the problem of the Sappaac ARB Multi-Purpose Cooperative is the non-payment of debt by buyers of consumer stores and non-payment of loan from the cooperatives. Therefore, educational training is needed for the enhancement of social consciousness among the members and the non-members.

8) Agricultural Credit System Plan

For the project to produce agricultural production and income at the rate of return shown in paragraph of 7.5.1 "Economic Justification," it is estimated that about 4.434 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 coops 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, bagalunga, 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.

7.2.5 Water Resources Development Plan

1) Development of Surface Water Resources

As explained in paragraph 7.1.5 "Irrigation Water Source," Sitio Pita has a relatively stable water source (small creek) even during rainy season only. Also, suitable impounding dam sites to store water are available near the water source.

For the development of water source for the Area, the creek water is diverted to the impounding dam using polyethylene pipe, and regulated in the dam. This water source could be used mainly for supplementary irrigation for paddy rice cultivation during the wet season. Also, a part of water source could be used for upland crop irrigation during the dry season.

2) Development of Groundwater Resources

About ten shallow wells are presently observed in the Area. In the beginning of dry season, this groundwater is used for upland crop cultivation in small areas using small-scale pump facilities.

In the project, however, the groundwater source development is not planned considering the high cost of operation and maintenance for pump operation.

7.2.6 Irrigation and Drainage Plan

1) Irrigation Plan

The Sappaac Area is located in the hilly and undulating topography with scarce water resources for irrigation. Hence, large-scale irrigation plan could not be expected in the Project. Since a small amount of water from the creek is presently available during the wet season, an irrigation plan using the water source 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 following proposed cropping pattern is prepared, after due consideration of prevailing conditions in the Area such as, climate, topography, soil condition, marketability of crop, etc.

Paddy Rice + Garlic

The detailed description of the proposed cropping pattern is referred to in paragraph 7.2.4 "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 climatological data. Since the ET_o values used by NIA, however, has been calculated applying Modified Penman method, the same method was 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 ET_o is shown below:

$$ET_o = C \times [W \times R_n + (1-W) \times f(u) \times (e_a - e_d)]$$

where;

ET_o = reference crop evapotranspiration (mm/day)

R_n = 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.

Necessary Data and Calculation of ET_o

As the basic data for calculation of the ET_o, 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(1) shows the calculated ETo for the Sappaac Area.

(3) Calculation of Crop Evapotranspiration (ETcrop)

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

The crop coefficient (Kc) of paddy rice is assumed to be one (1) throughout the growing season. Since the Kc values of upland lands are generally not available, the values were estimated at 10-day interval according to NIA's Guidebook. Table J.2-2(1) shows the procedures to obtain the Kc 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 is used for the design of irrigation facilities as canal and it's related structures. The latter, being equivalent to actual water demand is used for reservoir operation study mentioned subsequently.

In the estimation of 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 Vigan station in Ilocos Sur Province. In the Project, design rainfall with return period of 1/2-year is adopted considering characteristics of marginal areas such as size of area, topography and scarce water resources.

As a result, two year rainfalls equivalent to about a return period of 1/2-year, 1963 with 2,336.1 mm and 1988 with 2,364.2 mm are selected. About 80 percent of the selected two year average rainfalls is assumed to be the effective rainfall for the 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 according to the "FAO Irrigation and Drainage Paper 24." Especially, conveyance efficiency is decided at 90 percent because irrigation canal will be made by concrete flume.

For the Project, the following irrigation efficiencies were adopted:

Irrigation Efficiency

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

Table J.2-3(1) and Table J.2-4(1) show the estimated irrigation water requirements in cases of without and with effective rainfalls for Sappaac Area. As seen in Table J.2-3(1), the maximum diversion water requirement is calculated at $q = 0.99$ lit./sec./ha.

b) Reservoir Operation Study

A small-scale water impounding dam (reservoir) is proposed for the effective utilization of available water resources in the Area. The reservoir operation study at 10-day interval is analyzed to decide the most optimum irrigable areas in both wet and dry seasons.

Table J.2-5(1) shows the reservoir operation study in case of Sappaac Area. In the analyses, 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 (Qi)

Direct Inflow:

The direct inflow to reservoir from its catchment area should be based on actual monthly observation data. However, in the marginal areas, such data are usually not available. Hence, it is estimated using the following equation and assumptions:

$$\text{Monthly run-off discharge (Qr)} = R \times A \times C$$

where:

R = 10-day basis average rainfall in design year with return period of 1/2-year.

Two year average data will be used considering the rainfall fluctuation by year.

A = catchment area (ha)

C = run-off coefficient, 0.6

Diverted Flow:

Since the Sappaac Area has only scarce water, diversion of available water source located outside the Area is planned to the proposed reservoir through a pipeline. This diverted amount of water is decided to be 19 lit./sec for wet season from the middle of May to the beginning of November, and 5 lit./sec for remaining dry season. These are derived from actual observation at the site.

Diversion Requirement

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

Irrigation Area

Out of the potential cultivation area of 118 ha, the irrigation area is finally decided through trial calculation of reservoir operation study based on the following assumption and procedure. At first, the irrigation area is assumed. Then the frequency of water shortage is checked. If shortage of water will occur at the frequency of more than two times a year, the assumed area would be 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 from Reservoir (Q_o)

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

Effective Storage of Reservoir (S_e)

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 (Q_s)

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

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

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 based on the following rule:

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

Considering the results of the reservoir operation study, the irrigation area for the Sappaac Area is finally decided at 30 ha of wet season paddy and six hectares of upland crop (garlic) as shown in Table J.2-5(1).

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 newly established by the Project.

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. The result is not only low agricultural crop production, but also occurrence of water-borne diseases such as diarrhea and malaria.

