8.2.2 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 beneficiaries of the Project are involved in all phases of the development process from the conception to planning and implementation stage for the Project to become sustainable.

The plan shall start at the beneficiary level where at the initial stage, problems, needs and interest are identified, prioritised 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 to other institutions at the local or provincial or 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 worker (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 form as 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/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, 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 Cofcaville 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, 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/presentation, the DAR will also solicit and confirm their participation in terms of facilities, resources, manpower, support and time 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 Technical Working Group (LTWG) to be proposed and (vi) allocation and inclusion of budget for the committed counterpart support, and

- After the formal 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, and the like 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 implemetors for the development of the Cofcaville Area.

a) Social Preparation of the Community

The levels of social preparation of the organizations in Cofcaville Area are at the low level stage. The cooperative has suspended its activities and is concentrating on the collection of debts and additional capital build-up to be able to comply with the Land Bank requirement for debt re-structuring. There is a high rate of non-payment of loan. The cooperative has a total debt with the Land Bank in the amount of about 400,000 pesos. Non-payment loan is due to the continuos' calamities that affected the Area, such as, drought and typhoon. Though some of the members and leaders of the various have undergone training and exposure on farming techniques and other income generating skills, they have not started practicing the technology learned due to lack of capital and labor.

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.

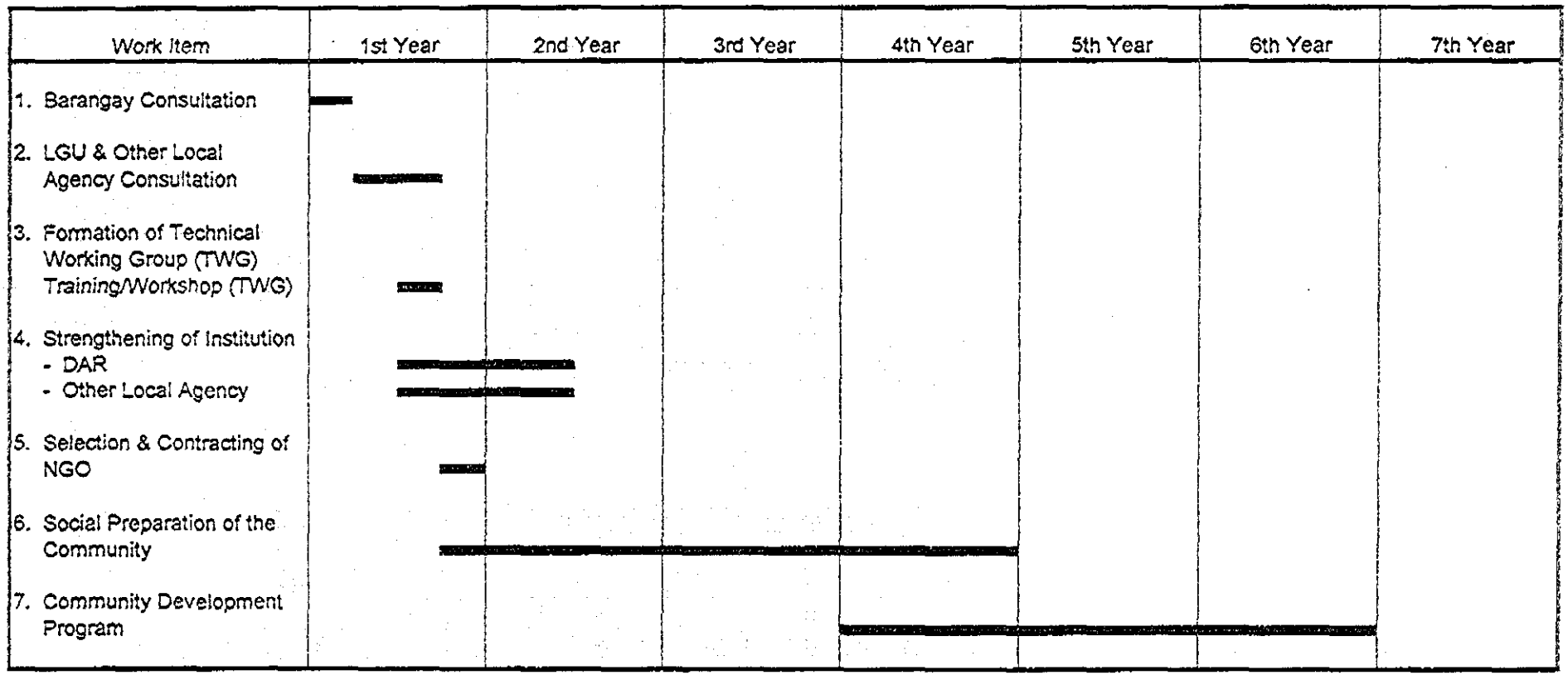
Earlier training conducted in the ARC area are inadequate, and therefore more social preparation will solve the problems being faced by the organization. However, training and seminar are not enough to make the organization successful. It is necessary that during the social preparation phase, the community organizer and/or DF shall 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 relationships 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. Figure 8.2-1 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. Therefore, there are a need to build-up and strengthen community capability for attaining self-sufficiency and management or their resources.

FIGURE 8.2-1 IMPLEMENTATION PLAN OF SOCIAL PREPARATION AND INSTITUTIONAL STRENGTHENING



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

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 available), 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, poultry and pig raising, community mobilization, for example 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 shall be rotated and every member shall 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 in general and the cooperatives and associations in particular. 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, to name a few.

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 as follows: 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 and 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.

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/seminar 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 seminar/workshop shall be the preparation of workplan for each agency/institution 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 Development Facilitator and NGO community organizer assigned in the area. Besides their activity to implement the programs conceived for the ARC during the seminar/workshop, they will 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.

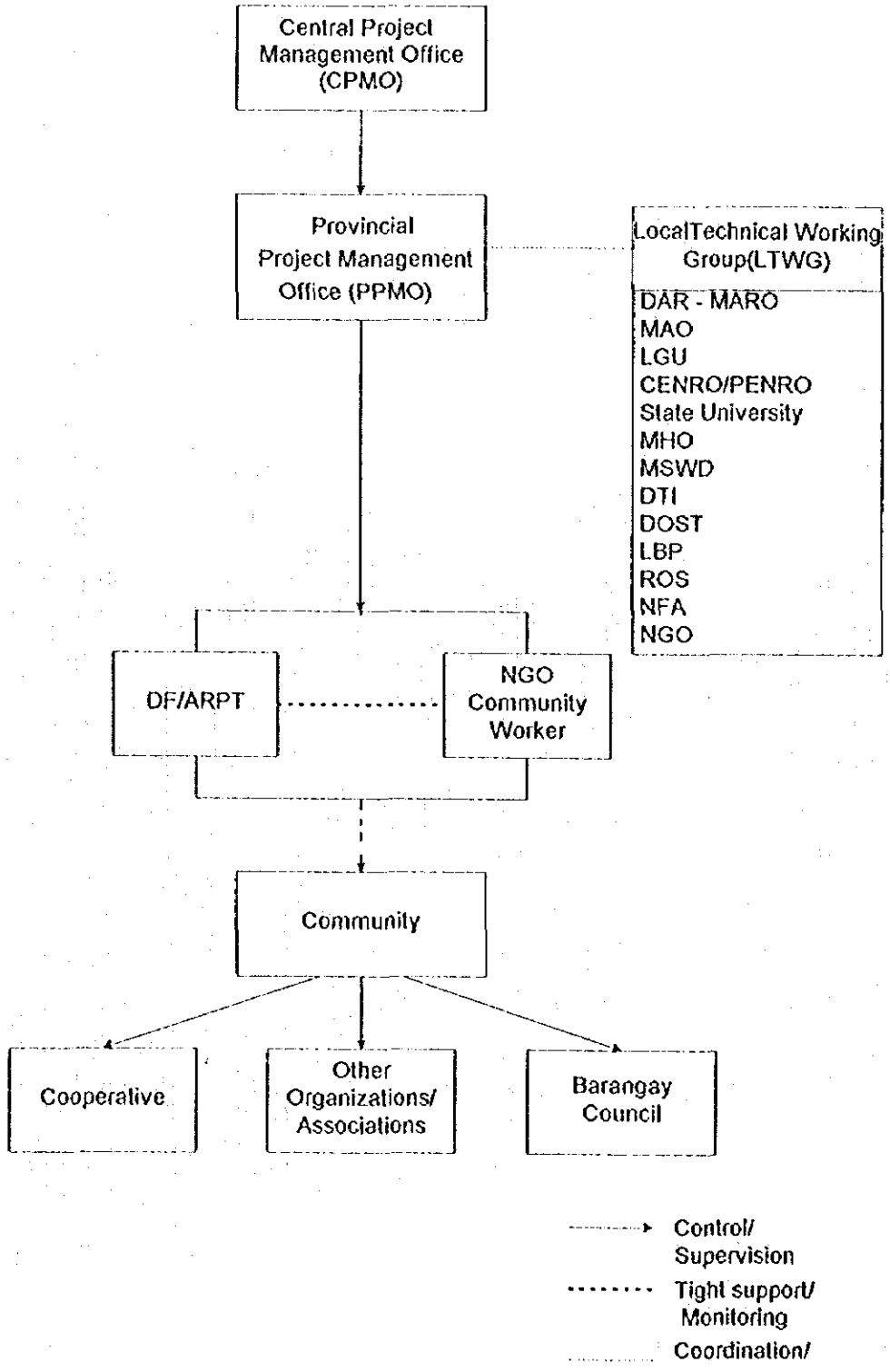
The LTWG will meet regularly on a monthly basis. The meeting will be presided by the DAR-MARO. During this meeting, progress, problems, needs, resolutions, etc. will have to be discussed. Issues and problems that cannot be resolved at this level will be presented to the PPMO for decision making and possible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

The structure of the institutional mechanism for the social preparation activity is presented in Figure 8.2-2.

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 levels be provided additional and necessary skills to keep up with the task of assistance in the development of the area. The

FIGURE 8.2-2 INSTITUTIONAL MECHANISM FOR SOCIAL PREPARATION



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.

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, MSWO, etc. must be strengthened and mobilized as a guarantee for continuity and sustainability. The LGUs must, therefore, acquire necessary expertise that will help 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 a continuo 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 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 together with the DF assigned in the area shall consult and discuss with the organizations in the community, to determine the other specific 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. It shall focus on but not limited to the following type of skills and education awareness programs.

- 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, specially 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 and provide income generating activities.

e) Equipment and Facilities Support

In the self-assessment of support agencies conducted during the field works, the support agencies 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 support be provided to the support agencies, specifically the DAR, MAO and the LGU. Also, some basic equipment support will have to be provided to the community. The barangay center that is the venue for meetings, seminars, forum, training, etc. will be provided with basic equipment and facilities. Motorcycles for mobility, computers, typewriters, projectors, television, video equipment shall be provided to the barangay community for the training support and information campaign.

f) Partnership with Business Community

The LGU or NG shall tap 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 8.2-1).

8.2.3 Land Use and Environmental Management Plan

1) Land-Use Plan

Although Cofcaville Area has relatively less steep land compared with the other Project Areas, there is no uniform area. The topographic and soil conditions are different by location. However, the slope is the most significant factor to be considered. Hence, the same five cases of land use patterns similar to Sappaac Area was formulated. Among these five cases, Case-3, which includes development of the existing cultivated area + contour farming in 8 to 18 percent slope + production/protection of forest in 18 to 30 percent slope is selected as the most appropriate land use (refer to Figure 8.2-3). Besides the reasons cited for Sappaac Area, two other reasons are cited in the selection for Cofcaville:

(i) Most of the soils in the area with the slope of 18 to 30 percent has infertile soils. The soils are hardly suitable to grow crops,
(ii) The land holding size for gross area per farm household is as large as 2.73 ha, which means Case 3 has adequate cultivation area.

About one third of the Project Area is covered by Ultisol. These are mostly located in steep areas. The 15-20 cm surface soil layer is stiff and compact clay. The fertility problems as phosphorous deficiency and fixation are associated with strongly acid soils. These lands are marginally suitable to grow upland crops. Although the soils in the other areas are more fertile, the soils are derived from Ultisol. Considering soil problems, conservative development is recommendable in the Project Area. The proposed land use is indicated in Table 8.2-1.

A supplemental irrigation for the seven hectares of converted land to rice land is planned to increase the production of staple food including paddy rice.

