CHAPTER 9 SUPPORTING PROJECTS AND PROGRAMS

The supporting programs are to be implemented with a view to ensuring the smooth and sound implementation of the priority projects described in Chapter 8. These programs are comprised of institutional, technical, financial and managerial strengthening services to assure the sustainability of the anchor priority projects. Considering the past lessons learnt and the fact that many resettlement and other infrastructure projects had failed due to lack of supporting programs, it is recommended that all core priority projects be implemented as a package with the supporting programs.

9.1 Present Conditions and Problems

9.1.1 Existing and On-going Supporting Programs

(1) Livelihood Improvement Program

To support and improve the resettlers' livelihood in the resettlement sites of Banquerohan and Mi-isi (or Salvacion), the following services have been provided to them so far:

- "Food for work" granted to relocates with the aid of BSBI (NGO)
- Revolving capital for 200 families (PHP1,000 each)
- Free vegetable seedlings from City Agriculture Office
- Animal dispersal at PHP3,000 each for 80 families
- Seed capital (PHP30,000) for Commissary/Cooperative (recipients were granted PHP2,000 to 4,000, depending on their project proposal)
- PHP 100,000 loan granted by Self-Employment Assistance (SEA)
- Skills training
- Hand paper making by FIDA
- Food processing by DSWD
- Day care services
- Farming and long weaving assistance from City Agriculture Office
- Food assistance from local government
- Film showing sponsored by DA for at least 4 times
- Sulong-Dunong scholarship for non-formal education (5 persons up to date)

(2) Findings or Lessons Learnt

Although these support services have been granted to the relocatees/resettlers by the national government agencies, LGUs and NGOs, these were much too limited to satisfy all demands of the required resettlers, and even piecemeal just to comply

with some of their immediate needs. Besides, most of these supporting programs have been provided independently without continuity nor coordination among the competent authorities.

Under such circumstances, the first thing to do for improving the resettlers' livelihood is to form a cooperative and pool their resources. Organizing cooperatives is one of the best ways for resettlers to avail of financing and government assistance programs. Because of their limited capabilities, resettlers need assistance to develop a strong and viable cooperative.

(3) Agricultural Production and Agro-industry Development Programs

Lack of the working capital to invest in the farming is one of the main reasons for poor productivity and slow pace of agro-industrialization in the area. The government supports in agricultural sector have been also minimal in the area around Mayon Volcano. It is pointed out that it is partly due to the land tenure system in this area.

Most of landowners live either in Legazpi or in Manila and are not very much interested in developing the land. They are rich and not in immediate need to earn income from their farms, and prefer to just keep them as an investment, waiting for land prices to rise and sell the land in the future. The owners of these lands are afraid of land tenancy or losing land in the future due to land reform and do not want to hire farmers to work and live on the farm.

In addition to the land tenure problem, the area around Mayon Volcano is known as a disaster prone zone repeatedly hit by several disasters like volcanic eruptions, mud and debris flows, floods and others. Most of entrepreneurs are likewise afraid of these potential hazards in the area and hesitate to invest in costly or large-scale enterprises.

Apart from these negative disaster impacts, the area around Mayon Volcano is considered as the best area for agricultural production and agro-industrial development in the Province. Siltation from the slopes of the mountain keeps the soil fertile and the abundant fresh water is available for agro-industry activities.

(4) Mini-infrastructure Improvement Program

Most of infrastructure sector development programs in Study Area fall under the category of mini-infrastructures. The components of such infrastructures cover the following: essential transport system, water supply, waste disposal, power supply, communications, mud & debris flow control, drainage and flood control, and irrigation. Social infrastructures, which involve education, health and other

facilities/building, are implemented separately from the main infrastructure under the social services sector.

Infrastructure is to be planned as a vital support to the productive sectors, especially for area socio-economic development. Major hindrances to the area socio-economic development in Study Area are pointed out as follows:

1) The insufficiency of sources of funding for the identified programs and projects, which has resulted into a thinly spread project mixed with a very narrow scope, and a long gestation period,
2) The ineffectiveness of the interventions formulated, born out of non-complementation for lack of a clear sectoral and administrative framework for inclusion and prioritization, and
3) Institutional weakness, resulting in unproductive duplication and competition in undertaking development interventions.

In the context of these problems, there is a need to improve the planning, programming and project packaging to be more focused and effective. In this regard, the key strategies in the infrastructure sector should include the following:

1) Develop a fair and reasonable cost sharing system for services provided without unduly sacrificing recovery cost to enable the sector or authority to sustain its operation,
2) Promote a strong linkage with the private sector in providing the needed infrastructure facilities and services,
3) Encourage a broader base of ownership of the facilities, and
4) Provide a clear delineation of responsibilities among concerned agencies predicated on complementation and efficiency. Overlapping and inconsistent functions should be identified and addressed.

9.1.2 Willingness-to-Pay of the Respondent Resettlers and Candidate Resettlers

The following table shows the results of “the willingness-to-pay” of the interviewed resettlers and candidate resettlers.

Willingness-to-Pay of the Resettlers and Candidate Resettlers

Questions/Answers		Total	%
1.	Establishment of community-based calamity fund		
	Good	142	78.9
	No	38	21.1
2.	Willing to pay community-based calamity fund		
	Yes	132	73.3
	No	48	26.7
3.	How much will they pay ? (Amount in pesos per month per household)	69.4	-
4.	Pay occupancy fee		
	Yes	112	62.2
	No	68	37.8
5.	How much is the fee? (Amount in pesos per month per household)	59.5	-

Source: People's Intention Survey for Resettlers and Candidate Resettlers on Resettlement Site Improvement and Livelihood Development conducted by the JICA Study Team, September – October 1999.

Regarding the establishment of community-based calamity fund, 79% of the total respondents agreed to this idea by giving an answer of "good", while the rest (21%) answered that this is "not good". For the latter negative answer, they give the reason that it will no be properly administered and will be a source of corruption among them.

On the matter of willingness to make a monthly contribution to build up the calamity fund, 73.3% said they are willing to pay an average of PHP70 per month per household. When asked further if they are willing to pay an occupancy fee to help maintain the site and rehabilitate the facilities, 62% said they are willing to pay an average of PHP60 per month per household. For those who answered in the negative, 38% said that maintenance is the responsibility of the household. One of the main problems in the resettlement sites is the lack of livelihood and job opportunities, and if there are any, they are very insufficient or are rated poor by the resettlers. Trainings toward the establishment of livelihood are not satisfactorily conducted in the areas.

The resettlers themselves say that they lack discipline and trust in each other. Trust and self-discipline can be fostered by community organizing and team building activities. However, considering the present way of thinking of the resettlers, it seems to take much time to foster this trust and discipline among them. Regarding this, the results of the People's Intention Survey reveal interesting outputs for community assimilation as shown below.

Responses on Willingness to Participate in Organizations

Willingness	Total	%	Order
1. Willing to Participate in Group Enterprise			
- Yes	91	50.6	-
- No	89	49.4	-
Total	180	100.0	-
2. Acceptable investment amount (pesos) per respondent answered "Yes" *	2,928.5	-	-
3. Reasons for Not Willing to Invest			
- Difficult to work with others	45	29.6	2
- Cooperative is not strong	17	11.2	4
- No benefits	7	4.6	5
- No trust for leaders	31	20.4	3
- No capital	47	30.9	1
- Too old	3	2.0	6
- Financial problem	2	1.3	7
Total	152	100.0	-

Note: * Average capital share per respondent who gave an answer "Yes" to the question : Are you willing to participate in group enterprise ?

Source : People's Intention Survey conducted by the JICA Study Team in September – October 1999.

It is notable that nearly a half (49.4%) of the interviewed respondents gave the answer: "not willing to participate in group enterprises". The reasons of this negative answer include : (a) no capital (30.9%), (b) difficult to work with others (29.6%), (c) no trust for leaders (20.4%), (d) cooperative is not strong (11.2%), (e) no benefits (4.6%), and so on. Since these reasons are mostly based on their past experiences and lessons, the problems seem to be deeply rooted. To overcome such problems and improve their living standards, there is a need to help to enlighten the interested people so that they can consolidate their community organizations through providing various support services, especially training programs. On the other hand, there is another example of successfully organized and run agricultural group in the area around Mayon Volcano.

For those who are willing to invest, a capital share or counterpart of PHP2,930 per household is acceptable. As far as livelihood support services are concerned, the resettlers say that the support services needed to sustain their livelihood are lacking in the resettlement areas. A "productivity center" is a support facility which the resettlers feel can help them.

9.1.3 Necessity of Proposed Support Programs

In September and October 1999, the People's Intention Survey was carried out by the JICA Study Team, with a view to grasping the needs and requirements of the resettlers and candidate resettlers in both the existing resettlement site at Banquerohan (Legazpi City) and the planned resettlement site at Anislag (Daraga Municipality), respectively. To improve the quality of life in the resettlement area, the following projects and programs are expected by the respondent resettlers:

1) Provision of basic infrastructure and facilities such as water, roads, bridges, irrigation facilities, training centers, market stalls, multi-purpose hall and schools (24.6%)[1],
2) Vocational training in the fields of auto-mechanic, dressmaking, cosmetology, food processing, electrical/electronics, banking and drafting (19.4%),
3) Support service needed is micro-credit as initial capital and individual loans (19.4%),
4) Dissemination of new technologies, introduction of new machinery and equipment, new farming technique, bakery management and meat processing (17.1%),
5) Establishment of cooperatives in abaca weaving, farmers and multi-purpose was cited as the fifth need (11.6%)
6) Market analysis such as selling of products, marketing assistance, marketing trends, price ceiling, and promotion of products by the local government units were cited as the sixth need (5.9%), and
7) Other important support services mentioned was the provision land (2.0%).

This appraisal given by the resettlers represents what they need to sustain their livelihood in the resettled areas. In addition to the construction of basic infrastructure projects, they require a wide range of supports including the vocational training on new practical skills, financial assistance like micro-lending, institutional strengthening services to form a cooperative, and market-related information.