For the Project Area, a drainage improvement plan is formulated.

a) Drainage Modulus for Paddy Fields

Design Rainfall

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

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

Design Rainfall for Drainage Plan

Return Period	Design Rainfall (mm/day)
1/2	233.6
1/5	296.1
1/10	335.6
1/20	372.5
1/50	419.2

Design Drainage Modulus

The design drainage module for the Sappaac Area is determined on the assumption that design rainfall will be drained within two days. Its modules is calculated at $q = 13.7 \text{ lit./sec/ha}$ (4.9 mm/hr) as shown below:

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

where; C = run-off coefficient, 0.8

$$q = 296.1 \text{ mm/day} \times 0.8 \times 1.0 \text{ ha} \times 10^4 / (24 \text{ hr} \times 3,600 \text{ sec} \times 2 \text{ days})$$

$$= 13.7 \text{ lit/sec/ha}$$

3) Design Flood Discharge for Spillway of Small Water Impounding Dam

The small water impounding dam is proposed in the Project for the purpose of supplemental irrigation water supply for the paddy fields. This paragraph deals with the calculation of design flood discharge of the spillway to be provided on the small water impounding dam.

Design Rainfall

The design rainfall in planning the required capacity of spillway for the small water impounding dam is decided at 419.2 mm/day. This is equivalent to a return period of 1/50-years, as indicated above.

The selected daily maximum rainfall of 419.2 mm/day is distributed at hourly maximum rainfall using the following equation:

$$R_1 = R_{24} \times (1/24)^k$$

where;

- R_1 = hourly maximum rainfall intensity (mm/hr)
- R_{24} = 24 hour rainfall to be distributed (mm/24 hr)
- k = 0.5

As a result, hourly maximum rainfall is calculated at 85.6 mm/hr as shown below:

$$\begin{aligned} R_t &= 419.2 \text{ mm/day} \times (1/24)^{1/2} \\ &= 85.6 \text{ mm/hr} \end{aligned}$$

Design Flood Discharge

The design flood discharge (Q_p) for spillway is calculated based on the following equation;

$$Q_p = R_t \times C \times A / 360$$

where;

Q_p = Design flood discharge (cu.m/sec)

R_t = Design rainfall (mm/hr)

C = Peak run-off coefficient , 0.8

A = Catchment area, 7.2 ha

$$\begin{aligned} Q_p &= 86.5 \text{ mm/hr} \times 10^{-3} \times 0.8 \times 7.2 \text{ ha} \times 10^4 / 3,600 \\ &= 1.4 \text{ cu.m/sec.} \end{aligned}$$

7.3 Physical Plan and Cost Estimate

7.3.1 Agriculture and Social Infrastructure Plan

1) Agricultural Infrastructure Plan

a) Irrigation Plan

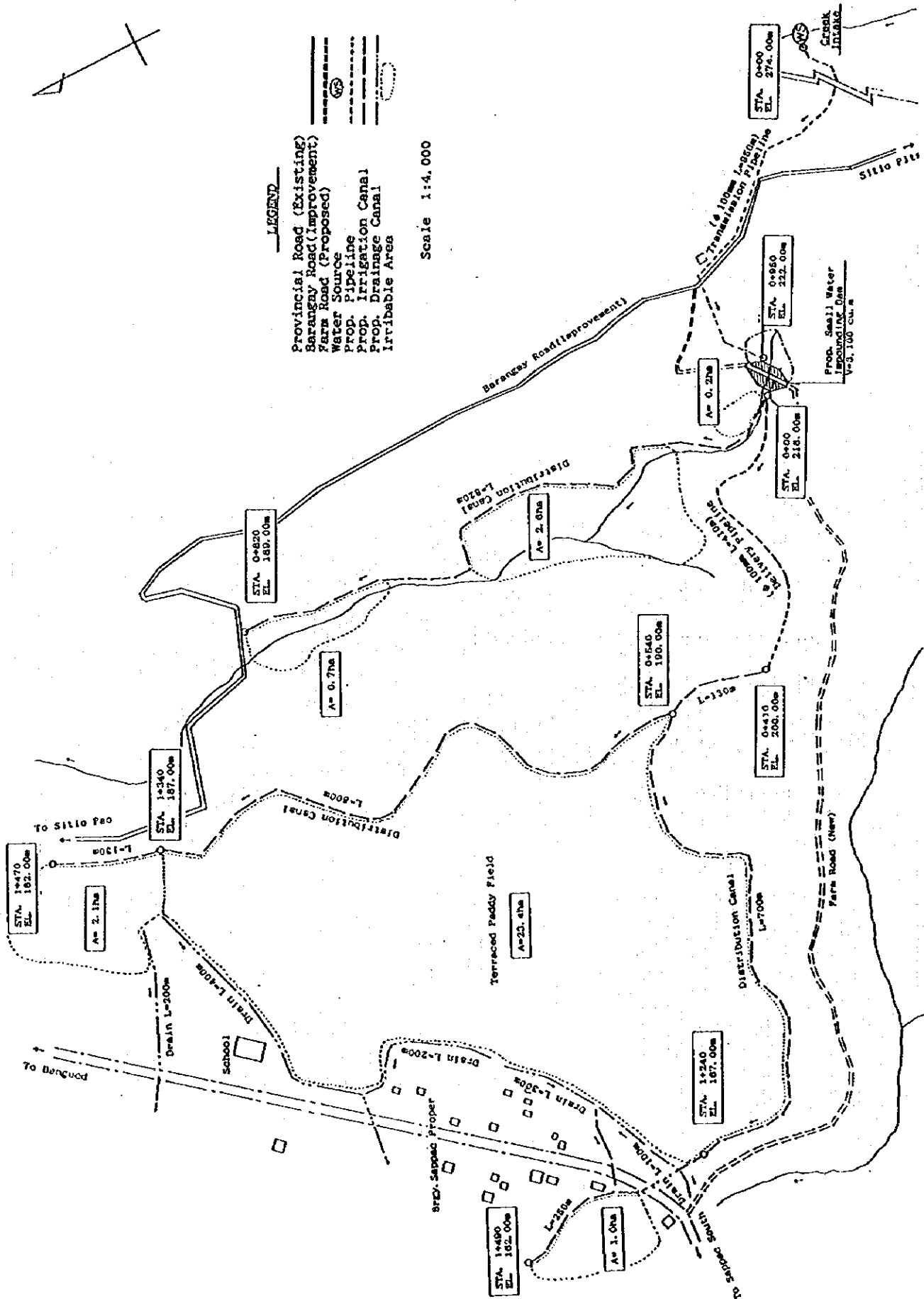
The physical features of the design of the irrigation system proposed in the Project Area are as follows:

- Creek intake
- Transmission pipeline
- Small water impounding dam (SWID)
- Delivery pipeline
- Distribution canals

The source of water for the irrigation system is the creek located at sitio Pita. Water from the creek will be transmitted to the small water impounding dam (SWID) through a pipeline. The site of the SWID is the existing water pond site. The SWID will be used for irrigation and fish culture purposes. Therefore, a reservoir storage will be put up for irrigation and fish culture. From the SWID, irrigation water is conveyed to the service area of 30 ha through delivery pipeline and distribution canals (refer to Figure 7.3-1). Farm ditches will not be required since plot-to-plot irrigation system is applied in the terraced paddy fields.

All structural dimensions are computed based on the Technical Model and Standard of Small Water Impounding Project issued by Bureau of Soils and Water Management (BSWM). A summary of the irrigation system is as noted below, and details are presented in Annex M.

- Creek intake : 1 place
- Transmission pipeline : L= 950m, PE pipe ø100mm
- Small water impounding dam (SWID)
 - Dam type : Homogeneous earthfill
 - Dam height : 4.40 m
 - Crest width : 5.00 m
 - Crest length : 52.00 m
 - Effective storage capacity : 3,100 cu. m
 - Design flood discharge : 1.40 cu. m/sec
 - Outlet pipe : ø 200mm * 25.00 m
- Delivery pipeline : L= 410m, PE pipe ø100mm
- Distribution canals : L= 2,830m
Concrete block canal



LEGEND

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

Scale 1:4,000

FIGURE 7.3-1 GENERAL LAYOUT OF SMALL WATER IMPOUND PROJECT IN SAPPAAC AREA

b) Drainage Plan

Earth lined drainage canals are planned and located along the lower edge of irrigated paddy fields. Drainage culverts with R.C. pipes are also planned where roads and foot path are crossing. Total length of drainage canal is 1,200m.

c) Farm Road Plan

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

- Sappaac Area proper -- sitio of Pita road : L= 1.30 km
(0.54 km with gravel and 0.76 km with concrete surface)
- Sappaac Area South -- sitio of Pita road: L= 2.00 km
(1.30 km with gravel and 0.70 km with concrete surface)

Road surfacing materials are gravel in the normal section and concrete in the steep section more than eight percent gradient. 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

Existing barangay road shall be improved/upgraded to function as a farm-to-market road and to ensure access to barangay proper and/or other barangays at the following section:

- Sitio of Pao -- Sitio of Pita -- Sitio of Sappaac Area South road: L= 6.80 km
(4.50 km with gravel and 2.30 km with concrete surface)

As to the farm roads, the steep sections over eight percent gradients are planned with concrete surface. Side road ditch with grouted riprap is also important structure to protect the roads from erosion by rain water. When the road crosses a small creek, the spillway bridge is convenient structure in the marginal area. Standard cross section of barangay road is presented in Annex-M.

Apart from the road improvement and upgrading, supply of road maintenance equipment such as dump truck, motor grader, road roller, pay loader, etc. to the municipal government is planned to encourage road operation and maintenance activities.

Besides the above, transport vehicles shall be provided to the barangay unit for the establishment of public transport system. Such vehicles shall be operated

and managed by the transport cooperative that is to be newly organized by 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 be 20m - 30m since existing deep wells with depths of only 10m - 15m are mostly dried up in the dry season. The location and number of deep wells required are as shown below:

- Sitio Sappaac Area proper : 3 deep wells
- Sitio Pao : 2 deep wells
- Sitio Sappaac Area South : 3 deep wells
- Sitio Pita : 1 deep well

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

c) Social Infrastructure Plan

The marginal area development to be successful must also include provisions for rural and social infrastructures to make small farmers productive and prosperous. It is vital to improve the lives and prospects of the rural population and make their environment favorable. Thus, building the human capital is a key factor in improving living conditions. It is, therefore, essential to give emphasis on the development of the basic social services and other social structures to build the human capital. This can be facilitated by providing and/or improving primary health care and basic education and other facilities and services 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/or rehabilitated as in the case of Sappaac Area. The construction programs must be supported by improvements on teachers, particularly preparedness for multi-grade teaching (a necessity in areas where school children'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 the 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 social infrastructure that is proposed to be provided is the multi-purpose center for the use of the beneficiaries for social, training and education purposes and others. This facility will be useful in promoting camaraderie, unity and understanding in the community. For areas with existing barangay halls and/or multi-purpose centers, upgrading and rehabilitation activities shall be undertaken including provision of facilities

For the Sappaac Area, the following other social infrastructure plans are proposed: rehabilitation and/or improvement of the elementary school, barangay health center and day-care center, provision of paramedical supplies/equipment and facilities and construction of multi-purpose center to house the barangay center with provisions for facilities for training center.

7.3.2 Cost Estimate and Disbursement Schedule

1) Conditions of Cost Estimate

Construction unit costs are determined at the current prices in September 1996 and divided into the foreign and local currency portions. The construction costs shall be then 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. Furthermore, 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 68.6 million pesos, and these costs are classified into responsible implementing agencies concerned depending on the project components, as shown in Table 7.3-1.