In 70 percent of the total area with eight to 18 percent slope, cassava will be introduced, considering the soil characteristics. In the remaining 30 percent of the total area, banana will be grown. This will cover the transition zone between the valley and the upland where moisture is very favorable due to seepage. In areas with slope of 18 to 30 percent, forest trees will be planted for production of timber.

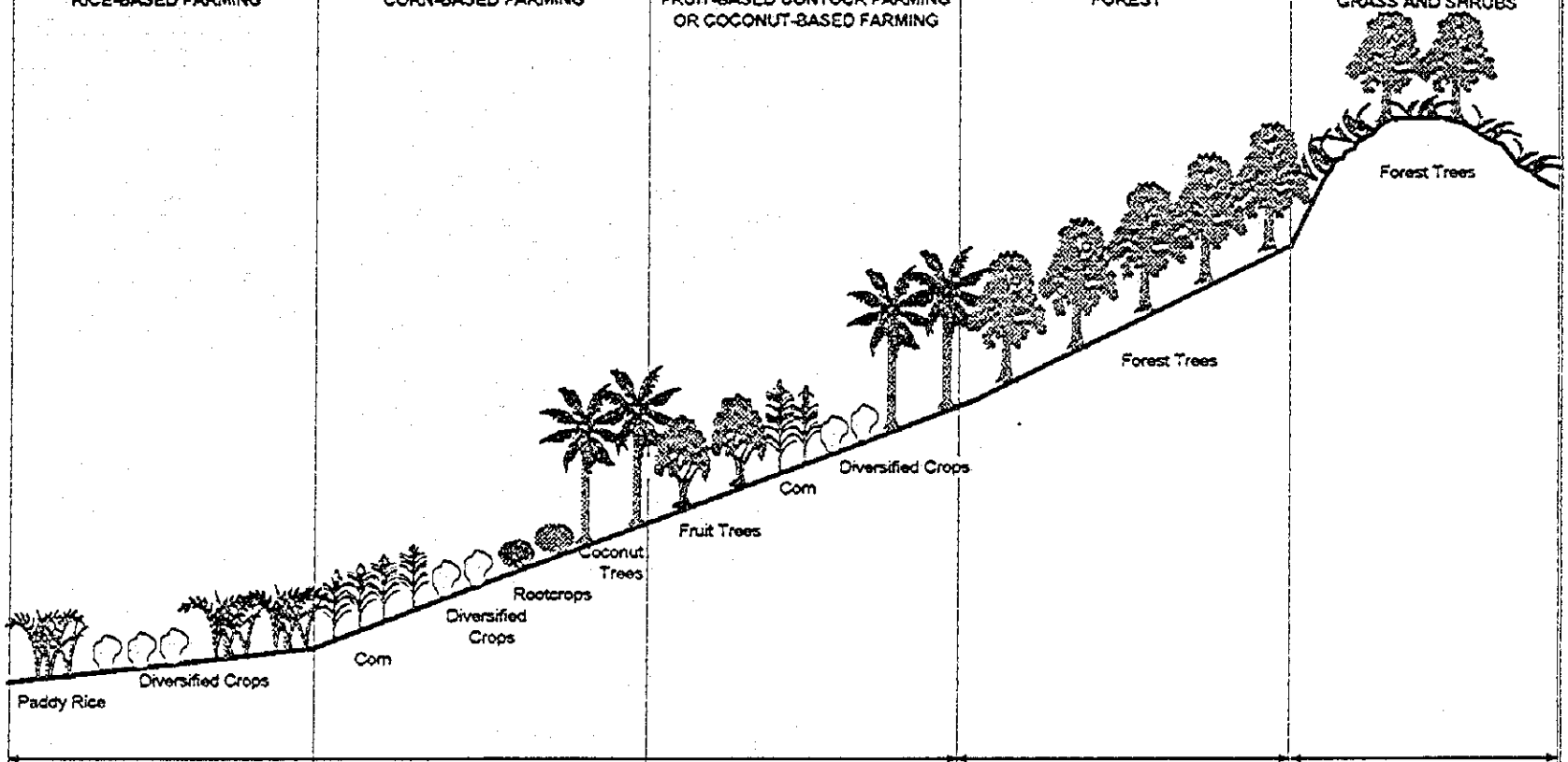
2) Environmental Management Plan

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

Table 8.2-1 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 interaction	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

FIGURE 8.2-3 PROPOSED LAND USE PATTERN (CASE-3)



Predominant Slope (%)	0-3	3-8	8-18	18-30	> 30
Proposed Crops / Trees	Paddy Rice Diversified Crops	Corn Beans Root Crops Coconut Trees	Coconut Trees Fruit Trees Diversified Crops Hedge Row Shrubs	Forest Trees Coconut Trees Fruit Trees	Forest Trees
Present Crops / Trees	Paddy Rice Corn Root Crops	Corn Rootcrops Coconut Trees	Coconut Trees Shrubs/Cogon Grass	Shrubs/Cogon Grass Coconut Trees	Shrubs/Cogon Grass Kaingin Forest Trees

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 countermeasures should be mainly undertaken by farmer's self-effort.

a) Soil Conservation

The components of the soil conservation plan both for the on-farm and off-farm are 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) to be used for 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 for farmers to observe other types of hedgerow, and pasture grasses, legumes or combination on the riser.

The on-farm soil conservation for various slope conditions would be simple and cheap method of soil conservation-based farming system. The off-farm structures will use grass waterway and check dam made of branches of trees and rock boulders in the farm.

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 farmlot 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 should have sediment traps along the channel made by digging about 30 cm deep 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 or star grass could be used instead of napier grass or both. The vertical distance between contour hedgerows is one meter (3-5 m surface distance between contours). 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. If there are shallow and small gullies on the farm, fill the gullies with soil during the construction of the hedgerows. 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 Kakawate 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. At an average spacing of five meters between contour lines (surface distance), one hectare upland needs 10,000 cuttings to form two strips' hedgerows. The cut grasses are piled between the hedgerows to serve as the temporary structure for minimizing downward massive movement of soil during high rainfall while the ground preparation by plowing is being done. Plant Napier stem cuttings on the riser at a distance of 30 cm. This will stabilize the hedgerows.

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 m 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 kakawati branches with three centimeter diameter. Bamboo split strips are weaved between pegs. Boulders or bush is placed on the upper side of the dam. The check dam will be closely space on steeper channel. This should be maintained after the heavy rain.

Large gullies should not be used as drainage canal unless check dams are well established across the channel. The drainage canal should be built on able ground away from the gullies. Trees should not be planted in the gullies below the high water level for it will obstruct the flow and could cause the under cutting of the side of the gully. Grass and piled up rock should form the check dam.

Replant the missing hills of hedgerows. Cut the hedgerows 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. Kakawate herbage when apply as green leaf manure contains 3.02 percent of nitrogen, 0.22 percent phosphorus, and 1.45 percent of potassium. The major branches from the sprouts could serve as fuelwood if cut every four years. At this cutting rotation, about 2-3 branches per plant each measuring an average of 1.5 m with a diameter of 6.5 cm can also be made available.

To minimize competition with the food crops, trim the roots that spread into the alley using a spade or plow. The napier, star, or guinea grass can 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. After a heavy rainfall event, repair any damage on the hedgerows.

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

If possible, cultivation of alternate strip should 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.

Plant perennial crops every third strip and borders of the farmlot. Only the spot for planting is 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, gravely, or with no more top soil, permanent crops as fruit or forest tree 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.

Table P.2-20 shows the marked reduction in soil erosion with different soil conservation methods. The piling of the cut grasses and shrubs between the rows of Kakawate cuttings will retain the transported soil materials in the hedgerows. The soil materials transported into the channel below the hedgerows will be deposited in the soil trap in the drainage canals. At full development of the Kakawate and the pasture grass, the expected reduction in soil loss will be attained. By regular cleaning the soil trap, the deposited soil will be returned to the adjacent field.

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

In the demonstration area, prepare 0.25 ha of farmlot by plowing and harrowing several times to have a fine seedbed. The existing weeds on the farmlot should reduce if not eliminated by allowing the weed seeds to germinate and kill by harrowing. Do these twice or three times to reduce the weed population before furrowing at 75 cm spacing to plant the pasture grass. Divide the farmlot into three

subplots. Napier and star grass stem cuttings and rootstocks of guinea grass will be planted at 40 cm spacing between hills. The grown-up plants will be used as materials for the hedgerows.

c) Establishment of Kakawate Stem Cutting Production

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

d) 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. Farmer' beneficiaries in the areas that will require soil conservation establishment would be organized for cross visit to the farmers' fields with SALT in nearby areas. The cross visit will expose the farmers to the benefits of and other issues on SALT establishment based on farmers' experiences. Those who were trained in the ISF program and started the hedgerows will be requested to be the facilitators of the training. The farms with initial hedgerows could serve as the learning laboratory during the training period. The training will include the use of A-frame, preparation of the land along the marked contour line, planting of kakawate stem cuttings or seeds and napier, star, or guinea grasses; and construction of contour ditches below the riser, silt trap, the drainage canal, and check dams. Work group will be formed to assist each other through labor exchange in establishing SALT.

These activities will be undertaken as a part of multi-purpose cooperative work.

e) 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 should start toward the end of the wet season. The spoil from the removal of the over burden should not be disposed into the waterways or creek to prevent sedimentation of the creek. It should be placed in areas free from runoff and protected by seeding grasses. The cut slope should have 1V: 3H dimension to have a relatively stable surface. Check dam should 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 should be done at 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, construction of gully plug using vegetative method should be done to minimize the cumulative impact.

f) 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 hills 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 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 ten meters 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 should 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.

g) Watershed Rehabilitation and Protection

The vegetation cover of the watershed of the small impounding dam on the creek in Cofcaville Area should be improved. This will be done to enhance the water yield to irrigate ten ha of rice field, to minimize sedimentation of the

reservoir, and 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. Bamboo, anahaw, and/or forest trees like mahogany that is harvested after a longer period by selective cutting can also be planted in the stream corridor. Farmers should 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 community so that they keep them for a long time.

h) Establishment of Wind Break

Since Cofcaville Area is frequently visited by strong typhoon, establishment of windbreak would be necessary to protect the crops of the farmers from wind damages. This will take about five meters of strip of land for the trees, shrubs and vines to occupy. This is spaced 100 m apart. Since each farmer has about two hectares of farmland, this would mean that only two strips of windbreak assuming the land is a square. At the same time, trees could be planted on the boundary of the farmlots to add more protection.

A proper combination of plants is necessary that consists of 65 percent shrubs, and vines and 35 percent tall medium trees. The windbreak should be dense in the lower part and opener in the middle and upper parts. The species to be used as windbreak must have the following characteristics:

- Have deep and well spread root system,
- Easy to propagate and maintain,
- Must not have a big and dense crown,
- Ability to coppice,
- Wind resistance, and
- Provide other economic benefits like food, fodder, etc.

The strips follow the contour lines like the hedgerows. The distance between strips is 100 m. Each strip would have five rows with one meter distance. The first and the fifth rows should be planted to shrubs. The three middle rows should be planted to medium and high trees in small clusters of 2-5 plants of the same species. A triangular method of planting shall be used with one meter spacing between plants.

<u>Suggested Species for Windbreaks</u>

Tall Trees (over 15 m)	:	narra, gmelina, molave, caimito, santol, sampaloc, teak, agoho
Medium Sized Trees (5-15 m)	:	kasoy, kamagong, banaba, ipil-ipil, Kakawate, duhat, akleng parang

Shrubs and Bamboos (up to 5 m) : dapdap, pigeon pea, aroma, kawayan, boho

i) Environmental Education

Supplementary curricular material on Environmental Science for the Cofcaville 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 Cofcaville 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 Quirino State College, University of the Philippines Los Banos-Institute of Environmental Science and Management, and DECS-Madella District will work together in the preparation of the curricular materials including teacher guide and the pilot testing in Madella Elementary School. The pilot-tested materials would be used for the elementary schools in the ARC and in the other marginal areas in the province and even in the region.

An environmental video tape for training of the beneficiaries at the multi-purpose building will be made available to the pupils of Cofcaville Elementary School.

j) Rural Life

Production of Medicinal Plant

The Barangay Health Workers and the Midwife assigned in the community should make an inventory of the available medicinal plants in the community. The Barangay Health Station should be encouraged to establish a nursery of medicinal plants in cooperation of 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 of the ARC on the use of the medical plants shall be conducted.

Public Health

Home garden will be improved by growing varieties of vegetables like lima bean, winged bean, ampalaya, and patola that 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 from the backyard and animal waste, placed in the basket and 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 also be a continuing program for the farmers.