Their needs relate to the four primary elements of project inputs: men (personnel & institution), goods (infrastructure & facilities and products), money (fund & finance), and information (education & enlightenment). To ensure the sustainability of the structural projects, it is indispensable to implement the supporting programs abreast, which are packaged with institutional, financial, technical and managerial services.

[1] Figures in parentheses are percentages to the total multiple answers.

9.1.4 Supporting Projects/Programs and Their Selection

In total, eight typical supporting projects and programs are proposed to be implemented abreast or as a package with the five anchor priority projects. The supporting projects and programs proposed in this Study consist of the eight projects and programs and they can be categorized into three groups: (a) livelihood development for resettlers, (b) area economic development, and (c) institutional strengthening as follows:

(Livelihood Development for Resettlers)

1) Organization and Strengthening of Multi-purpose Cooperatives with Micro-lending Component
2) Agro-industry Development Project
    - Abaca Production and Handicraft Development
    - Pilinut Processing
    - Coco Coir Production
3) Hollow Blocks Production

(Area Economic Development)

4) Aggregate Production Plant Project
5) Mineral Water Development Project
6) Productivity Enhancement Programs in the Protected Area

(Institutional Strengthening)

7) Provincial Disaster Management System Strengthening
8) Community-based Disaster Management Strengthening

In selecting these projects and programs, the present situations and problems mentioned in the previous Subsection were firstly scrutinized and reflected in the respective formulated projects and programs. Besides, especially about the livelihood and area economic development projects, they were selected based on the basic strategy worked out for prioritization of them in the Master Plan. These are:

a. Labor-intensive or employment generation scheme,
b. Utilization of local resources (material and expertise),
c. Prospects of marketability, and
d. Availability of the utilities (water and energy).

As area economic development projects, the three typical projects are proposed to be implemented for exploiting the local resources such as aggregate and mineral water, and enhancing the productivity in the protected area. Aggregate production plant project is closely related to the sound operations of the sabo project, and to be considered as its integral part. On the other hand, mineral water production applies to a "symbolic" project for area economic development, which dully fulfils some of the above-mentioned criteria: i.e. utilization of local resources and prospects of marketability.

The areas where the livelihood and area economic development projects are once realized will play a role as local growth centers in Study Area, and these centers as a whole contribute to promote the regional socio-economic development. The sustainable development of these projects is also expected to contribute partly to boost the per capita GRDP set for the Study Area in the target year of 2020. To attain this target, it is necessary for the LGUs concerned to implement the large-scale or pump-priming projects set forth in the respective area development plans. This will be done in close tie-up with the private sector and assistance from the national government agencies, international institutions (WB, ADB, etc.) and donor countries.

In proportion as this regional economy develops, an "economic surplus" will be generated. With the development of the area economy, the properties to be protected will increase accordingly. In this context, a part of the above economic surplus will be allotted to the disaster prevention. For strengthening the disaster prevention capacity of a community, it is essential to promote the area economic development. Although it seems to be a roundabout way, this is the best and only sure means to upgrade steadily the coping capacity and reach the goal and purpose of the comprehensive disaster prevention plan around Mayon Volcano.

9.2 Livelihood Development Program and Projects

9.2.1 Organization and Strengthening of Multi-purpose Cooperatives with Micro-lending Component

(1) Objective

The program aims to uplift the living standard of the resettled families through organizing multi-purpose cooperatives. The cooperative members will be given trainings on community organization, team building principles and practices, and project management.

(2) Project Description

Four hundred beneficiaries (200 each from the 2 sites) will be formed into cooperatives. They would be given organization and project management trainings, which will strengthen the cooperatives. The skills training using available community resources will also be given so that these materials can be productively utilized for their income generating projects. The program also hopes to give financial assistance in the form of loans to the members of the cooperative which they can use as seed capital for their livelihood projects.

(3) Beneficiaries

Target beneficiaries are cooperative members at Banquerohan and Anislag resettlement sites. There will be 400 direct beneficiaries (200 members in each site) at the start of the program.

(4) Expected Benefits/Outputs

1) The participants will be equipped with the basic knowledge and skills necessary to undertake standard cooperative activities.
2) The second phase will help the participants identify the resources available and will be provided with the necessary skills training.
3) The micro-lending finance will provide the participants seed capital for their own livelihoods.

(5) Conditions for the Project

1) Participants should be identified resettlers living in the two resettlement sites: Banquerohan (Legazpi City) and Anislag (Daraga Municiplaity).
2) The beneficiaries of the micro-lending scheme will have to be qualified members of the cooperative who have undergone all the pre-membership requirements of the CDA and all the trainings given.

(6) Estimated Investment Requirement (PHP in 1999 prices)

1) Trainings – 3 modules	:	950,000
2) Equipment for skills training	:	50,000
3) Micro-lending finance scheme	:	1,000,000
4) Administration cost	:	600,000
5) Total ……		2,600,000

(7) Implementing Agency & Relevant Agencies

As implementing body, a cooperative is to be formed by the interest resettlers. LGU will act a leading agency and others as cooperating ones which include CDA, DSWD, DTI, TLRC, LBP, etc.

9.2.2 Agro-industry Development Project

(1) Abaca Production and Handicraft Development

1) Rationale

The Bicol Region has been the center of abaca production and handicraft industry for many years until the advent of plastics and synthetic fibers. Cheaper and more durable plastics and synthetic materials flooded the market and the abaca started its decline from the 1970s. Because of this the price of abaca fiber plummeted and many abaca farms were abandoned and not taken cared of, causing a variety of diseases to destroy many farms.

Abaca fiber is in fact becoming an industry with a great potential for growth in Bicol, and to provide ample employment for many poor people. But for the opportunity to become a reality, there is a need to provide support to the handicraft makers, not only in terms of financial capitalization, but also in terms of constant market information and research on fashion trends, designs, new materials, and coloring.

There is therefore a need to establish a center where;

a. People can train and work at the same time;
b. Industry information can be compiled;
c. Research about new styles and material combinations can be done, and
d. Interested buyers or customers can always visit.

2) Objectives

The Project is intended to provide the resettlers a livelihood to improve their living standard. It is designed to produce handicrafts using local quality abaca materials to provide stably the agro-based industry to be set up. This handicraft production will provide the resettlers additional household income. The secondary objective is to develop a handicraft center that could serve as a training and research venue for the public.

3) Project Background

a. Production

Abaca or Manila hemp, as it is known in international trade is endemic in the region. About 84% of the world's supply of abaca come from the Philippines. Most of these come from the Bicol Region, and other provinces in the Visayas and Mindanao. On the annual average, Albay produces more than 980,000 kg of abaca, planted on about 4,500 ha of land. Abaca is planted in cool and shady areas, like under existing coconut plantations, the distance between coconut should not be closer than 10 m. Care should be taken that the areas planted are not waterlogged during the rainy season. Most abaca farmers do not use synthetic fertilizers, thereby, maintaining the natural soil ecosystem and minimizing pollution of the ground water.

In the Study Area, farmers are actively involved in abaca-based livelihood activities. Harvesting, hauling and stripping are male-dominated activities, while planting, sorting, drying are shared by both men and women. Women handle most of the marketing transactions. The native varieties of abaca produce 1,800 kg of fiber per ha per harvest. Harvesting in abaca plantations is done three times a year. The farm gate price of this fiber is PHP40 per kg. The market price of fine texture abaca is PHP100 per kg. Costs of plantation establishment, maintenance, processing and other materials used for a one hectare plantation amount to PHP35,000 on the first year. The estimated net income is realized at its second year of operation.

b. Processing

After harvesting, fiber extraction takes place. The processes involved are tuxying, pre-stripping, test run, and stripping. Stripping can be done in two ways, the traditional method (hand stripping), or semi-mechanized (spindle-stripping). The spindle machine can strip faster with fewer pulls, thus, producing more tuxies. It is processed into fibercrafts, cordage, textiles/ fabrics, nonwovens and disposable, pulp and specialty papers like currency notes, cigarette paper, meat and sausage casings, teabags, stencil paper, hi-tech capacitor and other specialty papers.

Drying and sorting takes place after stripping. The fibers are sun-dried or air-dried for one day in open areas. The fibers are sorted and twined. Abaca fibers can be made into sinamay, bags, placemats, slippers, hammocks, hand made paper, and other handicrafts.

4) Handicrafts

Bags, hammock, slippers, placemats are some of the handicraft made from abaca. The production of these handicrafts has been financial rewarding. These handicrafts items are favorite give-aways and gifts to friends and visitors/tourists, hence local demand is always there. Abaca handicrafts are exported to countries like Japan, USA and the United Kingdom.

Prices of these handicrafts vary according to size and style. Production of bags can generate an estimated annual net income of PHP297,000 equivalent to about PHP24,773 a month for the sale of 12,960 pieces of bags pegged at PHP60/bag. On the other hand, hammock making can generate a net income equivalent to about PHP13,770 a month.

5) Demand and Markets

As recent concerns for environment and the rising demand for natural fibers have increased the demand for natural fiber handicraft, abaca has nowadays vast economic potentials. Fibers extracted from abaca stalks are the strongest among natural fibers and can be substitutes to synthetic-based nylon, plastics and other non-biodegradable materials. The major buyers of abaca fibers are local processors and manufacturers of pulp, cordage, and fibercrafts. They get more than 60% of the total volume of fibers produced in the Philippines. Small abaca craft makers sell their products to wholesale buyers, while those with bigger capital bring them to market centers for higher selling price.

6) Project Components

a. Conditions of the Project

- A tie up with Bicol University or farmer cooperators may be necessary for the establishment of about 20-ha abaca plantation farm to supply the center with raw materials.
- Personnel to temporarily run the center for the initial two years should be detailed from the LGU, DTI, TESDA, and FIDA.
- A building of about 1,000 m^2 with offices, weaving and training room, storage room, laboratory room , and hand made paper de-pulping and working rooms. A Productivity center and equipment are needed for handicrafts production.
- The project should be a joint undertaking between the LGU, FIDA, DTI, and the cooperative. The initial expenses for running the center should be shouldered by the concerned government

b. Main Activities of the Project

The project will link with the Department of Agriculture (DA) through the Fiber Development Authority (FIDA), Department of Science and Technology (DOST), Department of Trade and Industry (DTI), and Technical Education and Skills Development Authority (TESDA) in the establishment of the Training Center.