Furthermore, the estimated project costs should be disbursed based on the implementation schedule of the Project as described in paragraph 7.4.2 "Facility Construction and Equipment Supply" (refer to Table N.2-19).

Table 7.3-1 Summary of project Cost for Sappaac Area

Description	Total Project Costs			Related Implementing Agencies								
	FIC	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	5,441	6,243	11,684				5,933				5,750	
c. Rural Infrastructure Development	22,501	6,672	29,173			13,393			300		15,480	
d. Post-Harvest Development	800	1,826	2,626		33			2,593				
e. Institutional Development	470	200	670								670	
Sub-total	29,351	15,753	45,104		514	13,393	5,933	2,593	300	340	22,000	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)	1,468	788	2,255		58	1,523	674					
b. Administration Cost (10% of 1 & 2)	2,935	1,960	4,895	90	256	1,339	683	259	30	34	2,200	3
c. Consulting Services (refer to Table N.2-16)	2,799	4,305	7,104	7,104								
Sub-total	7,202	7,052	14,254	7,194	314	2,862	1,357	259	30	34	2,200	3
4. Land Acquisition Cost												
	0	528	528	528								
5. Physical Contingency (10%)												
	2,935	1,960	4,895	90	256	1,339	683	259	30	34	2,200	3
Total Project Cost (1 - 5)	39,488	29,135	68,622	8,710	3,132	17,594	8,870	3,112	360	408	26,400	36

Note : Detailed estimation is given in Table N.2-14.

7.4 Project Implementation and Operation and Maintenance Plan

Implementation of the Project would be divided into following four stages, and implementation schedule of the Project is given in Figure 7.4-1.

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

7.4.1 Function of Multi-Purpose Cooperatives

The multi-purpose cooperative will organize committees such as, education and training, operation and maintenance, post-harvest, production and marketing, consumer goods and credit lending and assistance, as shown in Figure 7.2-5 (refer to paragraph of 7.1.8 and 7.2.2).

7.4.2 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 built-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 support national agencies with providing necessary skills and competence to help support project implementation.

The Local Technical Working Group (LTWG) shall be organized for the social preparation of beneficiary community. It will also act as the lead person of

FIGURE 7.4-1 IMPLEMENTATION SCHEDULE FOR SAPPAAC AREA

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

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/or 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 local government, provincial and municipal agricultural officers and 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 Abra State Institute of Science and Technology in Lagangilan and the Benguet State University in La Trinidad, Benguet.

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-ups and social preparation works, two years will be needed as indicated in Figure 7.4-1.

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)
 - Cordillera Integrated Agricultural Research Center (CIARC)
 - Department of Environmental and Natural Resources (DENR)
 - National Post-harvest Institute for Research and Extension (NAPHIRE)
 - Philippine Rice Research Institute (Phil Rice)
 - 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)
- 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 skills' 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)

7.4.3 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 7.4-2, 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.

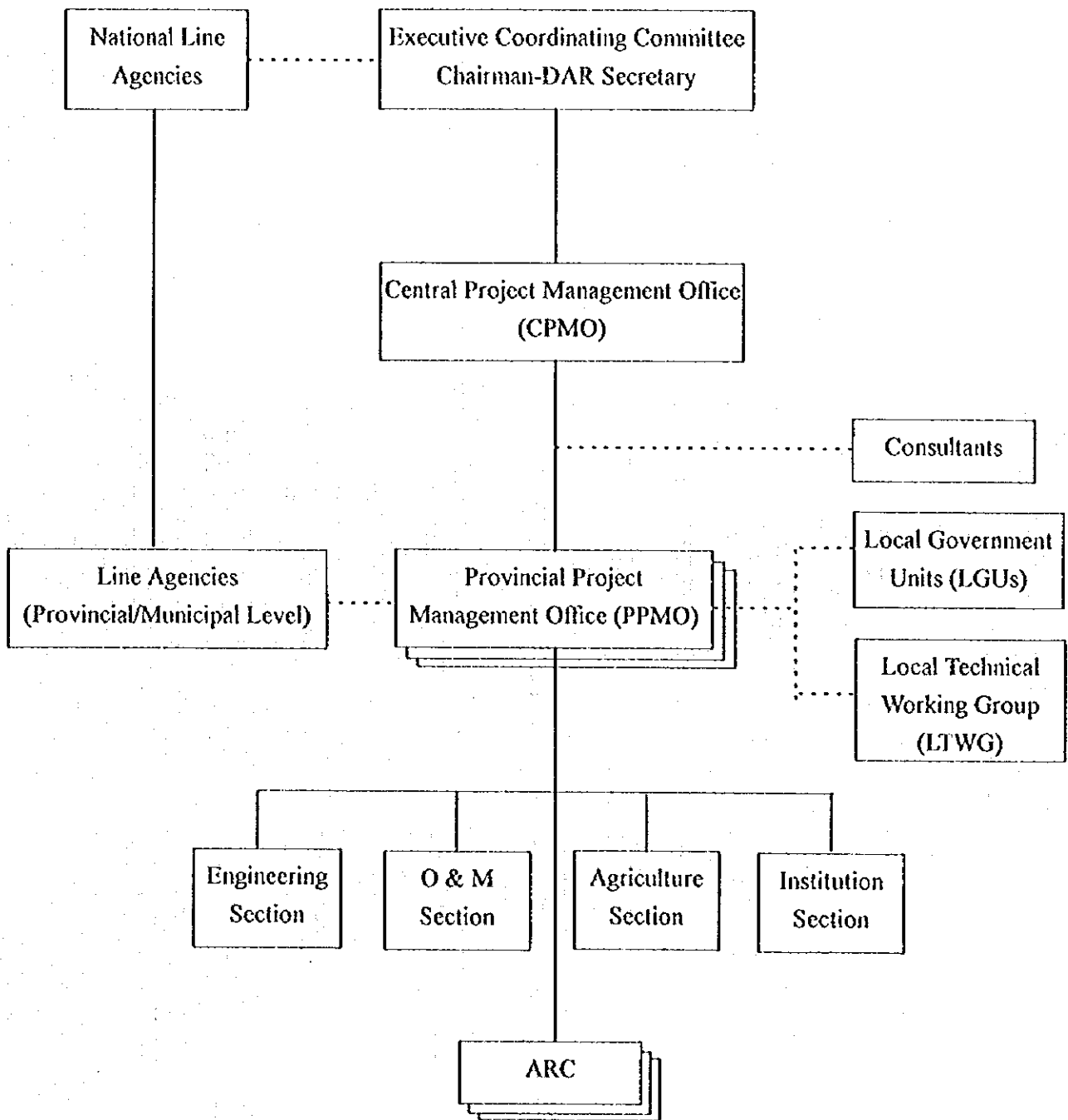
The highest policy making body for the Project shall be the Executive Coordination Committee (ECC), which shall be organized with DAR Secretary as the chairman. The ECC provides overall policy, direction and support, and shall also undertake linking and networking with other national and international 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.