The facilities of the Barangay Health Station must be upgraded and basic medical tools and equipment must 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 various components of the Project should monitor the environmental impacts of the project activities. This team is composed of the representatives of the farmer beneficiaries selected by the community, Sangguniang Barangay, MARO Office, municipal government, and of the Non-Government Organization assisting the Project.

The changes in the physical, biological, social, and economic environmental indicators must be established. This 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 discussion, decision, and action particularly against the negative impacts. As roll-on type of planning should be adopted such that the result of the monitoring and evaluation will be used in the next year targets.

8.2.4 Farming and Institutional Development Plan

1) Proposed Crop Selection and Cropping Pattern

In the irrigated rice land, double cropping of rice with mungbean will be introduced. The high yielding varieties of paddy rice like IR 60 and BPI Ri 10 and the improved variety of mungbean will be grown. In the existing cultivated land, rainfed rice land and the same orchard crops with same cropping pattern to the existing ones will be grown. Namely, paddy rice is grown in the rainfed rice land,

while corn (yellow corn), beans (peanut and mungbean) and root crops (sweet potato and gabi) will be planted as they are grown at present. However, mango plantation will be converted to banana, citrus and other orchard because mango is easily damaged by long wet season.

Cassava plantation will cover 70 percent of the area with slope of eight to 18 percent, while banana and other fruit trees will be planted in the remaining area of this land category. It is reported that a private company of feed has a plan to collect cassava for feed processing. As for banana plantation, mostly cooking banana will be introduced, as it is more resistant to typhoon damage than table banana. Nurse trees like kakawate will be planted along contour to protect the land from soil erosion in the banana plantation (refer to Figure F.2-42).

In the area with slope of 18 to 30 percent, such species of forest trees like mahogany and gmelina could be grown. Mahogany is planted as climax tree. On the other hand gmelina is nurse tree (the planting design is indicated in Figure F.2-43). In the proposed cropping pattern for production forest, some ten percent of the respective land is allotted for non-productive tree planting or fire line.

The proposed cropping pattern is indicated in Table 8.2-2. The overall cropping intensity in the proposed cropping pattern is accounted at 161 percent to the total cultivation area.

2) *Proposed Farming Systems*

The establishment of soil conservation-based farming system is essential in the marginal area. Therefore, not only the existing farming system of rice-based and corn-based farming system shall be improved, but also fruit tree based farming (banana and other kinds of fruit trees' plantation) and production/protection forest shall be introduced. These farming systems are *expected not only to cause increase agricultural production but also sustain* agricultural productivity. The nurse trees in the banana plantation will protect the land from soil erosion and improve soils. The production forest will not only produce timber, but also supply materials of organic fertilizer for the improvement of soils.

Since most soils in Cofcaville Area are acid and infertile, application of lime and adequate nitrogen and phosphate are essential. There is a need to apply adequate farm input and to improve farming practices as shown in Table F.2.-28 and Figure F.2-48 to F.2-55.

The unit yield and production with Project are estimated as shown in Table 8.2-3. A nursery station is proposed to supply quality seedlings of fruit, nurse and, forest trees at the barangay level. The proposed layout of the nursery station is shown in Figure F.2-59. To demonstrate the improved farming system for rice-based, corn-based, fruit tree-based farming systems, and production/protection

Table 8.2-2 Proposed Cropping Area in Cofcaville Area(Case-3)

Kind of Land	Land Area (ha)	Cropping Intensity (%)	Crop	Season	Area (ha)
1. Rice Land					
- Irrigated	7	86	Paddy Rice	Wet	6
		100	Paddy Rice	Dry	7
		86	Diversified Crops(Mungbean)	Dry	6
			Sub-total		19
- Rainfed	32	100	Paddy Rice	Wet	32
		40	Paddy Rice	Dry	13
			Sub-total		45
Total	39				64
2. Upland	163				
- Rainfed		95	Corn	Wet	155
		5	Root Crops (Sweet Potato*1)	Wet	8
		76	Corn	Dry	124
		10	Beans (Mungbean)	Dry	16
			Sub-total		303
3. Orchard	23	100	Fruit Trees (Banana)		23
4. 8-18% Slope Land	89	70	Cassava		62
		27	Fruit Trees (Banana)		24
		3	Nurse Tree (Kakawate)		3
			Sub-total		89
5. 18-30% Slope Land	132		Forest Trees (Mahogany*2)		
		90	Mahogany		119
		90	Gmelina		119
			Sub-total		238
6. Over 30% Slope Land *3	16				
7. Other Land	28				
Total	490				717
Overall cropping intensity = 717 ha./(490 ha - 16 ha. - 28 ha,)				=	160.8%

Note: The crops in the parenthesis show the respective representative crops.
*1 including gabi and cassava
*2 including narra
*3 including 13ha of land for fireline in 18-30% slope land

Source: JICA Study Team

Table 8.2-3 Crop Production With Project (Case-3)

Crop	Area (ha)	Unit Yield (ton/ha)	Production (ton)	Remarks
1. Rice land, Irrigated				
Wet season				
- Paddy Rice	6	4.9	29	
Dry season				
- Paddy Rice	7	5.5	39	
- Beans (Mungbean)	6	0.9	5	
Sub-total	19			
2. Rice land, Rainfed				
Wet season				
- Paddy Rice	32	3.5	112	
Dry season				
- Paddy Rice	13	3.5	46	
Sub-total	45			
3. Upland				
Wet season				
- Corn	155	3.5	543	
- Root Crops (Sweet Potato)	8	6.8	54	
Dry Season				
- Corn	124	3.5	434	
- Beans (Mungbean)	16	0.9	14	
Sub-total	303			
4. Orchard				
- Banana	23	10.0	230	3rd Year
5. Contour Farming and Agroforestry				
- Cassava	62	9.6	595	
- Banana	24	10.0	240	
- Nurse trees (Kakawate)	3			
Fuelwood		9.0 cu. m	27	4th Year
- Forest trees (Gmelina)	119			
Fuelwood		10.8 cu. m	130	7th Year
Poles		20.8 cu. m	2,475	10th Year
Sawlog		51.7 cu. m	6,152	15th Year
- Forest trees (Mahogany)	119			
Fuelwood		7.0 cu. m	126	6th Year
Poles		8.2 cu. m	976	15th Year
Sawlog		77.9 cu. m	9,270	25th Year
Sub-total	327			
Total	717			

Note: The crops in the parenthesis show the representative crops.
Source: JICA Study Team

forest, a demonstration farm shall also be established. The necessary facilities and items to establish the nursery and the demonstration farms are indicated together with the estimated cost in Table F.2-31 and F.2-32.

As shown in Figure 8.2-4, it is proposed to establish fruit tree-based farm and production/protection forest within four years as project implementation period.

3) Animal Husbandry and Inland Fishery Plan

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

(a) Carabao Development

This program is a joint undertaking of the Project Area (DAR) and Philippine Carabao Center (PCC). PCC network will support the dispersal program, training of farmers and establishment of community organization and cooperative. PCC shall also assists 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 Cagayan State University (CSU). Training of farmers in this Area is also supported by the PCC at Cagayan State University (CSU).

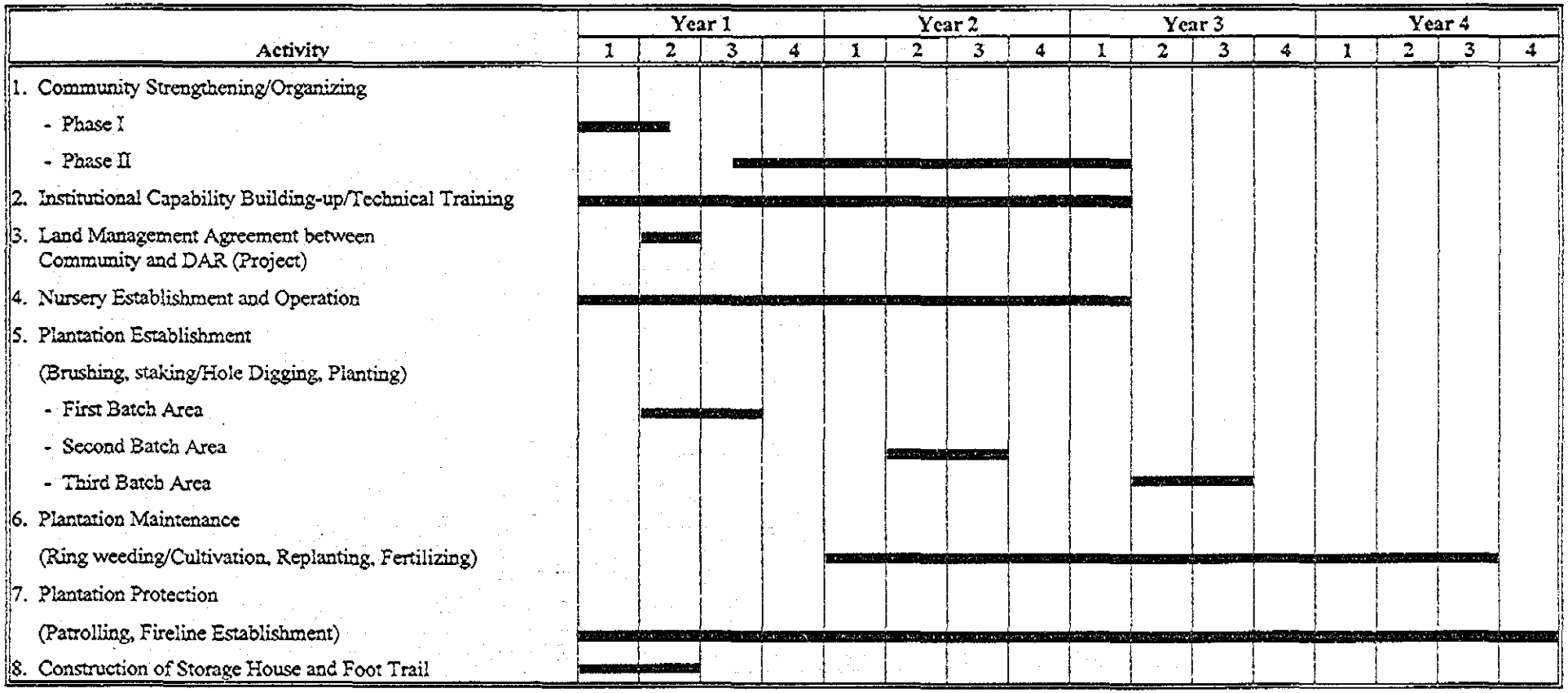
As an alternative plan of animal breeding in the Area, raising of pigs is considered. However, raising of pigs will be carried out for a part of beneficiaries, and this situation does not meet the overall requirement of the Project plan. Therefore, the carabao dispersal plan will be recommendable. Furthermore,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

Carabao Mini-Breeding Station (Bull Camp)

Heat or weak estrus is a serious constraints in carabao breeding. It is therefore necessary to (i) build a mini-breeding station, (ii) that females be 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 animal. 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.

FIGURE 8.2-4 SCHEDULE OF ESTABLISHMENT FOR CONTOUR FARMS



(2) 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 adapted to rural conditions, generally much hardier and more resistant to diseases and high temperatures than the exotic breeds. Furthermore, their meat and eggs are generally regarded as of better flavor. 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 techniques. With the incubator, the farmers can easily produce significant number of chicks.

4) Post-Harvest Plan and Agro-Industry Plan

Post-harvest plan in the Project Area should be based on the solution and reduction of the present problems and constraints and be formulated on the premise that necessary infrastructure and farming system development plan would be properly implemented and the production of crops 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. It should be implemented gradually, not promoted everything simultaneously. Therefore, the plan for post-harvest in the Area is 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 farmers' income and ultimately sustain some hard infrastructure measures are suggested as the above Chapter already mentioned.

- All-weather farm-to-market roads,All-weather farm-to-market roads

- Conduct continuos 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 Activity, for example, one to three ARCs producing the same high value crops either to create a demand or responds to market demands.

As the proposed major crops in the Area are rice and corn, the farming plan should be formulated taken into considerations the post-harvest equipment and facilities, that are popular near the Project Area.

Pre and Post-Harvest Plan

Since the production volume of rice and corn will be increased about two times compared with present production, that is, 225.4 ton/year of rice and 1,116 ton/year of corn based on the farming development plan(Case-3) (refer to Table K.2-6), and also the lack of man-power for harvesting seasons may become severe, the introduction of harvesting equipment and facilities might be able to solve these deficiency problems.