The main activities of the project are:

- Providing employment to relocation center residents through sub-contracting work either done at the center or done at their own houses.
- Marketing
- Research Tie Up with Bicol University or DOST
- Training Programs

c. Productivity Center for Abaca Handicrafts and Handmade Paper

The Center will be a mini-factory which will link with exporters who would buy the products produced at the Center and provide continuous information for product development. At the same time, the Center will be a training area for weaving, dyeing, and handicraft making not only for the relocated families but also for other areas of the Albay Province.

7) Cost and Return Analysis of Abaca Utilization

The data on cost and return analysis of abaca production are given in Volume IV: Supporting Report (2), Chapter XXIII - Section 1.2.

(2) Pili Nut Processing

1) Objectives

The project aims to provide employment opportunities to the residents of the resettlement sites. They would be assured of a stable additional household income. The productivity center will provide the much-needed space and shelter for production of pili finished products. The project is also designed to develop a model factory with standardized packaging and preparation methods which can be adopted by the industry, and also serve as a training venue for the region.

2) Project Background

a. Production

Pili is an indigenous tree with varied uses, specially its nut. Commercial production and processing of pilinut kernel for food is done only in the

Philippines. Pili tree grows abundantly in the Bicol Region. The pili tree can thrive over a wide range of soil types and climatic conditions. The tree grows best in areas with rainfall evenly distributed throughout the year. It grows best in sandy loam soil high in organic matter at fairly low elevations ranging from sea level to 400m above sea level. Pili could be planted either by using seeds for seedlings or by grafting. Seeds germinate 30-45 days from sowing.

Grafting is preferred by some over seedlings because it ensures the production of quality fruits in lesser time, but grafted seedlings produce smaller trees. The pili tree bears fruits six to seven years from seedlings and three to four years from grafting. Harvest season begins in May and ends in September with July as the peak month. The fruits are harvested when their pulps are purplish black. Some pili trees planted from seedlings may not bear fruits on the sixth year. These might probably be male trees. They could be used to produce various woodcrafts.

In the plantation, weeding and fertilization are done by women, while in land preparation, men do the planting and hauling. Harvesting, processing and marketing of pilinut products are usually done by women. It also involves children who assist in the processing, while not in school.

b. Processing

Albay is well known for its delicious and nutritious pilinut delicacies. Processing of pilinut kernel for delicacies provide additional income to farmers, as well as provide much needed livelihood to processors. Pili confectioners are included in the list of promising industries in the Philippines. Delicacies from pili are exported to the United States, Canada, Australia, and Guam.

Pili nut kernels are made into mazapan, turones, pastillas, suspiros, molido, pili spread, pili nut brittle, crispy pili and sugarcoated pili. These products are a favorite “pasalubong (souvenir)” by local and foreign tourists. The prices of these delicacies vary according to the processed food. Pili delicacies are produced/processed form the kernels. Whole pili kernels with intact seed coat are roasted and packed. They are sold either by plastic bags or by plastic jars.

The spilit kernels are mixed in thick syrup until covered with white sugar coating. They are then glazed or coated with sesame seeds. When cooked,

these are packed and labelled/sold like crispy pili, carmelitos, conserva, and sugarcoat pili.

c. Resources for Livelihood Development

Pili is a very good crop for multi-farming. It is compatible with coconut and other fruit trees if proper distancing is maintained. The establishment of a pili plantation does not only provide livelihood opportunities to farmers and entrepreneurs but also fast track the re-greening program of the government. The tree is an attractive, sturdy and highly resistant shelter belt against winds that makes it a good reforestation specie.

The processing of pili poses no problem to the environment. The water used in depulping can be used for watering plants while the extracted pulp can be used as animal feeds and the excess pulp is food material for compost. The pulp is used as a nutritive delicacy, eaten as vegetable or sweetened as desert, while the shells are made into fashionable handicraft items. The seed coat is used for animal feed while the trunk can be made into woodcraft. The branches and twigs are excellent for charcoal and fuel wood, the resin has many industrial uses and the kernel is prepared into various confectioneries and snack food.

Pili production, processing and utilization of tree parts and fruits provide significant employment to farmers, fruit gatherers, processors and handicraft makers. Pili provides food, livelihood and income to both poor and rich people.

d. Marketing and Prices

Income derived from pili depends on the products sold and marketing scheme employed. Grafted seedlings sell at PHP40 per piece while seedlings sell at PHP7 per piece. Farmers can venture in planting stock production and derive income early enough to further production either in fruits or processed products.

Farmers and traders sell pili in unshelled or depulped form in sacks. Some sell in raw or kernel forms. There are two marketing practices employed by the buyers; pick-up and delivery. Wholesalers use a passenger jeepney in picking up or buying pilinuts from farmers.

Raw and unshelled pilinuts are bought by kilogram or by piece while shelled kernels are bought by kilogram or by the “ganta”. During peal season, raw or depulped pilinuts cost PHP20-25 per hundred, at farm level. Traders or

processors buy them at PHP20-21 per hundred. During lean months, raw or depulped pilinuts are bought at PHP35-45 per hundred at farm level and sold at PHP50-70 in the market. Kernels are bought at PHP 170-200 kg on peak months and at PHP250-300 on lean months.

3) Project Components

a. Conditions of the Project

- Land area is needed for plantation.
  - In the buffer zone proposed to be installed surrounding the sabo facilities, pili trees will be planted for both the environmental conservation of the area and agro-forestry development of the community.
- Skills training and seed capital for livelihood are required.
- Productivity center with processing equipment is needed.

b. Productivity Center for Pilinut Processing

The Project will link with the Department of Agriculture (DA), Department of Science and Technology (DOST), Department of Trade and Industry (DTI), and Technical Education and Skills Development Authority (TESDA) in the establishment of the Training Center.

The center will be a mini-factory which will link with exporters who would buy the products produced at the Center and provide continuous information for product development. At the same time, the center will be a training area for pili tree production and nut processing not only for the relocated families but also for other areas of the Albay Province.

c. Expected Benefits/Outputs

Harvesting of pilinuts is realized on the 6th to 8th year. Harvests of 1 hectare pili plantations will give an estimated annual net income of PHP50,000. Processing of pili into various handicrafts and food will give substantial and stable income to the whole members of the family.

4) Cost and Return Analysis

As for the cost and return analysis, please refer to Volume IV: Supporting Report (2), Chapter XXIII (Section 1.2).

(3) Coco Coir Production

1) Objectives

The project aims to generate employment opportunities for the resettled people by developing labour-intensive industry in or around the resettlement sites by making the most of the indigenous local products or coconut husks.

This project is also intended to develop a model training facility in coconut coir manufacturing which can be duplicated in other parts of the region

2) Project Background

The Philippines is the biggest producer of coconut in the world today. It is the biggest exporter of copra and copra oil in the world with a total share of 68% of the products exported to Europe and North America (PCA, Annual Report, 1997). Unlike India and Sri Lanka however, the Philippines do not have a developed coconut fiber industry to match its coconut production. It is estimated that the country produces about 11 billion coconut husks and only approximately 30% are being used as fuel for copra making. Almost all the rest of the coconut husks are burned.

In the context of regional development and poverty alleviation, the development of the coconut fiber industry is very important for the following reasons: (a) With 648,739 ha devoted to coconut plantation and with 253,226 farmers, the coconut industry covers practically 72% of the regional cultivated areas of 895,087 hectares. It therefore dominates the agriculture industry in the region (Regional Council Report, Feb. 1997); (b) The coconut farmers comprises the biggest poverty group in the Bicol Region with about 70% of the families falling below the poverty line (Poverty Survey, NEDA, 1989).

There is a growing interest and demand in the world for natural fibers for environmental concerns. Coconut fiber is the cheapest natural fiber in the world today. The greatest volume of farm waste in Bicol Region including Study Area consists of coconut husks. Almost 2.4 billion husks per year are gathered from the 674,400 ha of coconut land in the region. In Albay Province, 95,800 ha (49%) out of the total area is devoted to coconut in 1996, and more than 45,000 farmers are engaged in coconut production. Using coconut husks for coconut fiber production is ecologically advantageous as it would minimize accumulation of farm wastes, reduce harmful burning of husks and floating debris in coastal areas, as well as, reduce the clogging effects on drainage systems.

3) Production

a. Raw Materials:

Bicol Region produces 1.4 billion coconut husk wastes which are just generally burned. Bicol Region is one of the biggest producers of coconuts in the country today. For every 7 coconut husks, one kilo of coconut fiber and 2 kilos of cocopeat can be produced. Albay alone has 211 million coconut husks available even after producing copra. The available supply can produce 30,000 tons of coconut fiber and 60,000 tons of cocopeat. The project only projects a total of 2,000 tons of fiber and about 4,000 tons of cocopeat. Enough for the vicinity of 2nd and 3rd districts to supply.

b. Processing

Coir is obtained from the husk of the coconut. The husks contain about 30% fiber and 70% coir dust. Of the extractable fiber, 40% is bristle fiber and 60% is mattress fiber.

Fibers and coir dust from the coconut husks can be made into: brushes, ropes, twines, yarns, carpets, rugs, doormats, plant pads, growing medium for plants, soil mulches, conditioner, fertilizers, bed mattresses, upholstery cushions, car seat stuffing, caulking materials for boats, insulation materials, particle boards, pelletized fuel, and geo-textile nets. These ventures can provide farmers additional income aside from copra and lumber production.