Memorandum of Agreement (MOA)/Memorandum of Understanding (MOU) shall be forged among the different supplementing agencies.

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.

FIGURE 7.4-2 PROPOSED ORGANIZATION CHART FOR PROJECT IMPLEMENTATION



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

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. Therefore, 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, SWID, farm roads, deep wells, various social facilities, and others.
- Topographic survey for major facilities.
- Route survey for roads and canals.
- Geological investigations for SWID.

5) Consulting Services

Consulting services to be hired through the same manners in the case of 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 7.4-1.

7.4.4 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 for agricultural support services and institutional development shall be made by LGUs and NGOs. In the Project, four years inclusive of social preparation for the community are proposed as indicated in Figure 7.4-1.

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 of the implemented project. The local government units (LGUs) and farmers' organizations/cooperatives 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. As the people's organization, farmer's organization, multi-purpose cooperatives, water user's association (WUA) will be newly 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 operation and maintenance organization.

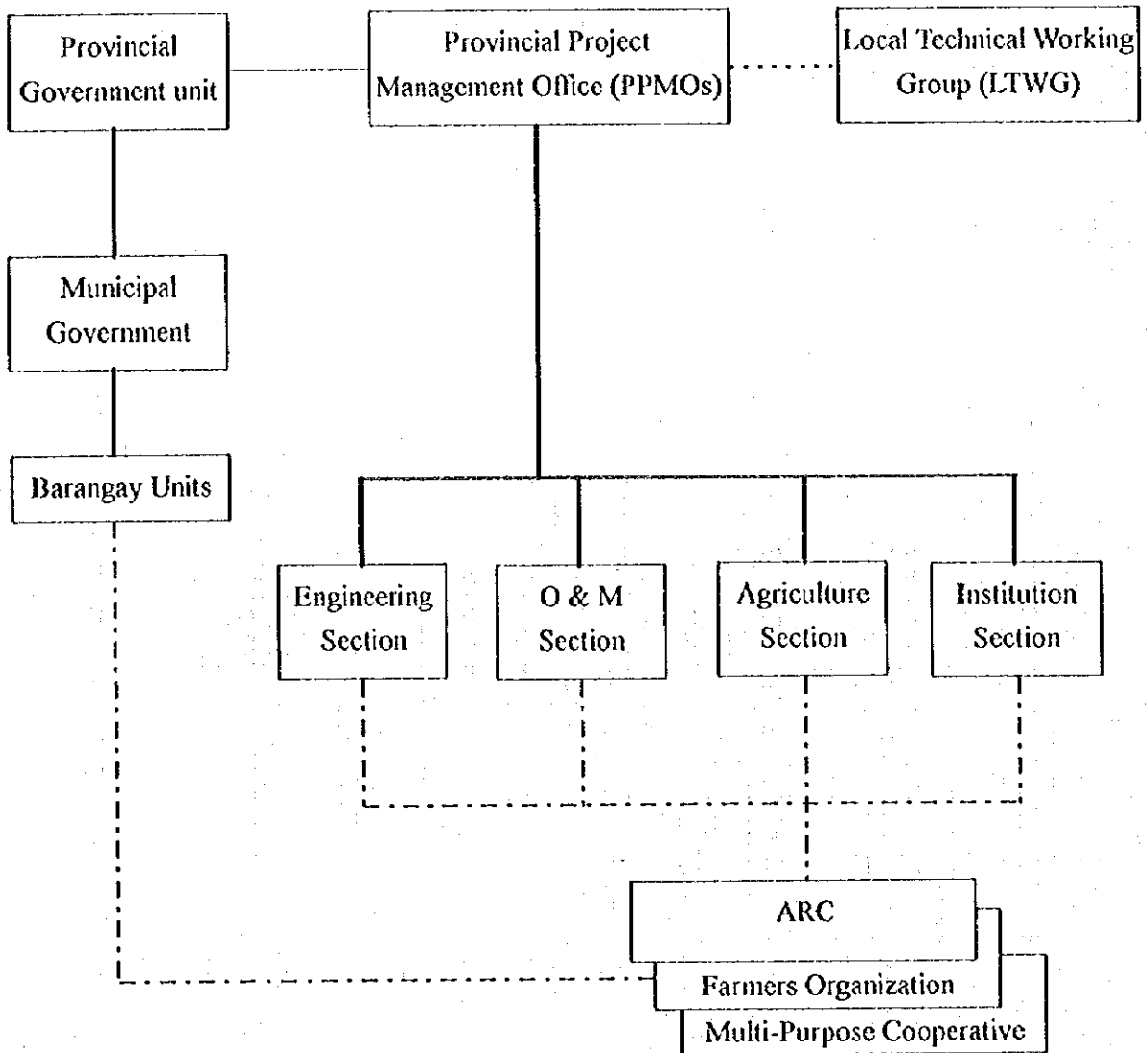
The proposed operation and maintenance organization chart is shown in Figure 7.4-3.