Harvesting, threshing and drying facilities will be efficient for improvement of quality and reduction of harvesting and processing losses. The threshing machine is one of the important equipment for reduction of the working hours. Thresher with prime mover is necessary because the production volume will become high enough. One multi-purpose dryer will be equipped in the warehouse for storage of input, to get better input, to obtain better selling prices and to store emergency food.

The plan of multi-purpose dryer and warehouse with 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 to be introduced will correspond to the initial farming development plan. These equipment are one tractor and some animal-drawing type machines suitable for developing farming system.

Agro-Industry and Processing

Production volume of rice and corn in the Project Area will be increased by project development plan of infrastructure and farming technology. It will produce sufficient volume for an introduction of rice and corn agro-industry center, such as small-scale rice and corn milling plant with quality control equipment. This agro-industry center might be effective for emergency food stock and provide better livelihood for all beneficiaries in the Area.

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 of the farmers' intentions and present conditions.

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

- Better access for collecting and forwarding the produce,
- Flat land and enough space for installation,
- Production area is situated near the land,
- Farmers' residences are located near the land,
- Idle land is preferable, and
- Public land is desirable.

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

Plans for other farming and institutional development of agro-industry and processing such as banana chip making will be considered in future according to the farming development. However, since the development shall be conducted step by step, banana chip making should now be started, considering the future expansion of the home made or cottage industry. This development should be executed by using the farmers' extra time and by means of the activities of WID. Initial stage of the development requires the training and instruction by the government and related agencies concerned, and such training should be carried out periodically. Special equipment and facilities are not required, except for the meeting and demonstration rooms, that is, inside space of the barangay hall, during the first development stage. However, the farmers' intention for development and cooperation are only required.

Proposed development plan is shown in Table K.2-9.

5) Marketing Plan of Agricultural Products

With the implementation of the Development of Agrarian Reform Communities in Marginal Areas, it is envisioned that agricultural productivity and production at Cofcaville Area will increase substantially, both in volumes and varieties. 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 by and for the farmers wherein the objectives of increased income and improved quality of life are realized.

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

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 is institutional development The program envisages the establishment of a strong and efficient farmers organization to facilitate or directly take action in moving as much as possible the increased agricultural production to the market at reasonable prices. Support services in the forms of training, information, and other technical assistance are already incorporated in the Project.

The existence of Barangay officers along with the cooperative in the Project 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 the role of technical and institutional supporters to them.

This institutionalization movement, particularly among the rural poor, has been known to be time-consuming and subject to strong resistance from those having benefited from the unorganized poor. In many cases in the past, efforts toward creating such efficient people's organizations failed to create sufficient impact within a foreseeable time. Apart from the need for strong commitments from all concerned, supplementary measures on marketing activities before full fledge operation of a strong people's organization has 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 establishments 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 scales, dryers, shellers, small trucks, etc., and

- The local functionaries of DAR, DA and other related departments are to regularly provide all price and market information to the villagers. They, together with other LGUs and NGOs, may serve as technical advisors to the people's organization on any marketing problems of their produce.

6) Farmers' Organization Plan

a) Present Status of the Cofcaville Multi-Purpose Cooperative Inc.

Present status of the Cofcaville Multi-Purpose Cooperative Inc. is in the recovering stage from the failed takeoff. The activities are limited to repayment of the big debt of corn production loan to LBP, which was caused by the severe calamities of drought and typhoon for last three years. So, the cooperative activity is concentrated on the debt collection. The activity is also focused on the collection of capital share and forced saving. At present the members who paid the share capital of 500 pesos per member are only six. The remaining members have paid only a part of the capital share. Considering such situations, a five year plan for recovering cooperative finances was planned as shown below.

b) Development Plan of the Cooperative

To attain the above aims, five year development plan of the cooperative was made as shown below:

Five Years Development Plan of the Cooperative

Year	Aims	Activities
1st to 5th year	Increase in production and introduction of cash crops	The cooperative concentrates the energies on increase in production of crops and introduction of cash crops (banana) with improved technology and expanded area by project. The expected production increase with the project is 3.6 times in rice, 1.8 times in corn and 7.9 times in banana.
	Promoting of group activities	(i) Group purchase of agricultural production materials such as improved seeds/ seedlings, fertilizer, agricultural chemicals and agricultural implements/machinery through cooperative. (ii) Group sale of agricultural products through cooperative. (iii) Group production of banana suckers
2nd to 5th year	Management of consumer store	The cooperative opens consumer store for the convenience of the residents and the cooperative profit
2nd to 5th year	Repayment of the debt	The cooperative promotes repayment of the debt by the profits derived from the increased production, the group activities and from the consumer store.
	Accumulation of cooperative capital	Cooperative promotes accumulation of the capital through collection of share capital from the members, thrift and saving of money, group activities and operating of consumer store.
	Fullness of own facilities for increased productivity and new business	(i) Solar dryer, (ii) Warehouse for storing products and production materials, (iii) Banana chips processing facilities, (iv) Pick-up lorry, (v) Tractor for pre and post-harvest operations.
	Development of market	Development of markets for the increased productions such as cash crops and banana

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

(1) On Education and Training

- Pre-membership training (PMT) should be provided to all prospective members within the community by DAR,

- A thorough re-orientation and intensive membership expansion campaign must be undertaken for inactive and new members to encourage then 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, 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 and 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 8.2-5.

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

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

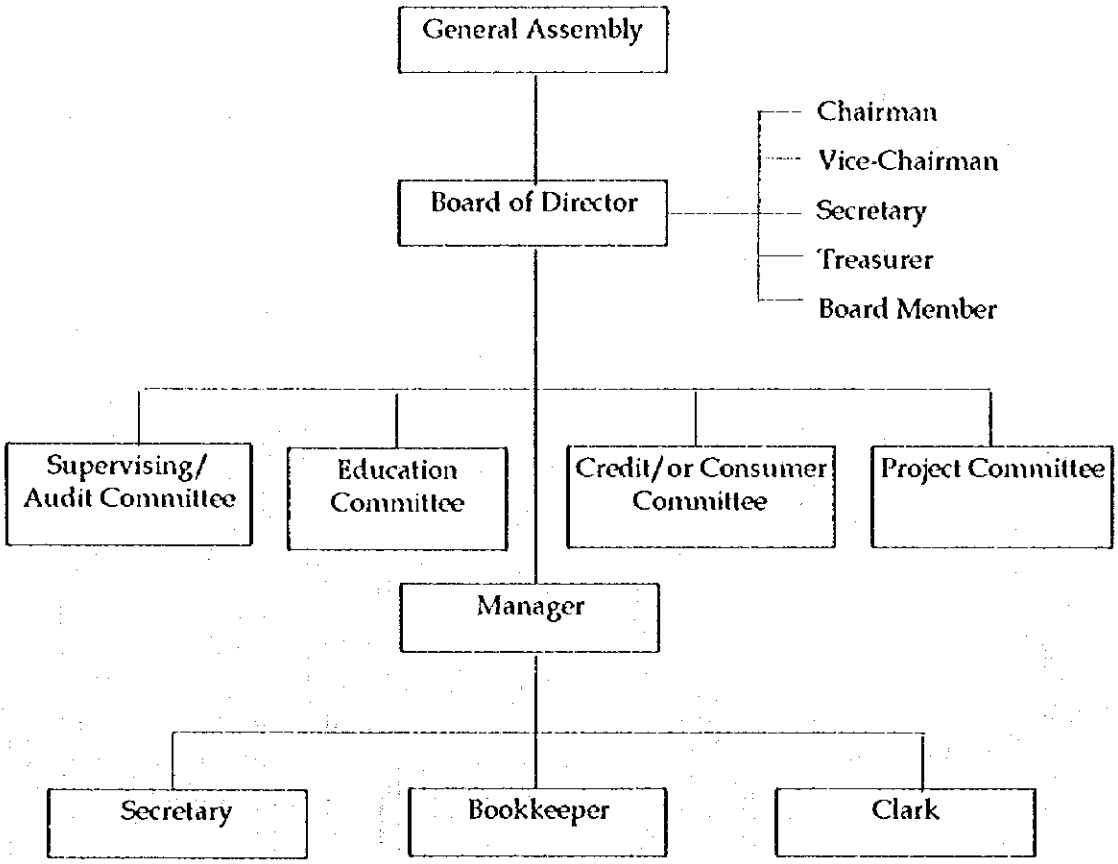
7) Institutional Development Plan

a) Institutional Support System

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

DAR plays the role of coordinator and facilitator of the support activities to be carried out by the agencies concerned. For every specific activity to be undertaken, Memorandum of Agreement (MOA) will have to be executed. This will ensure 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-II, PARO of Quirino and MARO of Madella who is responsible for the implementation of the projects. The development facilitator (DF) and MARO of Madella will become key person of the projects.

FIGURE 8.2-5 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 Cofcaville Area are rice, corn, mungbean, sweet potato, peanut, banana flemingia (hedgerow plant), gmelina and mahogany. Technologies such as suitable variety selection, proper time of seeding/transplanting, necessary input, yield expected, crop rotation, farming and farming income expected, etc., will be supported by CVIARC, ROSs of Tapaya, Aglipay, and Iguig and Quirino State College of Agriculture. For carabao raising technology, PCC has the responsibility.

(3) Supply of Agricultural Input Materials

Before the start of farming, DAR Development Facilitator (DF) shall discuss with the farmers the amount of agricultural input materials to be provided by the agencies (seeds, seedlings, number of livestock and fingerlings and amounts of fertilizer and agricultural chemicals). On the fruit seedlings, the number of seedlings to be provided by each agency should be arranged taking their production capacities into account. The fruit seedlings must be grafted, virus free seedlings and must be the best quality to survive in the market competition in the future. The Quirino State College has been producing virus free seedlings of banana using cell culture. The price of the production materials should be cost production price.

The main production materials planned to be introduced in the Project Area and their respective suppliers are as shown in Table H.2-9.

To diffuse the advanced technology, it is proposed 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 shall 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, the technology developed at the research and development agencies is 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 provide advanced techno-demo farms on lowland farming and upland farming with SALT techno-demo farm in the Project Area, as shown in Table H.2-6.

Farmer's Training

Training on cooperative management is needed, because Cofcaville Multi-purpose Cooperative has been faced with the problem of non-payment of big debt to LBP due to calamities such as drought and typhoon for three years. The training details are given in Table H.2-8.

(5) Provision of Farming Funds

LBP and CDA are the support agencies for farm funds. Before financing activities, 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 engagement in the supply of agricultural materials to members and sale of their products.

(7) Strengthening of Farmers' Organization

CDA and LBP shall support strengthening of the cooperative through the above training.

8) Agricultural Credit System Plan

For the project to produce additional agricultural production and income at the rate of return shown in paragraph 8.5.1 "Project Justification," it is estimated that about 5.6 million pesos will be required as loanable fund to the ARBs at Cofcaville.

Among the proposed measures toward mobilizing enough funds to meet the aforementioned credit demand, the following is proposed;

- 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 as 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, bagalunge, gemelina, 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.

8.2.5 Water Resources Development Plan

1) Development of Surface Water Resources

The potential water resource for the Area is spring water. Although its amount is quite small it has a stable flow throughout the year. However, to expect an effective utilization of available water resources, some adequate measures to use this water source should be considered.

In the Project, small-scale impounding dam should be planned using the spring water. This water source will mainly be used for paddy cultivation during the wet season.

2) Development of Groundwater Resources

Due to hilly and undulating topography in the Area, the possibility for developing groundwater source is quite small. No groundwater resource development plan is formulated in the Area.

8.2.6 Irrigation and Drainage Plan

1) Irrigation Plan

Cofcaville Area is located in hilly and undulating topography. It has scarce water resources, so that large-scale irrigation plan could not be expected in the Project. However, small amount of water resources by spring water are presently

available. An irrigation plan using the water source is formulated paying due attention to low investment costs.

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, marketability of crop, etc.:

Paddy Rice + Paddy Rice + Mungbean

The detailed description of the proposed cropping pattern is referred to in paragraph 8.2.4 "Farming and Institutional Development Plan."

(2) Calculation of Reference Crop Evapotranspiration(ETo)

Calculation Methods

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

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

$$Eto = C \times [W \times Rn + (1-W) \times f(u) \times (ea-ed)]$$

where;

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

Necessary Data and Calculation of ETo

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

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

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

(3) Calculation of Crop Evapotranspiration (ETcrop)

The crop evapotranspiration (Etcrop) is calculated by multiplying the estimated ETo value by the 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 crops are generally not available, the values are estimated at 10-day interval according to NIA's Guidebook. Table J.2-2(2) 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 such as canal and it's related structures. The latter one being equivalent to actual water demand is used for reservoir operation study mentioned subsequently.