Coconut fibers, owing to its durable quality, are sold to furniture manufacturers for use as cushion materials. They are also used for making carpets and doormats among handicraft makers. Furthermore, coconut fibers can be sold to boatmakers for use in boat construction, especially in plugging joints and in between woods to prevent leakage. Stitching factories buy raw coco-fibers as stitching materials for bed mattresses.

c. Resources for Livelihood Development

Coconut fibers are cheap and environmentally friendly materials for controlling riverbank erosion. Being porous in nature, it allows free exchange of water between rivers and adjacent field, recharging ground water, long lasting drainage and flood control measure. Furthermore, since cocopeat (coconut coir dust) are food materials for seedbeds for vegetables and tree seedlings, they could reduce dependence on expensive chemical fertilizers.

However, caution should be observed since large volumes of fresh coconut husk usually release brownish tannin or dissolved organic substances especially in stagnant water. Soaking of husks while inside fences in rivers can control this. Coir dusts could cause health problems among workers. Workers should then use face masks while working with the husks.

d. Marketing and Prices

Concerns for the environment has led many countries to shift from synthetic materials to natural materials. The following are the recent developments which make coconut coir in demand in the world market.

4) Erosion Control

Intensive construction activities in the world have given rise to more areas being opened for construction, especially in the uplands. This causes erosion problems and a more recent technology, called Bio-Engineering has become popular and heavily uses coconut fiber products to control erosion and enhance vegetative growth protection for eroded areas.

In North America alone, it is estimated that the erosion control industry is about US$ 2.5 billion a year. Current estimates put about 7% of the amount, or around US$ 175 million has been allocated for coconut or jute erosion control materials. The actual demand, however, is about 20% or US$500 million. The traditional supplier, India and Sri Lanka, could no longer supply the demand so the market still relies on synthetic fibers. (International Erosion Control Assoc. Report, 1997)

5) Building Materials/Furniture and Beds

Synthetic and asbestos insulation materials have mostly been gradually decreased recently because of health and environmental concerns. Many European countries, particularly Netherlands and Germany have started to adopt coconut fiber as an alternative. Rubberized or needle-punched coconut fiber materials are being used, although a little bit more expensive than rock wool and other materials.

Europe now currently imports about 73,000 tons of various coconut fiber products from India and Sri Lanka and they are valued at about US$120 million (Coconut Coir Board Annual Report, Sri Lanka 1996). It is estimated, however, that the actual figures are only 15% of the demand.

6) Cocopeat for Horticulture, Agriculture, and Gardening

The best development in the coconut fiber industry is the discovery of coconut fiber dust as very good soil conditioner, even better than peat moss. The trading for cocopeat, therefor, rose from almost none in the 1970s to almost 150,000 tons in 1996 (Coconut Coir Board Annual Report, Sri Lanka). The current demand for the product, because of the decline in peat moss supply, is about three times of what is being traded today.

In spite of its vast resources, there is practically no coconut fiber industry in this country.

Local market demand for fiber is high in November and December. Abroad, coco-fibers are sold to car seat manufacturers, bio-engineering companies and erosion control companies that use coco-fibers to make geo-textile nets for coastal use, area rehabilitation and erosion control. European countries and Japan make use of coconut coir dust (coco peat) in cutflower production. By year 1998, the total exports reached more than US$217 million, with Japan, USA, and Singapore cornering the large market.

7) Project Components

a. Conditions of the Project

A productivity center with the manufacturing facilities and equipment, together with the basic infrastructure development, coupled with skills training is very important.

b. Productivity Center for Coco Coir Production

The project will link with the Department of Agriculture (DA) through the Philippine Coconut Authority (PCA), Department of Science and Technology (DOST), Department of Trade and Industry (DTI), and Technical Education and Skills Development Authority (TESDA) in the establishment of a Training Center. The center will be a mini-factory which will link with exporters who would buy the products produced at the center and provide continuous information for product development. At the same time, the center will be a training area for pili tree production and nut processing not only for the relocated families but also for other areas of the Albay Province.

8) Expected Benefits/Outputs

Production of coconut husks into fiber and coir dust requires a production cost of PHP13,400 per year. However, it can give as much net income as PHP10,000. This product can further be processed into ropes, twines, and geo-textile nets.

9) Cost and Return Analysis

As for the data on cost and return analysis, refer to Volume IV: Supporting Report (2), Chapter XXIII (Section 1.2).

9.2.3 Hollow Blocks Production

(1) Objectives

The Project is intended to provide employment to the unemployed resettlers and accomplish the following:

1) To provide for an immediate response to the financial requirements of the cooperative initiated livelihood projects and enhance their capabilities through income generating projects,
2) To create/sustained livelihood activities that will help in augmenting the family income and attain better quality of life, and
3) To increase the beneficiaries sense of self-worth and improve their status in the community.

(2) Rationale

Poverty alleviation in terms of job creation is one of the primary concerns of the government. However, lack of funds to meet such demand is a strong deterrent factor for people who wish to engage in livelihood activities for income generation.

For the Mayon Volcano victims who were already resettled and/or to be relocated to the resettlement, one of the projects that could benefit these families is the "hollow blocks making". The sand to be used for this making will be excavated inside the sabo facilities proposed in JICA Master Plan. The hollow blocks making will be then operated under a recycling scheme so as to ensure sound and sustainable O&M of the sabo facilities.

Manufacturing of hollow blocks is one of the profitable ventures in the country today. Initially, the project would service the resettlement site development projects with hundreds of houses and public facilities to be constructed. Eventually, it can cater to the requirements of development sites and nearby areas

as well, with greater demand due to the increasing number of housing and industrial development projects. The investment would create employment opportunities for more than 1,000 beneficiaries' households.

(3) Target Beneficiaries

Members of the cooperative who are unemployed resettlers, and those residing in the neighboring barangays are the target beneficiaries. The cooperative will screen their beneficiaries based on the following qualifications.

1) Bonafide residents (or resettlers) in the resettlement sites
2) Willing to be relocated in the project area
3) Attended training conducted by the competent authorities/TESDA or with existing skills on hollow blocks making.

(4) Management Aspect

1) The cooperative will elect set of officers and Board of Directors.
2) The management of the Center will be undertaken by the cooperative.
3) Project implementation will be governed by policies/rules to be defined by the cooperative. Operation will be subjected to audit according to the rules of the cooperative.

(5) Market Aspect

The Project will initially cater to around 1,000 houses and several public facilities to be constructed in both Banquerohan and Anislag resettlement development sites. Demand will continuously rise as a result of other housing and industrial development projects that will be put up in nearby areas. The dwelling units at Phase I was designed with an area/space for expansion as derived by the occupant. Thus, this would create additional demand for the product.

(6) Materials and Tools Needed

1) Cubic feet, measuring box
   (To be used for measuring the sand. This could be purchased from the foundry shop and/or hollow blocks manufacturer)
2) Galvanized mold measuring 4" x 8" x 16"
3) Tin pail (10 liters)
4) Shovel
5) Wheel barrow
6) Hollow blocks stand

(7) Budgetary Requirement

The hollow blocks production requires the material, tools, supplies and personal services, and its budget is estimated at PHP3.1 million. The detailed breakdowns are given in Volume IV: Supporting Report (2), Chapter XXIII - Section 1.3.

(8) Participating Agencies

The main participating agencies are the Cooperative Development Authority (CDA), Technical Skills and Development Authority (TESDA), Cooperatives, and National Housing Authority (NHA). The respective roles and functions of the related institutions are given in Supporting Report (2), Chapter XXIII - Section 1.3.

(9) Project Justification

Resettlement greatly affects the socio-economic situation of the families. They are dislocated from their jobs and their houses destroyed.

In the light of these situation an economic intervention that is deliberate and developmental should be instituted. The Cooperative Development Authority, National Housing Authority and the Council will provide its economic intervention through a comprehensive and integrated delivery of a livelihood program that involves skills training with value formation and capital assistance. The need for providing capital assistance to the cooperative that will respond to the demand/needs to start the business.

To ensure recovery of the loan, a deed of undertaking will be signed by the Cooperative of Directors. The project is self-liquidating and self-propelling.

9.3 Area Economic Development Projects

9.3.1 Aggregate Production Plant Project

(1) Objectives

Aggregate production plant project is one of the proposed projects for regional economic development to enhance and sustain disaster prevention capacity. The objectives of this Project are:

- To contribute to the development of regional economy through production and marketing the aggregates.
- To utilize the dredged materials for the maintenance of the proposed sand pocket as the goods for marketing so that a cost turns to be a benefit.

(2) Quality of Aggregate Materials

The features of dredged materials are given in Supporting Report (2), Chapter XXIII - Section 2.1, together with those being excavated in other areas of Bicol Region.

The quality of the proposed dredged material is not an excellent ones but is acceptable as an aggregate of construction works.

(3) Present Aggregate Production

1) Present Annual Exploited Volume

There are several small to middle scale enterprises who quarry sand and gravel from the deposit sites of mud and debris flow. Their quarrying sites are located near the provincial road. Excavation and hauling of the aggregate are mostly manual and their transportation is ordinary by truck. In Legazpi City, there exists only one middle scale quarrying company with a production capacity of 150 t/h. The annual average exploitation volume of the aggregate from the slopes of Mayon Volcano is estimated to be 216,000m^3 as shown below.

Present Annual Exploited Volume from the Slope of Mayon Valcano

River Basin	Sand (-9.5mm) (m^3)	Gravel (75-150mm) (m^3)	Boulder (150mm -) (m^3)	Mixed S&G (m^3)	Total (m^3)	Percentage (%)
Yawa	23,059	300	100	1,808	25,267	12
Pawa-Burabod	1,047	630	499	4,301	6,477	3
Anoling, Budiao	2,308	783	1,033	9,092	13,216	6
Quirangay	467	133	117	2,867	3,584	2
Ogsong, nasisi	78,468	14,023	7,398	10,476	110,365	51
Buang	267	342	367	653	1,629	1
Quinali (B)	0	0	17	10,032	10,049	5
San Vicente	2,717	1,250	800	2,617	7,384	3
Arimbay	517	283	67	2,083	2,950	1
Padang	6,150	1,283	1,967	5,500	14,900	7
Basud	4,500	5,583	2,050	500	12,633	6
Bulawan	4,275	1,992	867	350	7,484	3
Total	123,773	26,604	15,280	50,279	215,936	100

Note: Figures are the averages of three years from 1996 to 1998.
Source: Environment & Natural Resources Office, Albay (ENRO)

The sand and gravel thus produced have been used in the construction works in and around the Study Area as aggregates although some have been transported up to Naga City. The demands in and around the Study Area are expected to be far beyond the supply.