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)

FIGURE 7.4-3 PROPOSED ORGANIZATION CHART FOR OPERATION AND MAINTENANCE



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

- 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)
- 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' 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 beneficiary farmers' organization. Development Workers will be assigned by the cooperative organization to manage the nursery station. The LTWG and the municipal agricultural office and CENRO will assist in the development of the nursery. During the project implementation stage, the nursery shall supply adequate seedlings according to the established schedule of fruit tree-based farms and production or protection forest.

■ Demonstration Farm

To demonstrate a set of technology at the farm level, one demonstration farm is 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 as well as production/protection forest. The farm lots may belong to the above said Development Workers. It will be operated and maintained mainly by these farmers under the technical assistance provided by the LTWG.

■ Livestock and Poultry

Dispersal of pregnant carabao will be done 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' cooperatives, especially 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 cooperatives organization. The operation and maintenance of the incubators will also be made by the organization.

Agricultural Infrastructures

■ Irrigation Systems

The small water impounding dam 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 user' association.

The WUA will operate and maintain the irrigation facilities, supervise the equitable distribution of water to farmers, and collect the necessary irrigation fees or charge.

■ Farm Roads

Farm roads categorized into barangay roads will be periodically maintained by the beneficiaries' cooperatives in the Area. However, when heavy equipment will be needed for repairing the roads, the beneficiary's cooperatives shall use the equipment from the municipal office by paying necessary charges.

■ Farm Land Conservation

Most of the seeds and seedling or cutting to be used for the contour planting to protect soil erosion at the sloping and undulating farm land 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 the 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. Small-scale silting basin will be provided at the terminal of the drain systems.

Rural Infrastructures

■ Rural Roads

Rural roads playing important roles such 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 the provincial DPWH.

■ Rural Water Supply

Rural water users' association (WUA) will be established among households to be directly benefited by the rural water supply. The association will be organized by DAR-PPMO at the construction stage with the assistance of 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 associations and/or organizations shall be tapped to do work on a regular basis to imbue participatory work and responsibility among members of the community. Contributions for maintenance works may be for materials, equipment or tools, labor and food. The LGU and/or other governmental agencies shall be tapped to undertake work for major rehabilitation and/or repair works. Examples of operation and maintenance work that can be applied to the Project Area are as follows:

- Elementary school:
 - Major rehabilitation/construction - DECS/DPWH
 - Repair/rehabilitation work - 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 - PTA, barangay council

- Health Station/Center
 - Major rehabilitation/construction - MOH/DPWH
 - Repair/rehabilitation work - 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 beneficial farmers' cooperatives will be requested to do daily and periodic care for 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 in the vicinity 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. The operators' payment will be taken 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 are estimated to be about 463 thousand pesos per annum, as shown below:

Annual O & M Costs

Items	O & M Costs (peso/year)
- Agricultural Development	9,510
- Agricultural Infrastructure Development	116,850
- Rural Infrastructure Development	291,730
- Post-Harvest and Rural Industry Dev.	38,300
- Institutional Development	6,700
Total	463,080

The detailed estimation of O&M costs classified into the related implementing line agencies are given in Table N.2-23. According to the estimation, the required O&M costs for the LGU is 220 thousand pesos. This is equivalent to 0.8 percent of annual budget of 26.6 million pesos for the municipality of Bangued in 1996.

7.5 Project Evaluation

7.5.1 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 Philippines economy as a whole.

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

In either case, incremental benefits or the cash flows which are the streams of differences between the net production value (NPV) of the With-Project case and that 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

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

For the 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 much lower than the market wage rates. All others unchanged are multiplied by the factor of 1.0.

The financial and economic prices used in the financial and the economic analyses of the project are as shown in Tables 7.5-1 and 7.5-2 below.

Table 7.5-1 Financial and Economic Prices of Output for Sappaac Area

Crop			Financial Prices		Economic Price	
	Product	Unit	Sappaac	Average	SER	Peso
Field Crops						
Paddy		kg	9.00	8.26	1.00	9.00
Corn		kg	6.20	6.20	1.00	6.20
Peanut		kg	13.87	13.89	1.00	13.87
Mungbean		kg	24.72	20.74	1.00	24.72
Sweet Potato		kg	6.95	5.35	1.00	6.95
Garlic		kg	60.00	60.00	1.00	60.00
Squash		kg	5.04	5.27	1.00	5.04
Cassava		kg		2.58	1.00	
Fruit Trees						
Coconut	Copra	kg		8.99	1.00	
	Charcoal	kg	2.50	2.50	1.00	
Mango		kg	13.60	13.93	1.00	13.60
Banana		kg	3.32	3.32	1.00	3.32
Abaca		kg		21.22	1.00	
Cashew		kg	18.00	18.00	1.00	18.00
Rambutan		kg		15.91	1.00	
Durian		kg		30.22	1.00	
Jackfruit		kg	5.00	5.00	1.00	5.00
Forest Products						
Fuelwood	All	cu.m	85	80.00	1.00	85.00
Poles	All	cu.m	1,372	1,069.00	1.00	1,372.00
Pulpwood	Falcata	cu.m	2,478	2,064.00	1.00	2,478.00
Sawlog	Begalinga	cu.m	1,519	1,265.00	1.00	1,519.00
Sawlog	Bagras	cu.m	1,682	1,401.00	1.00	1,682.00
Sawlog	Gemelina	cu.m	3,076	2,562.00	1.00	3,076.00
Sawlog	Mahogany	cu.m	4,444	3,701.50	1.00	4,444.20
Livestock						
Carabao	Milk		35	35.00	1.00	35.00
	Cow/Bull	ea	4,500	6,710.00	1.00	4,500.00
Chicken	Meat	ea	60.86	62.95	1.00	60.86
	Eggs	ea	2.89	2.89	1.00	2.89