On estimating the irrigation water requirement at 10 day interval, the following are taken into account:

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

Effective Rainfall

As a first step of the estimation of effective rainfall, the design rainfall is selected based on the 34 years annual rainfall data (1961-1994) observed at the Baler station in Aurora Province. In the project, design rainfall with return period

of 1/2-years is adopted considering characteristics of marginal areas such as size of area, topography and scarce water resources.

As a result, two years rainfalls equivalent to about a return a period of 1/2-years, 1972 with 3,125.8 mm and 1978 with 3,139.0 mm are selected. About 80 percent of the selected two year average rainfall 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 (ETcrop) mentioned above.

Irrigation Water Requirement

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

Diversion Water Requirement

The diversion water requirement is estimated by dividing irrigation water requirement by irrigation efficiencies. The irrigation efficiencies are determined based on "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 are adopted:

Irrigation Efficiency

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

Table J.2-3(2) and Table J.2-4(2) show the estimated irrigation water requirements in cases of without and with effective rainfalls for Cofcaville Area. As seen in Table J.2-3(2), the maximum diversion water requirement is calculated at q =1.21 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(2) shows the reservoir operation study for Cofcaville Area. In the analysis the followings 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:

Monthly run-off discharge (Qr) = R x A x 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

Spring Water:

Main water source of the proposed reservoir is spring water located upstream most part of the basin. According to the discharge observation at the site, amounts of water available is 2.5 lit./sec.

Diversion Requirement

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

Irrigation Area

Out of the potential cultivation area of 205 ha, the irrigation area is finally decided through trial calculation of reservoir operation study 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 should 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 of Water (Qo)

The total outflow from 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 (Se)

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

Water Level of Reservoir (W-EL)

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

Spillage Water from Reservoir (Qs)

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

- If $(Se._1 + Qi - Qo) > S_f$, $Se._1 + Qi - Qo - Se$
- If $(Se._1 + Qi - Qo) < S_f$, 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

As the results of reservoir operation, the irrigable area for the Cofcaville is finally decided at six ha of wet season first paddy, seven ha of wet season second paddy, and six has of upland crop (mungbean), as shown in Table J.2-5(2).

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.

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

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

2) Drainage Plan for Paddy Fields

The existing paddy fields located in low-lying and flat topographical areas, especially lower parts of the existing paddy fields are periodically inundated during the wet season. The result is not only low agricultural crop production, but also occurrence of water-born diseases such as diarrhea and malaria. For the area, a drainage improvement is formulated.

a) Drainage Modulus for Paddy Fields

Design Rainfall

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

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

Design Rainfall for Drainage Plan

Return Period	Design Rainfall (mm/day)
1/2	234.6
1/5	283.1
1/10	313.1
1/20	340.6
1/50	374.9

Design Drainage Modulus

The design drainage modulus for paddy fields in Cofcaville Area is determined on the assumption that the design rainfall will be drained within two days. Its modulus is calculated at q = 13.1 lit./sec/ha (4.7 mm/hr) as shown below:

$q = R_{max} \times C / (24 \text{ hr} \times 2 \text{ days})$
where; C = run-off coefficient, 0.8

$q = 283.1 \text{ mm/day} \times 0.8 \times 1.0 \text{ ha} \times 10^4/(24 \text{ hr} \times 3{,}600 \text{ sec} \times 2 \text{ days})$
$= 13.1 \text{ lit/sec/ha}$

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

A small water impounding dam is proposed in the Project Area to provide supplemental irrigation water 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 374.9 mm/day. This is equivalent to a return period of 1/50-years, as indicated above.

The selected daily maximum rainfall of 374.9 mm/day is distributed in hourly maximum rainfall using the following equation:

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

where;

R_t = 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 76.5 mm/hr as shown below:

Rt = 374.9 mm/day x (1/24)1/2
= 76.5 mm/hr

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, 6.25 ha

Q_p = 76.5 mm/hr x 10^{-3} x 0.8 x 6.25 ha 10^4/3,600
= 1.1 cu.m/sec.

8.3 Physical Plan and Cost Estimate

8.3.1 Agriculture and Social Infrastructure Plan

1) Agricultural Infrastructure Plan

a) Irrigation Plan

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

- Small water impounding dam (SWID)
- Delivery and distribution canals

In the proposed irrigation system, spring and rain water are impounded in the small water impounding dam. The site of SWID shall be the existing fish pond site. The SWID will be used for irrigation and fish culture. Therefore, a reservoir storage will be allocated for irrigation and fish culture. From the SWID, irrigation water is conveyed to the service area of 7.0 ha, through delivery and distribution canals (refer to Figure 8.3-1). Farm ditches will not be required since the plot-to-plot irrigation system is applied in the terraced paddy fields to be developed.

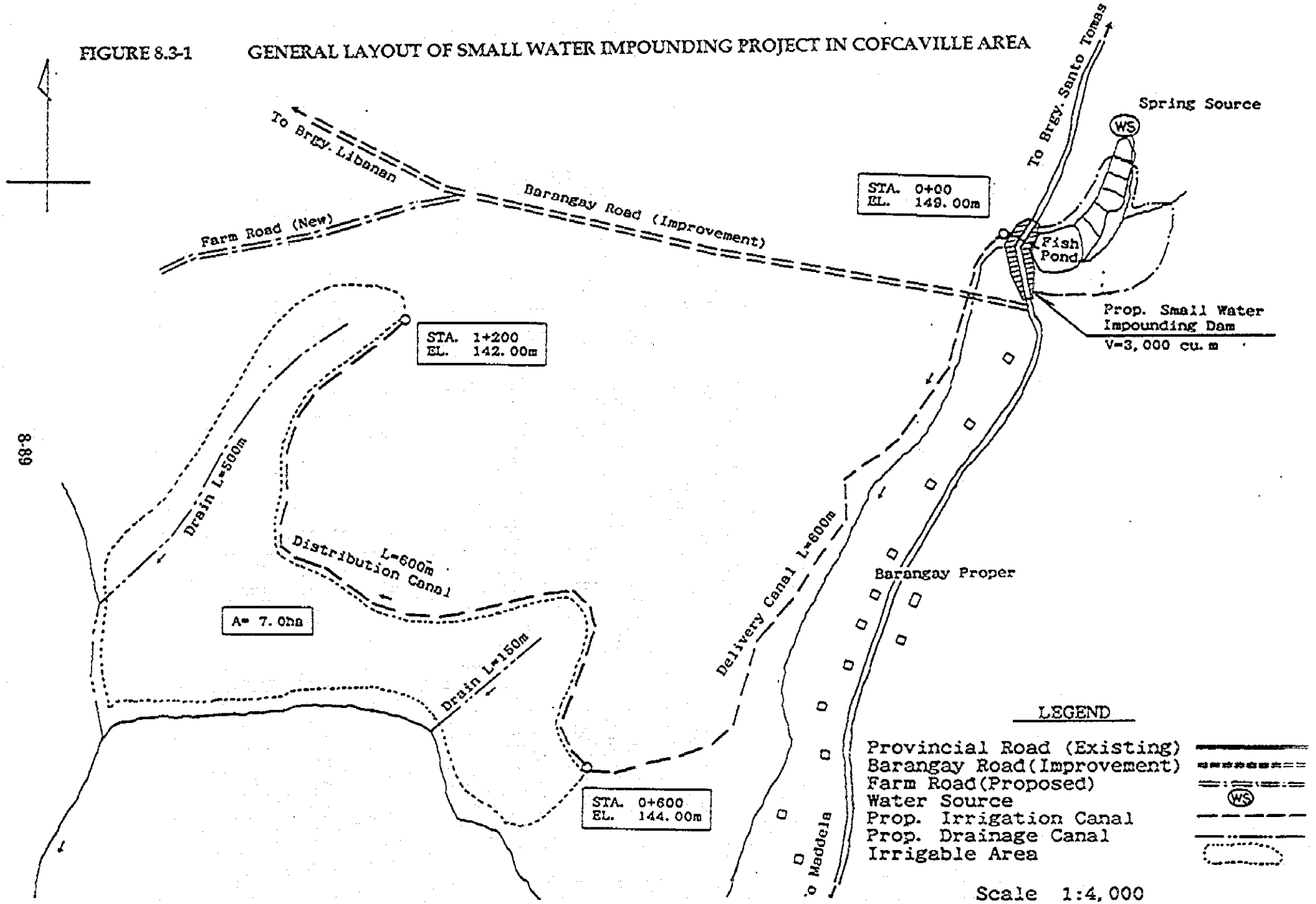
All structural dimensions are computed based on the Technical Model and Standard of Small Water Impounding Project issued by Bureau of Soils and Water Management (BSWM). A summary of the irrigation system is presented below. The details are presented in Annex-M.

- Small water impounding dam
  - Dam type : Homogeneous earthfill
  - Dam height : 3.40 m
  - Crest
  - width : 6.00 m
  - Crest length : 71.00 m
  - Effective storage capacity : 3,000 cu. m
  - Design flood discharge : 1.10 cu. m/sec
  - Outlet pipe : ø150mmx24.00 m
- Delivery canal : L= 600m, concrete block canal
- Distribution canal : L= 600m Concrete block canal

b) Drainage Plan

Earth lined drainage canals are planned and located at the proposed irrigation area. Drainage culverts with R. C. pipes are also planned where roads and foot paths are crossing. Total length of drainage canal is 650 m.

FIGURE 8.3-1 GENERAL LAYOUT OF SMALL WATER IMPOUNDING PROJECT IN COFCAVILLE AREA



c) Farm Road plan

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

- Provincial road junction -- San Salvador road : L= 2.35 km
  (1.85 km with gravel and 0.50 km with concrete surface)

- Provincial road junction -- Labanan junction road : L= 3.20 km
  (2.60 km with gravel and 0.60 km with concrete surface)

- Other interior road : L= 3.10 km
  (2.80 km with gravel and 0.30 km with concrete surface)

Road surfacing materials are gravel in the normal section and concrete in the steep section more than eight percent gradient. 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 provincial and barangay roads shall be improved/upgraded to function as a farm-to-market road and to secure access to barangay proper and/or other barangays in the following sections:

Provincial Road
- Part of provincial road : L= 0.30 km with gravel surface

Barangay Road
- Cofcaville -- Labanan junction road : L= 3.50 km
  (1.60km w/ gravel and 1.90 km w/ concrete surface)

As 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 sections of provincial and barangay roads are presented in Annex-M.

Besides the road improvement/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 organized by the barangay unit with strong support from the municipal government.

b) 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, 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 Cofcaville Area. The construction programs must be supported by improvements on teachers, particularly preparedness for multi-grade teaching (a necessity in areas where school children populations are limited), materials (books, desks, instructional materials, etc.) and curriculum. In addition, complementary health and nutrition services should be provided to improve the health and well being of the children.

Primary health care services are provided by the barangay health stations and rural health units that are usually located in center of the barangays 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 continuos training of health workers and supervision and support of the municipal health officer.

Another important social infrastructure that is proposed to be provided to the Areas is the multi-purpose center for the use of the beneficiaries for social, training and education purposes and other functions. This facility will be useful in promoting camaraderie, unity and understanding in the community. For areas with existing barangay halls and/or multi-purpose centers, upgrading and

rehabilitation activities shall be undertaken including provision of additional space and facilities

For the Cofcaville Area, the following other social infrastructure plans are proposed: rehabilitation and/or improvement of the elementary school; provision of paramedical supplies/equipment for the health center and provision of necessary facilities for the multi-purpose.

8.3.2 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 then be estimated on a contract basis for all sectoral project plans.

2) Associated Costs

As the associated costs, five percent of the construction cost is adapted for the pre-engineering cost, and ten percent for the administration cost. The consulting service costs are estimated considering the project features. 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 72.4 million pesos. These costs are classified into responsible implementing agencies concerned depending on the project components, as shown in Table 8.3-1.

Furthermore, the estimated project costs should be disbursed based on the implementation schedule of the Project as described in paragraph 8.4.2 "Facility Construction and Equipment Supply" (refer to Table N.2-20).