2) Mining Concession

Environment and Natural Resources Office, Albay (ENRO), has controlled mining concession. One who exploits the aggregate is to pay tax in proportion to the exploited amount in accordance with the list shown below.

Tax Rates Imposed on Exploitation

Kind of Material	Size of material (mm)	Tax for Extraction (peso/m^3)
Sand	less than 9.5	8
Gravel	9.5 – 150.0	19
Boulder	more than 150.0	12
Mixed sand and gravel	mix of sand and gravel	6
Pebble (limestone, used for wall facing)	±30 mm	50

Source: JICA Team

(4) Demand Forecast

1) Annual Demand by Project

a. LGU Level Projects

The municipalities of Tabaco, Malilipot, and Sto. Domingo have the following development projects:

- Tabaco : Tabaco Reclamation and Development Project
- Malilipot : Malilipot Local Government Unit Complex
- Sto. Domingo : Basud River Flood Control Project (Operation & Management)

The aggregate demands for the respective projects are estimated below:

Aggregate Demand for LGU Level Projects

Municipality	Work Item	Implementation Period (year)	Quantity (m^3)
1. Tabaco	Reclamation	10	8,800,000
2. Malilipot	Reclamation	5	12,000
3. Sto. domingo	Reclamation	5	440,000
Total	-	-	9,252,000

b. Provincial Level Projects

NEDA has the "Master Plan for the Legazpi-Iriga-Naga-Daet Growth Corridor Project/Program". The general profiles of the development projects are given in Supporting Report (2), Chapter XXIII - Section 2.1.

The aggregate demand is not identified yet.

c. DPWH Road Network Plan

DPWH has road development plan in the Bicol region. The estimated demand for sand and gravel in this plan is assumed as follows.

Future National Road Network Plan in Bicol Area

New Road and Road Extension (km)	Concrete (30%)	Asphalt (20%)	Gravel (20%)	Total
Bicol Area	163.58	39.87	70.81	274.26
Sand and Gravel Volume (m^3)	Concrete	Asphalt	Gravel	Total
Bicol Area	367,237	56,456	100,267	523,960

Note: Estimated Project Period = 10 years

Source: Prepared by JICA Team based on the data from DPWH Region V.

d. Sabo Works around Mayon Volcano proposed in the JICA Study

The proposed sabo projects will be one of the major consumers of sand and gravel as estimated below:

Aggregate Volume for the Sabo Works around Mayon

River Basin	Sabo Dam		Dike		Total Aggregate Volume to be Needed (m^3)
	Length (m)	Volume (m^3)	Length (m)	Volume (m^3)	
Pawa-Burabod	450	30,420	600 (A) 4,075 (B) 375 (C)	18,456 214,508 22,496	285,880
Anoling, Budiao	650	43,940	1,725 (A) 1,800 (B)	53,061 94,752	191,753
Quirangay	350	23,660	950 (A) 700 (B)	29,222 36,848	89,730
Masarawag	100	6,760	1,250 (A) 2,050 (B) 1,050 (C)	38,450 107,912 62,990	216,112
Buang	0	0	1,150 (B)	60,536	60,536
San Vicente	700	47,320	1,950 (A) 4,250 (B)	59,982 223,720	331,022
Padang	350	23,660	3,950 (A) 600 (B)	121,502 31,584	176,746
Buang	0	0	1,150 (B)	609,536	60,536
Basud	350	23,660	2,500 (A) 500 (B) 2,000 (C)	76,900 26,320 119,980	246,860
Bulawan	0	0	1,350 (B) 3,050 (C)	71,064 182,970	254,034
Total	2,950	199,420	35,875	1,653,253	1,852,673

The unit sand and gravel volumes for each of dikes and sabo dams are as follows:

- Type A : 30.76 m^3/m
- Type A : 30.76 m^3/m
- Type A : 30.76 m^3/m
- Sabo Dam : 67.60 m^3/m

2) Total Annual Demand Forecast

The total aggregate demand in the Study Area is estimated at around 1.19 million m^3 per year as summarized below:

Estimated of Total Annual Demand

Item	(A) Aggregate Volume ($1000m^3$)	(B) Project Period (year)	(A)/(B) Annual Demand ($1000m^3$)
LGU Level Project	9,252	5 - 10	925
Provincial Level Project	1,410	10	141
DPWH Road Network Plan	524	20	26
Sabo Works around Mayon	1,853	20	93
Total	13,039		1,185

(5) Aggregate Supply Capacity

1) Sand and Gravel Deposit

The promising rivers for aggregate exploitation are:Yawa, Pawa-Burabod, Anoling, Budiao, Quirangay, masarawag, Ogsong, Nasisi, Buang, Quinali(B), San Vicente, Bulawan, Basud, and Padang .

2) Annual Amount of Materials to be Dredged

DPWH is to carry out dredging in the proposed sand pockets to maintain the function of the facilities. The following are the material volumes to be exploited as aggregate. The annual total volume of aggregate to be dredged amounts to about $616,000m^3$ in seven major sand pockets schemed around Mayon Volcano (for more detailed information, refer to Supporting Report (2), Chapter XXIII - Section 2.1).

Annual Amount of Sand and Gravel to be Dredged from Sand Pocket

(for Space Maintenance)

Sand Pocket	A Sand Pocket Capacity (m^3)	B Sediment Flow Deposit in 30 years (m^3)	(B – A) Total Excess Material Volume (m^3)	(B – A)/39 Annual Dredged Material (m^3)
Pawa-Burabod	14,960,000	6,257,400	-8,702,600	-
Anoling, Budiao	13,600,000	17,999,100	4,399,100	146,637
Padang	13,500,000	6,322,08	-7,177,920	-
Basud	8,000,000	5,936,880	-2,063,120	-
San Vicente	12,015,200	9,175,110	-2,840,090	-
Masarawag	4,320,000	10,611,990	6,291,990	209,733
Quirangay	1,710,000	4,668,300	2,958,300	98,610
Total	68,105,200	60,970,860	13,649,390	454,980

The maintenance works of the proposed sabo facilities would produce aggregates of $614,000m^3$ per annum. This assumed production ($614,000m^3$) and the existing

exploitation volume of 216,000m^3 total 830,000m^3 per annum, which would not reach the forecasted demand of 1,185m^3.

(6) Aggregate Production Plan

1) Basic principles for the Aggregate Plant Planning

The objectives of this Project are enunciated in the first paragraph of this Chapter. The following are the basic principles to formulate the aggregate development plan in conformity with the said objectives;

- The proposed plan will be feasible as a business because the targeted market is stable. In this connection, the demand emanated by the proposed sabo project of the Yawa river should be focussed.
- The proposed plan will not affect the existing quarrying enterprise significantly and the production capacity should be so designated as to enable to coexist with those existing.
- The proposed plan should contribute to the sustainability of the proposed sabo project. Accordingly, the plan will envisage the dredged materials for the maintenance works of the proposed sand pocket.
- In order to make the business sustainable, acquisition of raw materials needs to be stable with appropriate price.
- To make the business profitable, the effectiveness of the proposed plant is to be pursued. In this connection, the rates of operations should be deliberated.
- To make the business profitable and sustainable, the operation cost should be minimized. In this connection, the minimization of transportation cost should be due regarded.

2) Production Capacity

The demand that has not been foreseen by the existing enterprises might be ones of the proposed sabo projects. Therefore, there are very low possibilities to incur conflicts with them as far as the proposed aggregate plan envisions the demand related to the proposed sabo projects.

The sand pockets proposed in the Yawa river is supposed to yield the aggregate demand of 478,000m^3 within the proposed implementation period of 2.5 years. The average annual demand is estimated to be 191,000 m^3. Meanwhile the dredged materials in the proposed Yawa river sabo projects is estimated to be 160,000m^3 per annum with the dredging in the proposed Pawa-Burabod sand pocket of 13,000m^3 and Anoling-Budiao sand pocket of 147,000m^3. The estimated inflow to the proposed Pawa-Burabod sand pocket is 209,000m^3 per annum. This implies that the exploitation of 209,000m^3 per annum is the

harmless volume for the sand pocket. Consequently the production capacity of 356,000m^3 is adopted for the aggregate plant. This amount will suffice the demand of the Yawa sabo projects of 191,000m^3 and consume all the dredged materials for the maintenance. Moreover, the amount will extend the life of the proposed Pawa-Burabod sand pocket.

The production capacity of the proposed plant is 1,480m^3 per day assuming 20 working days per month. The hourly production capacity is 230m^3 assuming 6.5 operation hours a day.

3) Aggregate Plant Component

Main equipment for aggregate plant include crusher plant, dump truck, pay loader, backhoe, and bulldozer. In addition to the equipment, office, laboratory, warehouse, plant yard, and stockyard for raw material and products are necessary.