Table 7.5-2 Financial and Economic Prices of Inputs for Sappaac Area

Inputs		Unit	Financial Prices		Economic Prices	
			Sappaac	Average	SER	Peso
Seed/Planting Material						
Rice		kg	8.50	8.50	1.00	8.50
Corn	Hybrid	kg	60.00	60.00	1.00	60.00
Corn	OPV	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	300.00	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	Fert. egg	each	2.89	2.89	1.00	2.89
Fertilizer						
Urea (46-0-0)		kg	7.80	7.75	1.20	9.36
Muriate of Potash (0-0-60)		kg	4.66	4.63	1.20	5.59
Ammophos (16-20-0)-kg		kg	6.70	6.68	1.20	8.04
Complete (14-14-14) - kg		kg	6.85	6.84	1.20	8.22
Zinc Phosphate		kg	6.67	6.67	1.20	8.00
Pesticides						
Basudin 400EC		L1.0 ltr	280	279.90	1.20	336.00
Furadan 3G		G 34g	60	60.00	1.20	72.00
Decis		L1.0 ltr	453	447.25	1.20	543.60
Azodrin 202R		L3.0 ltr	319	315.00	1.20	328.80
Lannate EC		L1.0 ltr	415	411.25	1.20	498.00
Malathion		L2.0 ltr	251	248.29	1.20	301.20
Trigograamma		card	1.50	1.50	1.20	1.80
Herbicides						
2.4D-Amine EC		L2.0 ltr	467	462.69	1.20	560.40
Labor						
Land Preparation		mad	140	130.00	0.60	84.00
Others		md	70	65.00	0.60	42.00

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 with their financial and economic values. In arriving at the benefits, alternative land use plan 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 and environmental protection. Five cases are modeled from which one is selected for the derivation of the overall financial and economic returns. Case-1 excludes all the contour farming from the crop production plan. The remaining four cases include different levels of contour farming. Case-4 suggests only planting on land with 18 percent slope and below. Cases-2, -3 and -5 suggest different proportion of planted areas of selected crops during the first 3 years of the project. Finally, only Case-3 is selected based on its most relevance to the actual situation.

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

- 458 tons per year of incremental field crop production from paddy, corn, peanut, mungbean, garlic, sweet potato
- 809 tons per year of incremental fruit crop production from banana and mango
- 15,187 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 a period of 25 years
- 61,994 mandays and 49,800 animal days of incremental employment in crop production

Other benefits included in the analysis are the imputed costs of marketing and imputed values of 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, financial analysis is conducted for all the five cases while economic analysis is only made for the selected Case-3 of the project at Sappaac Area. The major outputs of the analysis are the economic viability of the project for its FIRR and EIRR.

Details of inputs, outputs as well as costs and benefits of individual enterprises used in the financial and economic analysis of the Project Area are shown in Annex O.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 numbers 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. One such benefit, which may later be quantifiable with improved data and analytical techniques, is 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 and so on.

All the above, together with the indirect and intangible benefits from improved incomes and more household expenditures on education, health and other social reforms of the people in the Project Areas, do exist and could make the rate of return to the project much higher than what has presently been 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 which in general 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.

Apart from those mentioned above, the cost of capital (money) is automatically taken care of in the process of analysis that values all economic items in terms of their present values. The conventional depreciation costs of capital items are also automatically taken care of by their present values. Inflation is 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 suggested growing of forest trees which either accrue some income in only a few years against every year expense, or do not provide any nominal income other than its environmental protection values. Kakawate and Flemingia are the two forest tree productions of 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 brought about by planting 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 Sappaac Area are given in Annex O.2.

5) Financial and Economic Internal Rate of Return

FIRR and EIRR are calculated for the Project Area. For detailed analysis, refer to Tables 7.5-3 and 7.5-4.

The analysis indicates an FIRR of 15 percent, and an EIRR of 12 percent for the Project.

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 of the Project are analyzed in terms of their sensitivity to said variations. A summary of the Sensitivity Analysis is as shown below.

Summary of A Sensitivity Test

Reduction in Agr. Income (%)	Increase in Agr. Costs (%)	FIRR (%)	EIRR (%)
0	0	15	12
10	0	13	10
20	0	11	8
0	10	14	11
0	20	14	10
10	10	12	9
Switching Values(15%)			
Income	(-)	3 %	None
Costs	(+)	9 %	None

7.5.2 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 modelled 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 are, the models for typical farmers in the Project Area.