Table 8.3-1 Summary of project Cost for Cofcaville Area

(unit :' 000)

Description	Total Project Costs			Related Implementing Agencies								
	F/C	L/C	Total	DAR	DA	DPWH	NIA	DTI	DOH	PCC	LGU	ARC
1. Construction Cost												
a. Agricultural Development	139	812	951		481					340	100	30
b. Agricultural Infrastructure Development	6,758	9,115	15,873				2,959				12,915	
c. Rural Infrastructure Development	19,905	4,427	24,332			8,932			100		15,300	
d. Post-Harvest Development	2,789	3,083	5,872		1,544			4,328				
e. Institutional Development	470	200	670								670	
Sub-total	30,061	17,637	47,698		2,025	8,932	2,959	4,328	100	340	28,985	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)	1,503	882	2,385		347	1,531	507					
b. Administration Cost (10% of 1 & 2)	3,006	2,148	5,154	90	407	893	386	433	10	34	2,899	3
c. Consulting Services (refer to Table N.2-16)	2,799	4,305	7,104	7,104								
Sub-total	7,308	7,335	14,643	7,194	754	2,424	893	433	10	34	2,899	3
4. Land Acquisition Cost	0	1,016	1,016	1,016								
5. Physical Contingency (10%)	3,006	2,148	5,154	90	407	893	386	433	10	34	2,899	3
Total Project Cost (1 - 5)	40,375	31,978	72,353	9,198	5,233	12,249	5,134	5,194	120	408	34,782	36

Note : Detailed estimation is given in Table N.2-15.

8.4 Project Implementation and Operation and Maintenance Plan

Implementation of the Project would be divided into following four stages. The implementation schedule of the Project is given in Figure 8.4-1.

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

8.4.1 Function of Multi-purpose Cooperatives

The Multi-purpose cooperative will organized 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 8.4-2 (refer to paragraph 8.1.8 and 8.2.2).

8.4.2 Support Services for Implemented Plans

1) Support Services for Capability Build-Up

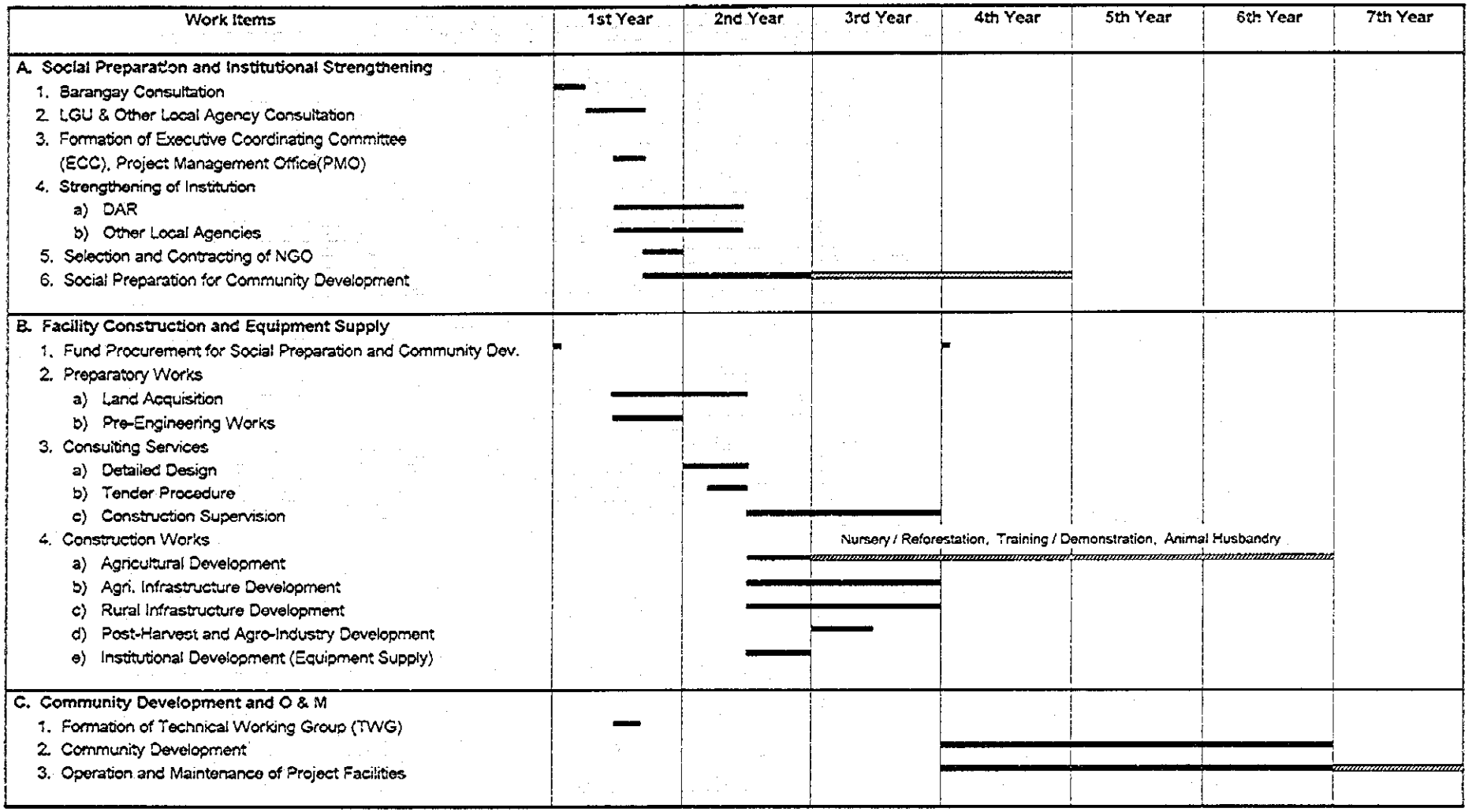
Before the implementation of the Project, there is a need to prepare not only the beneficiaries but also the support agencies who will play important roles in the implementation and sustainability of the Project. An intensive institutional capability building-up of support agencies will have to be undertaken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

Initially, local government and local agency consultations should be undertaken to complete program implementation, support and commitments to the Project. The DAR as a lead implementing agency will spearhead the consultation process. The related support agencies and NGO will also undertake the support services for capability build-ups 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 providing necessary skills and competence to help support project implementation.

FIGURE 8.4-1 IMPLEMENTATION SCHEDULE FOR COFCAVILLE AREA



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

The responsibility of providing and/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 Cabagan State University in Cabagan, Isabela.

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 8.4-1.

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)
  - Philippine Rice Research Institute (Munoz, Nueva Ecija)
  - National Post-Harvest Institute for Research and Extension (Munoz, Nueva Ecija)
  - Department of Environmental and Natural Resources (DENR)
  - Timberland Stock Farm in Aglipay, Quirino
  - Tapaya Stock Farm in Bagabag, Nueva Viscaya
  - Provincial Agricultural Office (PAO)
  - Municipal Agricultural Office (MAO)

- Extension services, crop technology, production and distribution of seedlings and planting materials:
  - Provincial Agriculture Office (PAO)
  - Municipal Agriculture Office (MAO)
  - Provincial Environment and Natural Resources Office (PENRO)
  - Timberland Stock Farm in Aglipay, Quirino
  - Tapaya Stock Farm in Bagabag, Nueva Viscaya

- 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)
  - National Post-harvest Institute for Research and Extension (Munoz, Nueva Ecija)

8.4.3 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 8.4-2, the leading 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 involved agencies will implement the sub-components according to their competence.

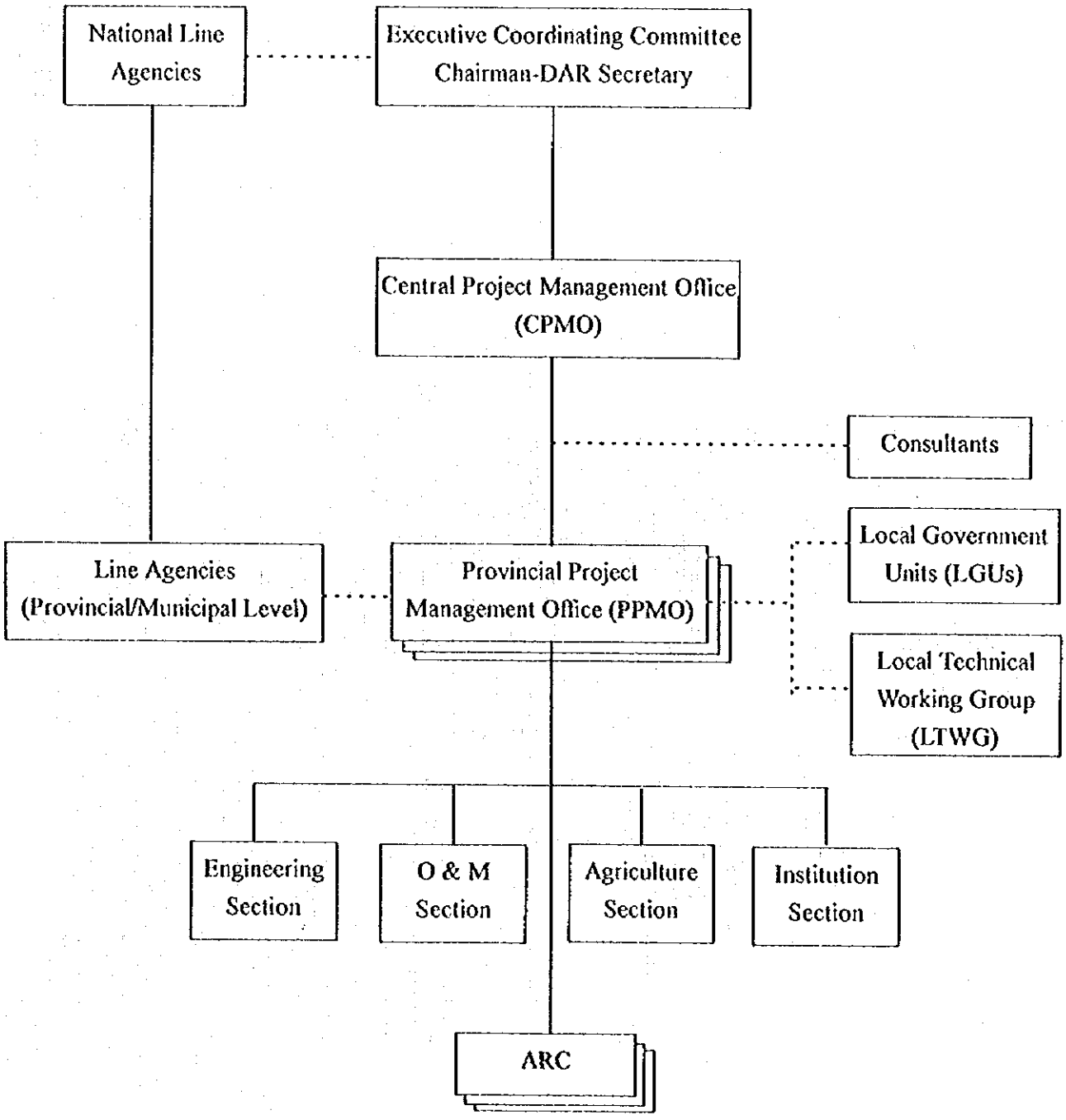
The existing organizational structure mechanisms for CARP projects already operating in DAR will be adopted for the Project. Agencies concerned will mobilize it's CARP Implementing Units and taps the other regular units of their respective agencies.

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.

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

FIGURE 8.4-2 PROPOSED ORGANIZATION CHART FOR PROJECT IMPLEMENTATION



Sections. The responsibility of the support staff is to assist the PPMO in the implementation of the Project. The support staff shall be selected from the regular technical staff pool of the regional, provincial, or municipal DAR and other agency offices.

A Local Technical Working Group (LTWG) at the provincial/municipal level shall be organized. The members of the LTWG shall be composed of the designated senior LGU officials and technical staff of designated line agencies. The LTWG shall assist in the social preparation of the community, provide technical assistance to the PPMO and shall also serve as the project focal persons in their respective municipalities and provinces for coordination mechanisms.

2) Implementation Mode for Facility Construction

Implementation mode for facility constructions shall be on contract basis, 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, various social facilities, and so on,
- Topographic survey for major facilities,
- Route survey for roads and canals, and
- Geological investigations for SWID.

5) Consulting Services

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

6) Land Acquisition and Compensation

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

7) Implementation Schedule

All facility constructions and procurement of equipment formulated under the Project can be completed within two years inclusive of the detailed design, as indicated in Figure 8.4-1.

8.4.4 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 a part of social preparation for the community development works are proposed as indicated in Figure 8.4-1.