In order to enjoy scale factor, all the production works are concentrated to one plant. In this connection, barangay Mabinit is proposed as the aggregate plant with a capacity of 250 m^3 per hour since the substantial raw materials are to be exploited from the Pawa-Burabod sand pocket. The materials from Anoling-Budiao sand pocket will be conveyed to the plant site through the existing provincial road. The necessary plant yard is estimated to be 4.0 ha including 20 ha of stockpile yard. The specificaitons of equipment are as follows:

- Crashing plant x 1 250 m/h
- Pay loader x 1 2.5 m
- Backhoe x 1 1.2 m
- Bulldozer x 1 22 t with ripper
- Dump truck x 10 11 t
- Generator x 3 250 Kva

4) Cost Items

The cost requisite to the proposed aggregate plant consists of investment and running costs. Investment cost comprises the costs for equipment, construction of office and yard preparation. Running cost includes the costs for manpower, OMR of equipment, office and yard as well as taxes.

a. Investment Cost

The investment cost is estimated at PHP81.4 million as broken down below:

Investment Cost

Item	No.	Unit Cost (pesos)	Total Cost (pesos)	Remarks
Crashing Plant	1	32,000,000	32,000,000	Production Capacity: 250 m^3/hr/1 plant
Generator	3	2,400,000	7,200,000	Spec. of Generator: 200 kw/0.8 = 250 KVA, 1 plant needs for 2 generators
Pay loader	1	4,300,000	4,300,000	New, Bucket Capacity: 2.5m^3
Dump Track	10	2,200,000	22,000,000	New, Bucket Capacity: 10m^3
Back Hoe	1	7,100,000	7,100,000	New, Bucket Capacity: 1.2m^3
Plant Yard	1	2,500,000	2,500,000	Office include
Bulldozeer	1	6,270,000	6,270,000	With ripper
Total			81,370,000	

b. Running cost

The estimated exploitation tax is PHP4.6 million assuming the rate of PHP13 per m^3. The proposed aggregate business might employ about 49 staffs. The cost for manpower employment is assumed to be PHP3.1 million (for detailed cost data, refer to Supporting Report (2), Chapter XXIII - Section 2.1).

The annual maintenance cost of the equipment and office is calculated applying 10% of the total investment cost or PHP81.4 million per annum. The operation cost of the plant is estimated at PHP4.1 million per annum considering the fuel consumption. The total running cost is estimated to be PHP19.9 million.

5) Financial assessment

The prevailing price of aggregate is assumed to be PHP130 per m^3. The annual sales amount is estimated to be PHP46.3. The annual benefit to be obtained by running the proposed aggregate business is estimated to be about PHP26.4. The investment can be paid back in about 3.1 years without interest.

6) Recommendations

The aggregate business justifies its financial viability. The early establishment is recommended. The business should be on operation before the commencement of the construction works of the proposed sand pocket project. The implementation organization should be designated as soon as possible. Likewise, EIS should be conducted as soon as possible.

The facilities such as water supply, drainage, electricity, communication system and road should be so developed as to contribute for the benefit of the related barangay.

9.3.2 Mineral Water Development Project

(1) Introduction

The mineral water development project aims at contributing for the development of the regional economy through introducing a sustainable industry in the most economically depressed region in the country.

The estimated mean annual precipitation depth in the Study Area is 3,000mm according to the recorded data observed in Legazpi. The gauging station is located at lower elevation than 100 m. The mountain slopes with higher elevations might have received much more rainfall. In addition, the estimated average annual rainy days of 210 days distribute through out the year almost evenly. Meanwhile, a part of received rain water intrude deep into the soil and become groundwater with high quality by the purification effect and mineral contents of volcanic deposit.

In the circumstances, a mineral water development project at the foot of Mayon Volcano is recommended.

(2) Present Conditions

Test exploitation of water has been done in and around Carayucay, a barangay of Municipality of Santo Domingo, to examine the quality and quantity of the resources preliminarily.

(3) Quality of ground water

According to a result of the inspection at the laboratory of above test exploitation, the physical components of the resources are as follows:

Physical Components of the Resources

Components	
Total Dissolved Solids (Parts Per Million)	PPM 99
Calcium	1
Magnesium	0.19
Iron	< 1
Chloride	4

(4) Quantity of ground water

Based on the estimated mean annual precipitation (3,000mm), the quantity of groundwater is estimated in the following manner.

1) It is assumed that 1,000mm/year of received rain water will intrude deep into the soil.
2) It is assumed that 20% of this 1,000mm/year can be pumped from a well, and the remaining water will pour into the sea.
3) As a result these assumptions, the amount of 0.2m/year/m^2 equivalent to 2,000m^3/year/ha might be exploited.

(5) Demand for Domestic Water

According to the JICA study report titled "Natural Water Resources Management Study, 1997", Metro Manila, Metro Sebu, and Baguio City are identified as a significant water critical areas. It means that water supply development is a emergency issue for the areas. Thus, potable water also has a great demand for the areas. Meanwhile, at present many kinds of bottled mineral water are selling in the local market. The market prices of bottled mineral water are about 30 PHP/liter for local products and more than 50 PHP/liter for imported ones. The market of bottled mineral water is expected to be further expanded.

(6) Market Aspect

The operation of production will be carried out initially to sell the mineral water to the places lacking in water in the country, and then may be expanded to export it to foreign countries.

(7) Planning of Mineral Water Plant

The facilities to be prepared at the mineral water plant in principle are as follows:

Facilities in the Mineral Water Plant

Facilities
1. Exploitation facility
Well and pump
Intake
Utility
2. Conveyance facility
Water conveyance channel and pipe
Utility
3. Plant and laboratory
Purification plant
Laboratory
4. Building and civil works
Office, factory and laboratory buildings
Access road
Yard
5. Storage and loading facility
Storage tank
Loading facilities for bulk and bottled water
Storage yard
Utility

On the assumption that concession area is 500 ha in the Santo Domingo Area, the production capacity is estimated at 1.0 million m^3/year on the basis of the estimated quantity of exploitable groundwater (2,000m^3/year/ha).

(8) Cost Estimate

The construction cost of the mineral water plant with this assumed production capacity is roughly estimated as follows.

Estimated Construction Cost of the Mineral Water Plant

(Unit: 1,000PHP)

Facility	Unit	Quantity	Total
1. Deep well drilling (20 m depth)	unit	15	4,500.0
2. Submersible pump, 5 HP (3.7 kW), cap. = 0.2 m^3/min	unit	15	2,250.0
3. Elevated water tank, 10,000 gal.	unit	15	8,100.0
4. Distribution PVC pipe	L.S.		4,000.0
5. Purification plant	unit	15	3,000.0
6. Laboratory equipment	L.S.		2,000.0
7. Office, factory and laboratory buildings	L.S.		3,500.0
8. Storage and loading facilities	L.S.		3,000.0
9. Civil works (Access road, yard etc.)	L.S.		8,000.0
10. Others (30%)	L.S.		11,505.0
Grand Total			**49,855.0**

It should be noted that this construction cost does not include the cost of bottling facility, transportation, administration and engineering services, since a bulk business is possible and the works of bottling and transportation can be contracted separately.

(9) Financial Assessment

The prevailing price of mineral water in bulk is assumed at 30 PHP per m^3. The annual sales amount is estimated at 30,000,000 PHP.

The total annual running cost is assumed at about 19,900,000 PHP equivalent to 40% of construction cost. Thus, the annual benefit to be obtained by running the proposed mineral water business is estimated at about 10,100,000 PHP. The investment can be paid back in about 4.9 years without interest.

9.3.3 Productivity Enhancement Programs in the Protected Area

(1) Present Situation and Scenario for the Project Area

The land around Mayon Volcano is very fertile, but agricultural production has remained very low. The present area to be protected by the project totals 2,339 hectares and about 1,850.34 hectares is currently being used for agricultural production; broken down as coconut lands, 811.068 hectares, non-irrigated paddy, 310.746 hectares, and irrigated paddy, 728.526 hectares (JICA Land Use Map, 1999).

Due to lack of farm activity, the agricultural land utilization is not maximized, and the productivity is quite low compared to the potential of the crop.

Productivity per Crop Type

Crop Type	Current Yields	Potential Yields	Percentage of Potential
Coconut	33/tree/year	55/tree/year	60%
Rice	2.97 tons/year	14.75 tons/year	20.1%
Corn	2.03 tons/year	15 tons/year	13.5%

Source: Bureau of Agricultural Statistics-Department of Agriculture
Provincial Agricultural Office

There are no easy solutions to low productivity and poverty, as each location has its own development peculiarities. For the case of the areas surrounding Mt. Mayon, however, calamity is a factor, which directly or indirectly affect productivity. Lessening the risk of crop losses caused by flooding or intense water flow, could encourage the farmers to invest more in the crop inputs.

For the purpose of this Study, crop productivity is envisioned to be raised to at least 65% the potential for rice, and 40% for corn.

(2) Cause and Effect of Low Productivity in the Protected Area

The land area around Mayon is one of the best areas for agro-industrial development in the province. Siltation from the slopes of the mountain keeps the soil fertile and the constant supply of fresh water is suitable for agro-industrial activities. The full potential of the land is not, however, taken advantage of by the farmers because of fear of calamities, lack of technical knowledge, and lack of sufficient capital to invest into the farm.

Even with these excellent conditions, the productivity of the farmers in Albay has been generally low. The main reasons for the low farm productivity of the farmers in the project area, are ignorance, lack of capital to invest in farming due to poverty, and calamities due to adverse weather conditions. The very low productivity due to poverty is also the cause of the increasing poverty situation in the area. The following table shows the household expenditure data in the Project Area.