Table 7.5-4 Economic Analysis for Sappaac Area

ENTERPRISE	Year 1																									
	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																										
Roady	30	477	624	655	672	679	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	
Roady	50	315	364	382	392	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	
Carrie	38	293	331	352	363	368	371	373	375	377	379	381	383	385	387	389	391	393	395	397	399	401	403	405	407	
Corn	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Soybean	21	363	451	556	622	689	744	794	839	879	915	948	978	1005	1029	1050	1069	1086	1101	1115	1128	1140	1151	1161	1170	
Peanut	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Munbean	16	140	184	207	231	255	278	300	321	340	358	375	391	406	420	434	447	459	470	480	489	497	505	512	519	
Peat Trees																										
Cashew	20	-170	-66	-65	-65	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	-68	
Manant	19	0	-120	-85	-55	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	
Mango	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Akavair	5	-28	-5	-1	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	
Pakras	31	-239	-58	-27	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	
Mahodany	21	-162	-29	-15	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	
Mahamira	20	0	-162	-29	-15	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	
Livestock																										
Carahao	1	-166	177	159	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	
Chickens	30	0	153	275	368	368	368	368	368	368	368	368	368	368	368	368	368	368	368	368	368	368	368	368	368	
Others																										
Rural Roads																										
Rural Water																										
Fish Culture																										
Post-Harvest Agrow-Industry																										
NPV with	839.25	1972.76	3215.82	3314.53	3374.93	3473.81	3521.75	3536.55	3543.94	3546.86	3547.69	3547.87	3547.79	3547.29	3546.17	3544.17	3541.17	3537.17	3532.17	3526.17	3519.17	3511.17	3502.17	3492.17	3481.17	
SPWV%	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	717.00	
Cash Flow less project cost	122.25	1255.76	2498.32	4367.33	4257.99	3158.81	3514.73	3519.33	3416.94	3293.86	3340.69	3333.17	3296.36	3283.42	3222.44	3180.83	3140.29	3094.17	3043.61	2988.29	2928.29	2863.16	2792.19	2715.00	2632.99	
Project investment	3.336	16.309	27.139	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	2.019	
Annual GRN																										
Economic cashflow	-3222.65	1956.46	2991.69	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	2999.309	
IRR =																										
NPV 15 =																										

With the view to providing agricultural land to the landless and the poor farmers so that their income disparities are minimized, 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 7.5-5. The analysis indicates the average annual return to family labor and management of 59,070 peso per farm, and 27,221 peso per hectare, of a typical farm at Sappaac Area having an average landholding of 2.17 ha.

7.5.3 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 the project objectives (general, development, long-term and specific, or 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 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 those of DA, LBP, NGOs and people's organizations in the Project Area should also be included in the monitoring process.

For evaluating the attainment of project's objectives, DAR should only participate as one among other parties assigned to jointly conduct it. NEDA, being the central economic planning agency of the Government should be another.

Table 7.5-5 Net Income of Typical Farm Household in Sappaac Area

ENTERPRISE	Year	Net Income over Variable and Fixed Costs (1000 peso)																			
		7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Field Crops																					
Rice	0.16	2,639	3,064	3,498	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	3,904	
Maize	0.31	1,658	3,215	3,634	4,452	5,070	5,070	5,070	5,070	5,070	5,070	5,070	5,070	5,070	5,070	5,070	5,070	5,070	5,070	5,070	
Coconut	0.03	327	460	574	688	797	897	997	1,097	1,197	1,297	1,397	1,497	1,597	1,697	1,797	1,897	1,997	2,097	2,197	
Corn	0.11	535	668	801	934	1,067	1,200	1,333	1,466	1,600	1,733	1,866	2,000	2,133	2,266	2,400	2,533	2,666	2,800	2,933	
Sweetpot	0.06	391	484	577	670	763	856	949	1,042	1,135	1,228	1,321	1,414	1,507	1,600	1,693	1,786	1,879	1,972	2,065	
Small Trees																					
Cashew	0.31	2,358	2,783	3,208	3,633	4,058	4,483	4,908	5,333	5,758	6,183	6,608	7,033	7,458	7,883	8,308	8,733	9,158	9,583	10,008	
Banana	0.07	1,361	1,654	1,947	2,240	2,533	2,826	3,119	3,412	3,705	4,000	4,293	4,586	4,879	5,172	5,465	5,758	6,051	6,344	6,637	
Mango	0.03	428	511	594	677	760	843	926	1,009	1,092	1,175	1,258	1,341	1,424	1,507	1,590	1,673	1,756	1,839	1,922	
Forest Trees																					
Kasuar	0.1	734	1,231	1,728	2,225	2,722	3,219	3,716	4,213	4,710	5,207	5,704	6,201	6,698	7,195	7,692	8,189	8,686	9,183	9,680	
Albizia	0.49	4,308	5,778	7,248	8,718	10,188	11,658	13,128	14,598	16,068	17,538	19,008	20,478	21,948	23,418	24,888	26,358	27,828	29,298	30,768	
Other																					
Swampy	0.33	2,191	2,616	3,041	3,466	3,891	4,316	4,741	5,166	5,591	6,016	6,441	6,866	7,291	7,716	8,141	8,566	8,991	9,416	9,841	
Livestock																					
Cattle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Area	2.17	0	2,527	5,855	7,685	7,685	7,685	7,685	7,685	7,685	7,685	7,685	7,685	7,685	7,685	7,685	7,685	7,685	7,685	7,685	
Net Income over WC/FIC																					
Net Income over WC/FIC	-5,495	15,277	19,667	23,171	24,878	26,133	25,451	31,638	35,712	48,747	48,018	36,240	48,292	148,353	48,180	43,317	39,498	41,390	41,390	42,552	
Net Income over WC/FIC	70,004	58,879	95,253	98,773	100,426	101,735	107,440	112,314	124,349	124,349	110,670	110,670	118,894	270,954	124,782	120,919	118,070	116,991	116,991	118,154	
Cost of Capital (15%)	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	48,352	
Cost of Land (5%)	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327	
Return on Family Labor/Management	10,424	29,199	35,574	39,099	40,742	42,051	41,373	47,560	52,634	64,669	53,940	51,162	56,214	161,275	61,239	58,102	55,390	57,311	57,311	58,474	
Average Annual Return/Farm	59,070																				
Average Annual Return/ha	27,221																				

Note: 1/ As per rule, a farmer/beneficiary is to pay 1.00 peso/ha meter of land allotted to them within 30 years at the interest rate of 5%. This is equal to a total amount of 60,000 peso/ha or an annual installment of 0.0075 60,000 = 5.25 peso/ha/yr. The same is applied after the 20th year as the opportunity cost of land.

Others may include those from outside agencies as universities and related institutions. Recently, efforts toward supplementing project evaluation with the process of Self Assessment by the implementing agency (in this case, DAR) have been experimented and found successful to a great extent. It, therefore, may be incorporated into the Project Monitoring and Evaluation plan of the Project.