2) Operation and Maintenance Plan

a) Operation and Maintenance Organization

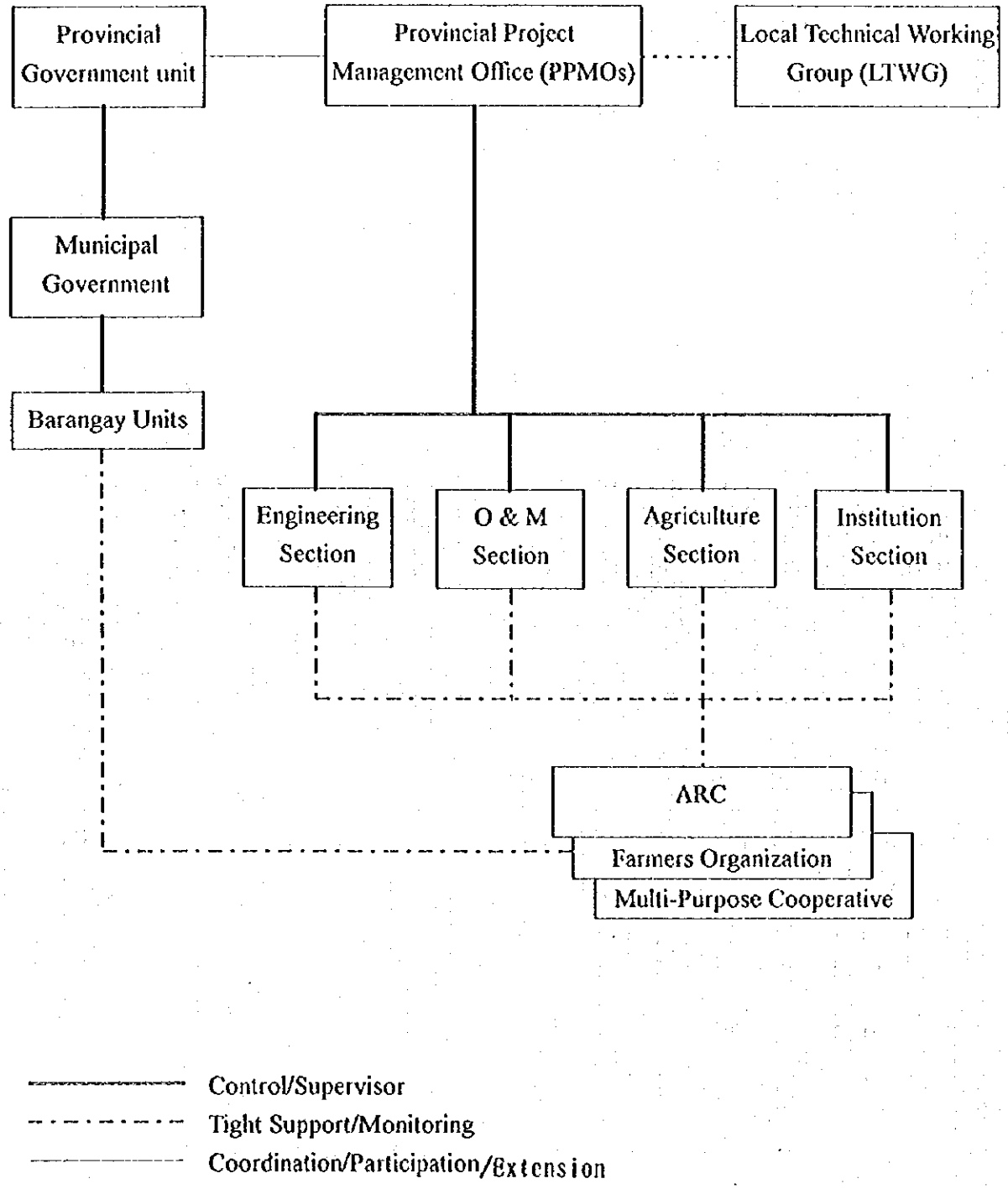
Operation and maintenance of the implemented project facilities will be conducted by the Provincial Project Management Office (PPMO). The PPMO will be in charge of planning and management for the implemented project. The local government units (LGUs) and farmers' organizations to be also established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

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

The proposed operation and maintenance organization chart is shown in Figure 8.4-3.

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

FIGURE 8.4-3 PROPOSED ORGANIZATION CHART FOR OPERATION AND MAINTENANCE



Related Agencies for O & M of Infrastructure Facilitates

- Rural roads and bridges, barangay roads and farm-to-market roads
  - Department of Public Works and Highways (DPWH)
  - Provincial Engineering Office (PEO)
  - Municipal Engineering Office (MEO)

- Agricultural infrastructure facilities like a small-scale irrigation system, and a water impounding dam
  - National Irrigation Administration (NIA)
  - Provincial Irrigation Office (PIO)
  - Department of Agriculture (DA)

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

b) Operation and Maintenance Plan of the Project

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

Agriculture Development

- Nursery

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

- Demonstration Farm

To demonstrate a set of technology at the farm level, one demonstration farm will be proposed. This demonstration farm will be composed of almost contiguous plots for improvement of existing farming system and introduction of new farming system as fruit tree-based farming as well as production/protection forest. The farm lots may belong to the above

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

Agricultural Infrastructures

- Irrigation Systems

The 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 it's 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 charges.

- Farm Roads

Farm roads categorized into barangay roads will be periodically maintained by the beneficiaries' cooperatives in the Area after the construction of roads, which will be implemented under the supervision of LGUs. However, when heavy equipment will be needed for repairing the roads, the beneficiary's cooperatives can borrow 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 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. In the drain systems, a small-scale silting basin will be provided at the terminal of the drain systems.

Rural Infrastructures

- Rural Roads

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

- Rural Water Supply

  Rural water users' association (WUA) will be established with the participation of households to be directly benefited by the rural water supply. The association will be organized by DAR-PPMO at the construction stage with 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 organizations shall be tapped to do work on a regular basis to instill participatory work and responsibility among members of the community. Contributions for maintenance works may be for materials, equipment or tools, labor and food. For major rehabilitation and/or repair works, the LGU and/or other governmental agencies shall be tapped to undertake work. 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, community, youth or womens' group

Post-Harvest and Agro-Industry

The actual operation and maintenance of post-harvest and agro-industry facilities will be conducted by municipal LGUs. However, the beneficiary organization will be requested to do daily and periodic maintenance for 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 operator's' payment will be paid from these sources. Management of this fee collection and payment will be conducted by the PPMO.

3) 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 cost is estimated to be about 840 thousand pesos per annum, as shown below:

Annual O&M Costs

Items	O & M Costs (peso/year)
- Agricultural Development	9,510
- Agricultural Infrastructure Development	158,730
- Rural Infrastructure Development	243,320
- Post-Harvest and Rural Industry Dev.	421,400
- Institutional Development	6,700
Total	839,660

The detailed estimation of O&M costs classified into the related implementing line agencies are given in Table N.2-24. According to the estimation, the required O&M cost for the LGU is 290 thousand pesos, which is equivalent to 0.6 percent of the annual budget of 49.8 million pesos for the municipality of Madella in 1997.

8.5 Project Evaluation

8.5.1. Economic Justification

1) Method of Economic Evaluation

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

The major difference between the two analyses is the prices used in calculating the values of both the Project's inputs and outputs. For the economic analysis, known taxes and subsidies imposed on/provided to a commodity are removed before arriving at its economic price.

In either case, incremental benefits or the cash flows which are the streams of differences between the net production values (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

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

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

The financial prices and economic prices used in the financial and the economic analyses of the project are as shown in Tables 8.5-1 and 8.5-2 below.

Table 8.5-1 Financial and Economic Prices of Output for Cofcaville Area

Crop	Product	Unit	Financial Price		Economic Price	
			Cofcaville	Average	SCF	Peso/unit
Field Crops						
Paddy		kg	7.70	8.26	1.00	7.70
Corn		kg	6.09	6.20	1.00	6.09
Peanut		kg	13.00	13.89	1.00	13.00
Mungbean		kg	20.14	20.74	1.00	20.14
Sweet Potato		kg	4.00	5.35	1.00	4.00
Garlic		kg		60.00	1.00	
Squash		kg	5.27	5.27	1.00	5.27
Cassava		kg	2.58	2.58	1.00	2.58
Fruit Trees					1.00	
Coconut	Copra	kg	11.45	8.99	1.00	11.45
	Charcoal	kg	2.50	2.50	1.00	2.50
Mango		kg	10.87	13.93	1.00	10.87
Banana		kg	3.32	3.32	1.00	3.32
Abaca		kg		21.22	1.00	
Cashew		kg		18.00	1.00	
Rambutan		kg	12.32	15.91	1.00	12.32
Durian		kg	23.41	30.22	1.00	23.41
Jackfruit		kg	5.00	5.00	1.00	5.00
Forest Products					1.00	
Fuelwood	All	cu.m	75	80.00	1.00	75
Poles	All	cu.m	893	1069.00	1.00	893
Pulpwood	Falcata	cu.m	1,613	2064.00	1.00	1,613
Sawlog	Begalinga	cu.m	988	1265.00	1.00	988
Sawlog	Bagras	cu.m	1,095	1401.00	1.00	1,095
Sawlog	Gemelina	cu.m	2,002	2562.00	1.00	2,002
Sawlog	Mahogany	cu.m	2892	3701.50	1.00	2,892
Livestock					1.00	
Carabao	Milk		35	35.00	1.00	35
	Cow/Bull	ea	6,000	6710.00	1.00	6,000
Chicken	Meat	ea	65.00	62.95	1.00	65
	Eggs	ea	2.92	2.89	1.00	2.92

Table 8.5-2 Financial and Economic Prices of Inputs for Cofcaville Area

Inputs	Unit	Financial Prices		Economic Prices	
		Cofcaville	Average	SCF	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	300.00	1.00	300.00
Fruit Tree Seedlings					
Coconut	ea	12.00	12.00	1.00	12.00
Mango	ea	20.00	20.00	1.00	20.00
Banana	ea	2.00	2.00	1.00	2.00
Abaca	ea		3.00	1.00	
Cashew	ea	2.50	2.50	1.00	2.50
Rambutan	ea	30.00	30.00	1.00	30.00
Durian	ea	30.00	30.00	1.00	30.00
Jackfruit	ea	30.00	30.00	1.00	30.00
Forest Tree Seedlings					
Any	each	2.50	2.50	1.00	2.50
Animal Stock					
Carabao, Cow	each	15,000	15,000	1.00	15,000
Bull	each	13,000	13,000	1.00	13,000
Chicken, Fertilized egg	each	2.92	2.89	1.00	2.50
Fertilizer					
Urea (46-0-0)	kg	7.50	7.75	1.20	9.00
Muriate of Potash (0-0-60)	kg	4.48	4.63	1.20	5.38
Ammophos (16-20-0)-kg	kg	6.80	6.68	1.20	8.16
Complete (14-14-14) - kg	kg	6.90	6.84	1.20	8.28
Zinc Phosphate	kg	6.67	6.67	1.20	8.00
Pesticides					
Basudin 400EC	1.0 lt.	282	279.90	1.20	338.40
Furadan 3G	G 34g	60	60.00	1.20	72.00
Decis	1.0 lt.	430	447.25	1.20	516.00
Azodrin 202R	3.0 lt.	303	315.00	1.20	363.60
Lannate EC	1.0 lt.	430	411.25	1.20	516.00
Malathion	2.0 lt.	260	248.29	1.20	312.00
Trigograamma	card	1.50	1.50	1.20	1.80
Herbicides					
2.4D-Amine EC	2.0 lt.	484	462.69	1.20	
Others					
Labor					
Land Preparation	mad	120	130.00	1.20	
Others	md	60	65.00	1.20	
Corn shelling	kg	2.92	2.89	1.20	

Note: 1/10 % is removed from the financial prices for local tax before applying SCF.

3) Project Benefits

The major project benefits to be incorporated into the analysis are the increased production of crops and livestock proposed to be produced in the project, measured for their financial and economic values. In arriving at such benefits, alternative plan for land use for the Project Area is developed. All technical and economic parameters are considered in modeling the alternative plan. The technical parameters include altitudes, land topography, soil structure, availability of inputs, yields, historical production in the area, soil conservation as well as the social consideration of environmental protection. Five cases are modeled from which one is selected for the derivation of the overall financial and economic returns. Case-1 excludes all the contour farming from the crop production plan. The remaining four cases include different levels of contour farming. Case-4 only suggests planting on land of 18 percent slope and below. Cases-2, -3 and -5 suggest different proportion of planted areas of selected crops during the first three years of the project. Finally, only Case-3 is selected for the overall analysis based on the judgement of the Study Team on its relevance to the actual situation.