Project Area Household Expenditures

(Unit: PHP)

	Relocation Center Respondents November 1999		Proposed Protected Area (November, 1999)		Poverty Study of Albay, 1989	
Items	Family Average	%	Family Average	%	Family Average	%
Food Meals	30,911.45	63.34	31,916.30	64.30	14,632.73	73.63
Clothing	1,447.78	2.97	2,690.30	5.42	562.41	2.83
Education	4,963.12	10.17	5,549.37	11.18	2,215.88	11.15
Medicine	1,900.03	3.89	1,315.37	2.65	347.78	1.75
House repair	2,280.75	4.67	1,226.02	2.47	268.29	1.35
HH asset acquisition	1,698.39	3.48	1,360.04	2.74	139.11	0.70
Fiesta/special occasion	1,416.19	2.90	1,255.80	2.53	343.81	1.73
Recreation	200.83	0.41	312.71	0.63	125.20	0.63
Wine/Cigarette	922.84	1.89	684.98	1.38	254.38	1.28
Repayment of non-farm loan	1,544.69	3.17	1,171.42	2.36	288.16	1.45
Repayment on-farm loan	56.22	0.12	367.31	0.74	59.62	0.30
Expenditures on farm inputs						
Seeds	59.04	*0.12*	94.31	*0.19*	15.90	*0.08*
Fertilizer	411.79	*0.84*	446.73	*0.90*	151.04	*0.76*
Pesticide	136.58	*0.28*	143.95	*0.29*	47.70	*0.24*
Labor	138.96	*0.28*	153.87	*0.31*	81.48	*0.41*
Animal stock	176.39	*0.36*	263.072	*0.53*	117.25	*0.59*
Feeds	345.79	*0.71*	461.62	*0.93*	129.18	*0.65*
Biologics	10.56	*0.02*	19.85	*0.04*	11.92	*0.06*
Others	180.44	0.37	203.51	0.41	81.48	0.41
Total	48,801.84	100.00	49,636.54	100.00	19,873.32	100.00

Sources: (1) Results of the People's Intention Survey conducted by the JICA Study Team, October – October 1999;

(2) Rapid Appraisal Survey on Proposed Protected Area carried out by the JICA Study Team, and

(3) Albay Province-Wide Resources Inventory and Mapping and Poverty Study, 1989.

According to the People's Intention Survey, the residents in the resettlement site are still going back to farm along the slopes of Mayon and have very little income from farming. Income from farming among the families who have resettled is probably lower because they have tried to plant in their farm, which are now prone to repeated destruction during heavy rain. Either the poor productivity was caused by the excessive sand and gravel deposits in the farm, or succeeding crop damages may have affected their calamity prone area.

Project Area Household Expenditures clearly shows the lack of capability of the farmers to invest in the farm. Only a little more than 2% of the expenditure budget is spent in the farm inputs and majority is spent on food and essentials. It can be noted that even if the main expenditure is on food, the child malnutrition rate in the area remains high, ranging between 25 to 35% for children up to 12 years of

age (DSWD, National Nutrition Council Report 1997). Any additional investment, therefore, in the farm would mean greater sacrifice on the daily life of the farmer, especially if the crop becomes a failure. The amount of investment they are putting therefore, is only less than 15% of the required. Almost all their income is spent for basic necessities. There is no room for more investment into farming except their own labor.

It can be observed from the above table: Project Area Household Expenditures that the farmers in the relocation centers had a deficit year during the survey. They spent PHP6,727.17 more than they earned for the year. They particularly experienced a loss in their agricultural investment where they invested on the average of PHP1,279.11 and only harvested PHP1,242.32 worth of products from the farm. It may have been caused by damage due to weather.

A poverty mapping survey for Albay commissioned by NEDA shows that considerable number of rural area residents belong to the lower income group which barely makes ends meet to be able to survive.

According to the table given in Supporting Report (2), Chapter XXIII (Section 2.3), about 78.8% of the farmers belong to the low income level which can not make the necessary farm investment. It can, therefore, be concluded that almost 78.8% of the farms in the area are being farmed by people who cannot afford to make the necessary investments in the farm. As such, most of the rural farmers have very low income that their capability to invest in a crop, especially if there is risk of loss, is very low.

There is also the problem on lack of technical knowledge of the farmers. Out of 180 farmers surveyed, none said that they are actively using organic fertilizers (JICA Survey). This is evidenced by the lack of nitrogen content and organic matter content of the soil in the area.

Because of this, agricultural production, in spite of the presence of the necessary technologies, has remained low in the past 10 years, approximately 2 tons for corn, and 3.5 to 4.0 tons for rice (for more detailed data, refer to Supporting Report (2), Chapter XXIII - Section 2.3).

(3) Topographic Condition, soil Fertility, and Present Land Use of Project Area

1) Topography

The project area is characterized by varying slopes from the six-kilometer radius to the Yawa River where much of the water run-off from the slopes drain. Much of the paddy fields and vegetable farms are located on the gentle slopes with 1 to

5% inclinations. Non-irrigated areas are located mostly on 60 to 110m elevation with gentle slopes up to 7%. Much of the coconut lands are above 120m elevation and with slopes from 7 to 10%.

Although the slope is still suitable for agriculture, water and silt retention in slopes is an essential part of any agricultural activity in the project area. Unfortunately, many of the farmers are lowland farmers trying to practice lowland agriculture on the slopes.

2) Soil Fertility

The upper area beyond 150m elevation is generally composed of Mayon Gravelly Loam, most of the areas at 50 to 150m elevation are of the Legazpi Fine Sandy Loam (Stony Phase) type and below the 50m elevation is Legazpi Fine Sandy Loam.

The soil is very suitable for agriculture especially for crops other than rice. The loose characteristics of the soil allow good water drainage from the surface while allowing for sufficient air in the soil for root growth. The nitrogen content is low at 0.15 to 0.3% and calcium at 3 to 15 ppm. The soil pH is mostly alkaline and therefore very responsive to fertilization.

The rice lands have formed a natural hard pan of clay and silt for water retention. Surveys made by the JICA Study Team, however, have indicated the lack of use by farmers of both organic and inorganic fertilizers, depleting the nutritional contents of the soil and thereby decreasing yields.

3) Present and Prospective Land Use

Many of the farmers cultivating the slopes of Mayon have their origins in the lowlands and are practicing lowland methods of farming. As shown on previous tables, these practices are often not very productive and promote further erosion and decrease in soil fertility. The existing and prospective land uses are summarized in the following table (for detailed information, refer to tables in Supporting Report (2), Chapter XXIII - Section 2.3).

Summary of Changes in Projected Land Use for the Proposed Protected Area Up to Year 2020

Land Use	Existing		Projected		Increase or Decrease	Percent Change (%)
	Total (ha)	%	Total (ha)	%		
Paddy						
Irrigated	725.526	31.01	761.280	32.55	35.754	4.9
Non-Irrigated	248.212	10.61	310.746	13.28	62.534	25.19
Coconut Land	723.139	30.91	811.068	34.67	87.929	12.16
Agro-Forestry Land	423.816	18.12	51.576	2.20	(372.24)	-87.83
Residential Land	121.238	5.18	259.860	11.11	138.622	114.33
Commercial Industrial	53.483	2.28	92,080	3.93	38.597	72.16
Education and Institutional	25.473	1.09	34.279	1.46	8.806	34.56
Roadways	18.140	0.77	18.140	0.77	-	-
Total	2,339.027	100.00	2,339.027	100.00	-	-

Source: JICA Land Use Map, 1999

(4) Proposed Agricultural Production and Cropping Pattern

The primary objective of this proposed cropping pattern is to increase the productivity of the farmers without having a destructive effect on the slopes. The capability of the slopes to absorb more water and release it slowly to the soil will have a balancing effect on the supply of water through springs and brooks to the agricultural of the farms and irrigation systems.

For ease of implementation, the proposed cropping pattern does not drastically change the present land use but instead introduce improvements through additional technological knowledge and investment into the farm. With a farm area more secure from calamities than before, more investments can be done to improve the farm and previous efforts and expenses incurred in the past in repairing and desilting canals every time there is a strong rain, could be spent in farm inputs for a more intensive farming activity.

1) Suggested Crops:

a) Abaca (*Musa Textilis)*

Abaca are succulent plants like banana which are also shade loving. They are about 93 to 95% water but the fibers are very long and easy to extract manually with stripping knives. The local varieties, Tinawagang Pula and Tinawagan Puti, and the newly developed varieties, Musa Tex 50 to 52 will be propagated. They are known for their adaptability in the area and good equality fiber especially for handicrafts.

b) Pilinut (*Canarium ovatum)*

Pilinuts are big trees with almond shaped fruits about 5 cm in length. Its pulp is rich in protein and its kernel is a delicacy in the Philippines. It is only grown in the Philippines and 82% of the country's supply comes from the Bicol Region. It has very great export potential. The local varieties will be used for propagation.

c) Moras (*Vetiver zesanoides)*

Moras or Vetiver is now a very well known grass in the world for its effectiveness against erosion. Its roots are very extensive and long and its stem can withstand strong runoff. Planted as line hedges, it makes one of the most effective erosion control methods practiced by bio-engineers today. It has an aromatic scent and its oil can be extracted for mixing with pesticides, detergents, etc.

d) Lemon Grass (*Paja de meca,* and Citronella)

These are aromatic grasses which can easily grow in sandy soils and are drought resistant. They are also known as spices and the oil is also being extracted for mixture for detergents and other products.

e) Rice (*Oryza sativa)*

The varieties that shall be recommended the project site are PSB-RC18, RSB-RC14 which have been developed at Philrice at Munoz, Nueva Ecija and are found suitable for the purpose of intensive cropping system because of its shorter maturity duration.

f) Corn (*Zea mays)*

The variety of corn that will be used here will be the open pollinated varieties from the Institute of Plant Breeding so that the farmers can grow their own seeds.

g) Mungbean (*Vigna radiata)*

Although the farmers along the slopes of Mayon produces a wide variety of vegetables these two vegetables are used as the basis for economic computation for feasibility of producing vegetables in the area.

h) Agoho (*Casuarina equisetifolia)*

This is a very sturdy perennial tree which propagates through seeds which fall on the ground and are carried away by rainwater along the slopes of Mayon. It grows very well in the sand and can become a large tree. People in Mayon use these trees as house building materials and for firewood.

2) The utilization of Uncultivated and Gravel and Sand Covered Areas

Especially if the dikes are constructed, much of the 423 ha in the protected areas made idle by deposition of gravel and sand from the volcano can be gradually recovered.

Even if the sand and gravel surface that accumulated in the surface is carried away by water or taken through gravel and sand business, it will still cost the land owner an average of PHP10 per square meter for irrigated rice paddy and PHP2.5 per square meter for non-irrigated land to rehabilitate the area. It is estimated that 372 ha will be reclaimed in this manner in case the protection dikes are built.