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

- 245 tons per year of incremental field crop production from paddy, corn, peanut, mungbean, cassava and sweet potato
- 483 tons per year of incremental fruit crop production from banana
- 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
- 15,149 mandays of incremental employment of family labor in crop production

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

Considering the above modelling of the land use plan, the financial analysis is conducted for all the five cases while the economic analysis is only made for the selected Case-3 at Cofcaville Area. The major outputs of the analysis are the economic viability of the project for it's FIRR and EIRR.

Details of inputs, output 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 a number of non-quantifiable benefits which are also worthy of mentioning, though not included in the analysis due to 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 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 presently shown, if included.

4) Economic Project Costs

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

The cost of capital (money) is automatically taken cared of in the process of analysis that values all economic items for their present values. The conventional depreciation costs of capital items are also automatically taken cared of as return of capital by their present values. Inflation is also assumed away considering that it would equally affect 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 that 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 caused 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 are given in Annex. O2

5) Financial and Economic Internal Rates of Return

FIRR and EIRR are calculated for the entire Project Area. Tables' 8.5-3 and 8.5-4 may be referred to for the detailed analysis made.

The analysis indicates an FIRR of 13 percent and an EIRR of 12 percent for the Project.

6) Sensitivity Analysis

Results of the sensitivity analysis as shown below indicate higher sensitivity of the reduction in agricultural income than the increases in it costs.

Summary of Sensitivity Analysis

Reduction in Agri. Income	Increase in Ag. Production Costs	FIRR (%)	EIRR (%)
0	0	13	12
10	0	12	10
20	0	10	9
0	10	13	12
0	20	13	11
7	7	12	11
Switching Values (15%)	FIRR		EIRR
Income (-)	None		None
Costs (+)	None		None

8.5.2 Financial Analysis of Typical Farmers

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

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

Table 8.5-3 Financial Analysis for Cofcaville Area

Table 8.5-3 FINANCIAL ANALYSIS : COFCAVILLE

Crop	Type/ Products	Qty	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
			Net Production Value (000pesos)																								
Field Crops		429																									
Paddy 2	Irri-wet	6	77	98	112	126	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141
Paddy 1	Irri-dry	7	80	103	142	162	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182
Paddy 4	R/C-Dry	45	164	365	441	518	595	595	595	595	595	595	595	595	595	595	595	595	595	595	595	595	595	595	595	595	595
Corn-y	Yellow	279	128	1635	2077	2553	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995	2995
Mungbean		22	168	232	265	298	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330
Swpotato		X	31	50	65	79	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Cassava		21	150	223	257	292	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327
		21		150	223	257	292	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327
		20			143	213	245	278	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311
Fruit Trees		47																									
Banana		31	-683	727	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877
		X		-176	190	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226
		X			-176	190	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226
Forest Tree		241																									
Kakawate		1	-7	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0
		1		-7	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
		1			-7	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0
Gmelina		40	-334	-76	-41	-45	-45	-45	-13	-45	-45	698	-45	-45	-45	-45	5935	0	0	0	0	0	0	0	0	0	0
		40		-334	-76	-41	-45	-45	-45	-13	-45	-45	698	-45	-45	-45	-45	5935	0	0	0	0	0	0	0	0	0
		39			-325	-75	-40	-44	-44	-44	-13	-44	-44	680	-44	-44	-44	-44	5787	0	0	0	0	0	0	0	0
Mahmany		40	-334	-76	-31	-45	-45	-22	-45	-45	-45	-45	-45	-45	-45	-45	-45	385	-45	-45	-45	-45	-45	-45	-45	-45	13197
		40		-334	-76	-31	-45	-45	-22	-45	-45	-45	-45	-45	-45	-45	-45	385	-45	-45	-45	-45	-45	-45	-45	-45	-45
		39			-325	-75	-30	-44	-44	-21	-44	-44	-44	-44	-44	-44	-44	376	-44	-44	-44	-44	-44	-44	-44	-44	-44
Livestock																											
Carabao	1		0	-141	204	193	440	193	440	193	440	193	440	193	440	193	440	193	440	193	440	193	440	193	440	193	440
Chicken	50		0	126	293	384	384	384	384	126	293	384	384	126	293	384	384	384	126	293	384	384	384	126	293	384	384
Others																											
Rural Roads			0	0	0	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426
Rural water			0	0	0	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64	116.64
Fish Culture			0	0	0	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Post-Harvest & Rural Indus			0	0	1,122	1,122	1,122	739	1,122	677	1,122	1,122	661.2	1,122	1,122	1,122	677.2	739.2	1,122	1,122	1,122	1,122	661.2	677.2	1,122	1,122	1,122
NPV-with			-578	2595	5353	8724	9769	9213	9650	9124	9883	10348	10133	10071	9760	9605	15817	15679	15937	9650	9989	9742	9528	9039	9897	9742	23231
NPV-w/o			1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819	1819
Cash Flow less project cos			-2397	777	3534	6906	7950	7395	7831	7305	8064	8529	8315	8253	7941	7786	13999	13860	14118	7832	8170	7923	7709	7220	8078	7923	21413
Project investment			3138	14626	28205	2016	2017	2017																			
Annual O&M			685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1	685.1
Financial cashflow			-6220	-14535	-25356	4205	5248	4692	7146	6620	7379	7844	7629	7567	7256	7101	13314	13175	13433	7147	7485	7238	7024	6535	7393	7238	20728

FIRR = 13%

NPV 15= -4,212

Table 8.5-4 Economic Analysis for Cofcaville Area

Table 8.5-4 Economic Analysis COFCAVILLE (Using SER and SVR)

Crop	Type/ Products	(ha)	Net Production Value ('000pesos) Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Field Crops																											
Paddy 2	Irri-wet	6	53	83	94	109	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Paddy 1	Irri-dry	7	97	123	144	160	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182
Paddy 4	Rf-Dry	45	275	448	514	612	678	678	678	678	678	678	678	678	678	678	678	678	678	678	678	678	678	678	678	678	678
Corn-y	Yellow	279	608	2036	2478	2954	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395	3395
Mungbean		22	207	265	298	331	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363
SwPotato		8	26	63	78	92	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
Cassava		21	190	391	425	460	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495
		21	0	190	391	425	460	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495	495
		20	0	0	181	372	405	438	471	471	471	471	471	471	471	471	471	471	471	471	471	471	471	471	471	471	471
Fruit Trees																											
Banana		31	-619	741	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877	877
		X	0	-160	191	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226
		X	0	0	-160	191	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226
Forest Tree																											
Kakawate		1	-5	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0
		1	0	-5	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
		1	0	0	-5	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0
Gemelina		40	-296	-73	-33	-36	-36	-36	-3	-36	-36	707	-36	-36	-36	-36	5945	0	0	0	0	0	0	0	0	0	0
		40	0	-296	-73	-33	-36	-36	-36	-3	-36	-36	707	-36	-36	-36	-36	5945	0	0	0	0	0	0	0	0	0
		39	0	0	-289	-71	-32	-35	-35	-35	-3	-35	-35	689	-35	-35	-35	-35	5796	0	0	0	0	0	0	0	0
Mahogany		40	-294	-76	-31	-45	-45	-22	-45	-45	-45	385	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	13197
		40	0	-294	-76	-31	-45	-45	-22	-45	-45	-45	385	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
		39	0	0	-286	-75	-30	-44	-44	-21	-44	-44	-44	376	-44	-44	-44	-44	-44	-44	-44	-44	-44	-44	-44	-44	-44
Livestock																											
Carabao	1		0	-113	171	150	382	150	382	150	382	150	382	150	382	150	382	150	382	150	382	150	382	150	382	150	382
Chickens	50		0	162	347	448	448	448	162	347	448	448	448	162	347	448	448	448	162	347	448	448	448	162	347	448	448
Others																											
Rural Roads			0	0	0	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298	1298
Rural water			0	0	0	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Fish Culture			0	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Post-Harvest & Rural Indus			0	0	421	421	421	421	421	-39	421	-114	421	421	-133	421	421	421	-114	-39	421	421	421	421	-133	-114	421
SPV-W/15			244	3,484	5,655	8,909	9,932	9,775	9,785	9,278	10,047	10,422	11,189	10,641	9,360	9,784	15,996	15,801	15,098	9,331	10,124	9,892	10,124	9,605	9,469	9,357	23,367
SPV-w/o			2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183	2,183
Cash flow less project cos			-1,939	1,301	3,472	6,726	7,749	7,592	7,602	7,095	7,864	8,239	9,006	8,458	7,177	7,601	13,813	13,618	12,915	7,148	7,941	7,709	7,941	7,422	7,286	7,174	21,184
Project investment			3,522	16,030	30,559	2,066	2,067	2,067																			
Annual O&M			685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685
Economic cashflow			-6,146	-15,414	-27,772	3,974	4,997	4,840	6,917	6,409	7,179	7,554	8,321	7,773	6,492	6,915	13,128	12,933	12,230	6,462	7,256	7,024	7,256	6,737	6,601	6,489	20,499

EIRR = 12%
SPW 15= -7,128

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 8.5-5. The analysis indicates the average annual return to family labor and management of 89,718 pesos per farm, and 23,364 pesos per hectare, of a typical farm at Cofcaville Area having an average landholding of 3.84 ha.

8.5.3 Project Monitoring and Evaluation

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

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

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

For the evaluation of the attainment of project's objectives, known as Project Evaluation, DAR should only facilitate or participate as one among other parties assigned to jointly conduct it. NEDA, being the Central Economic Planning agency of the Government should be another party involved in evaluating the project impact. Others may include representatives from any outside agencies as universities and other related institutions. Recently, effort toward supplementing Project Evaluation with the process of Self Assessment by the implementing

Table 8.5-5 Net Income of Typical Farm Household in Cocaville Area

Table A.5-6 Net Income of A Typical Farm : COCAVILLE

Crop	Type/ Products	(ha)	Net Income over Variable and Fixed Costs ('000peso) Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Field Crops																											
Paddy_2	Irri-wet	0.03	387	489	560	632	704	704	704	704	704	704	704	704	704	704	704	704	704	704	704	704	704	704	704	704	704
Paddy_1	Irri-dry	0.04	457	701	814	927	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039	1,039
Paddy_4	Rf-Dry	0.10	365	810	981	1,152	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322
Corn-y	Yellow	1.56	713	9,145	11,615	14,275	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745	16,745
Mungbean		0.12	915	1,267	1,445	1,623	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801
SwPotato		0.04	55	251	224	296	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469
Cassava		0.35	2,505	3,719	4,288	4,866	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444	5,444
Fruit Trees																											
Banana		0.26	-5,728	6,185	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359	7,359
Forest Tree																											
Kakawate		0.02	-133	-23	-20	0	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	0	0	0	0	0	0	0	0	0	0
Gemelina		0.66	-5,504	-1,261	-683	-749	-749	-749	-215	-749	-749	11,510	-749	-749	-749	-749	97,931	0	0	0	0	0	0	0	0	0	0
Mahogany		0.66	-5,504	-1,261	-512	-749	-749	-356	-749	-749	-749	-749	-749	-749	-749	-749	6,357	-749	-749	-749	-749	-749	-749	-749	-749	-749	217,755
Livestock																											
Chicken			0	2,527	5,053	7,685	7,685	7,685	2,527	5,053	7,685	7,685	7,685	2,527	5,052	7,685	7,685	7,685	2,527	5,053	7,685	7,685	7,685	2,527	5,053	7,685	7,685
Total Area (ha)		3.84																									
Net Income over VC & FC			-11,469	22,549	32,024	37,616	41,055	41,448	36,431	39,223	41,055	53,314	41,055	35,897	39,223	41,055	146,842	41,819	36,661	39,987	41,819	41,819	41,819	36,661	39,987	41,819	260,324
Net Income with unpaid lab			95,918	129,936	139,412	144,804	148,442	148,835	143,819	146,610	148,442	160,701	148,442	143,284	146,610	148,442	254,229	149,207	144,049	147,375	149,207	149,207	149,207	144,049	147,375	149,207	367,711
Cost of Capital (15%)			48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018	48,018
Cost of Land			20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045	20,045
Return to Labor/Management			27,856	61,874	71,349	76,741	80,380	80,772	75,756	78,548	80,380	92,638	80,380	75,222	78,548	80,380	186,166	81,144	75,986	79,312	81,144	81,144	81,144	75,986	79,312	81,144	299,648
Annual return per Farm			89,718																								
Average Annual Return per			22,364																								

agency (in this case, DAR) has been experimented and found successful. It, therefore, may be incorporated into the Project Monitoring and Evaluation plan of the Project.