These exposed land areas are still very prone for further erosion. It is therefore advisable that they be covered with vegetation especially if they are near gullies or is susceptible to flash flooding.

To cover these areas with the erosion control plants, it is necessary to establish nurseries to propagate planting materials. A distilling plant should be introduced in the project area to support this program. It is also necessary that technical assistance be provided to the interested farmers.

3) The Coconut Area

With an area of 723 ha, the coconut area is the quite large, but still very little utilized. The coconut trees are planted only as single crop and no fertilization is applied. As a result, the coconuts in the area only produces 33 nuts per tree, which is low compared to the potential of 55 nuts per tree. For the project area, they are dominant in areas with elevations of more than 100m. To maximize the coconut area, the project has identified areas where they may raise abaca, coffee, pilinut, or grass under the coconut tree.

In order to accelerate the development of coconut farms, it is necessary that the following activities be undertaken:

a. Organization of the farmers into Cooperatives
b. Training programs on technologies on coffee, abaca, pilinut, and aromatic grasses
c. Establishment of nurseries for propagation of planting materials
d. Financing arrangements with Land bank or any financial institutions

4) The Rice Farms

The un-irrigated rice farms can be assisted to grow three times a year by planting rice-legumes-corn. This pattern would be best especially for upper areas, which have been newly converted to rice.

Areas where irrigation is sufficient will be advised to plant legumes as its third crop to reduce the insect pests and enrich the land with natural nitrogen.

To improve farm productivity in the project area, it is advised to organize the farmers into cooperatives so that they can have the financing access and training program development.

(5) Integration of Medium/Large Scale Animal Production

At present, the province produces only 470.08 tons of chicken meat or only 11% of the required 4,289.99 tons for local consumption. The current demand for poultry eggs is 2,806.64 tons, and the production is only 1,162.84 tons or 41% of the demand. The consumption of pork in the province is estimated to be 8,740 tons while the available supply is only 5,004.33 tons.

The lack of financing and facilities of the small farmers and animal raisers leads to inefficient methods of farming, which eventually make animal production expensive in the province. Small corn farmers, since they need money immediately and have no storage facilities, sell their corn at very cheap prices immediately after harvest.

The weakness of the individual and unorganized farmers makes the existence of the rich traders necessary. The traders generally provide the following services which otherwise no one provides:

1) Financing

Traders often lend money to the farmers even at high rates. Farmers do not have ready access to institutional lending. They have to resort to non-formal lending arrangements which eventually become expensive for them.

2) Transportation

The traders have transport facilities which the farmers do not have.

3) Storage

The farmers can only store very limited amount of grains in their very small house. They are, therefore, forced to sell their produce even at low prices because they might spoil.

4) Managerial Expertise

The traders provide managerial skills to keep large volumes of transactions going which are otherwise unmanageable for ordinary farmers.

To be able to produce more efficiently, it is necessary for the farmers to integrate their production, and lower the transfer costs from one hand to the other. The farmers, however, can eliminate the middlemen or the traders if they are able to get financing, have their own transportation facilities, have their own warehouses, feed mill, and large growing facilities. Since the present farmers could not accomplish these on their own, it is quite obvious that a certain level of government intervention is necessary along these lines. The farmers would need external assistance on financing, technical knowledge, managerial and marketing skill development.

(6) Total Projected Yearly Production

The projected total population of Daraga and Legazpi by year 2020 will be 401,586. The volume of rice production which would be 9,136 tons will cover the rice requirement for 90,009 people at an average of 101.5 kg/capita consumption, which is around 22.4% of the combined population of Daraga and Legazpi.

(7) Preliminary Economic Assessment

1) Incremental Benefit to Coconut Farmers

Through the project, coconut farmers will enjoy higher income due to intercropping and processing of essential oils. The project makes it possible for the coconut farmers to intensify production in the coconut lands through intercropping with coffee, pilinut, and abaca.

From the intercrops, the farmers stand to have an average increase of P32,234 in income per hectare per year. Fertilization will lead to an increase of production by 30% or 1,000 nuts per year per hectare. The coconut farmers can also be members

of the cooperative which will engage in abaca and coffee trading, and essential oil production. Increased fertility due to application of fertilizers to the intercrop will also result in a better coconut harvest leading to an additional income of P25,000 per year per hectare.

2) Incremental Benefits to Irrigated Land Farmers

The rice farmer stands to benefit the most from the project. Firstly, he will not spend so much effort for the constant repair of his farm and will experience less loss due to calamities. The farmer could therefore be encouraged to invest money and efforts to improve his own farm.

More controlled water flow means more stable water supply, which is quite important for rice farmers. The result of additional investment by the farmer will be evident in the increase in farm income per. It is hoped that with the level of investment, the farmer would be able to increase his yield from about 20% of the potential to 60%.

The ability to plant three crops a year would mean a great difference for the rice farm. This would, however, entail more technological knowledge, more capital, mechanization of land preparation and harvesting to eliminate time delays, and technical knowledge.

3) Non-Irrigated Paddy Fields

Incremental benefits for un-irrigated rice farms will come from the possibility of planting high value crops and corn after rice. Farming technologies on the production of vegetables, corn, and legumes will be extended to the farmers. With the ability to raise three crops a year, and by improving their farm practice, the farm yields will definitely increase.

The average increases in net income per year of the non-irrigated farmer is P39,642 per hectare. This, however, requires the ability to produce a third crop of vegetables which the farmer need to sell without post harvest losses as possible.

4) Availability of Loanable Funds Due to Increase in Land Values

Because of the relative safety of the area protected by the dikes, more people will locate in the area, raising prices due to increase in demand for land. More agricultural activity and putting improvements on the land will definitely increase the value of the land. Higher property values allow the residents in the area access to necessary capital though institutional loans or simple sale of portions of their land.

The farmers would need to be financed with the necessary capital to be able to increase yields. The higher values of the land in the project area will surely enable the farmers to access loans from low interest banks with the land as their security.

5) Benefits for Increased Food Production for Food Security

More production from the area for rice, corn and meat products can be realized. It will contribute to the food security of the area.

Per Annum Production of Food in the Project Area

Commodity	Estimated Production w/o Project (tons)	Estimated Production w/ Project (tons)	Increase in Supply (tons)	Current Supply Deficit in Albay (tons)
Rice	2,647	9,136	6,849	40,436
Corn	Negligible	3,118	3,118	No shortage
Vegetables	789.39	1,324	534.61	26,352
Chicken	7.4*	109.2	101.8	3,608
Pork	79*	97	18	3,735

Source: Provincial Agriculture Office
JICA Survey
* Backyard Production

6) Benefits on Land Reclamation

Of the estimated 423ha of land covered with lahar, about 372ha will be recovered. Right now, gradual reclamation on already stabilized areas are being done by individual owners of land. The fastest method of reclamation is piling and selling lahar as sand and gravel now being used as construction and filling materials in the city and surrounding towns.

Even with that method of reclamation, the owner of the land will still have to spend about PHP10.00 per m^2 for irrigated land and PHP2.50 per square meter for non-irrigated lands.

The cost of reclamation will be recovered in 1.85 years in case of irrigated lands, 2.1 years for non-irrigated lands. This means that the farmers themselves can pay for the reclamation of their land provided that they are given the initial necessary support to produce their crops.

7) Negative Benefit on Sand Pocket Area

It is expected that the sand pocket area will have a negative project economic effect on agriculture. The area will be covered by sand and gravel debris at the average of two meters.

Although much of the area would still be probably arable up to 2020, there is danger that sand and gravel deposition would occur in the area. For the purposes of this project, it will be recommended that the area be acquired by the government as a designated public land. Although parts of the sand pocket may be totally arable at any point in the next twenty years, anybody farming in the area would be doing it at his own risk.

(8) Support Programs

1) Yawa River Basin Development Project (Umbrella Support Program)

The Sabo dike would effectively protect the down slope areas of Legazpi City and Daraga and in theory, the people in the protected areas should be able to take advantage of the relative safety of the area. Unfortunately, the farmers have very little resources and capabilities to make improvements and investments on the land.

There is a need to accelerate the development in the area by creating a concerted effort aimed at being able to economically develop the project protected area and at the same time preserve a desirable vegetative cover that would provide a desirable environmental protection to the area.

Mayon is the main watershed of the province of Albay and it is the main source of water for many populated and economically active areas surrounding its slopes. A deterioration of the slopes of Mayon will have a great effect on the economic activities on the down slope areas.

The slopes of Mayon have many potentials not only for agriculture but also for industrial development and tourism.

There are projects being proposed by the different agencies for the province of Albay whose components for Daraga and Legazpi can be incorporated into or assisted by one umbrella project called the Yawa River Basin Development Project, which could also be a consolidating support project for the economic development of Daraga and Legazpi City.

2) The Main Objectives of the Project:

a. To maintain optimum ecosystem along the slopes of Mayon that will not only improve the present environmental conditions but also increase the income of farmers working along the slopes of Mayon
b. To develop and encourage minimum tillage farming systems along the higher slopes to reduce the exposure of farmers to danger and minimize erosion

c. To improve water retention along the slopes of Mayon to reduce stress on drainage and Sabo Project structures and reduce flooding during storms
d. To improve water quality and stabilize water supply from the slopes into springs and tributaries feeding into the Yawa River System
e. To improve farm productivity of farmers not only for rural economic development but also for the food security of the province

3) Project Components:

a. Project Management

The personnel mostly seconded from line agencies, local government units, will provide the project management. Their basic salaries shall be drawn from their mother agencies. Project contractual workers and consultants will support them.

b. Pilot Reforestation Projects

After so many failed experiences in reforestation projects, the DENR have developed ideas for reforestation and agro-forestry concepts that may be implemented not only on the National Park, but the upper slopes of the volcano. An agro-forestry system that involves the active participation of the farmers, which also encourages them from cutting the trees are deemed effective. These pilot projects will also be used for training farmers from other parts of Mayon and the region.

c. Pilot Farms Along the Slopes of Mayon

The pilot farms to be established in different parts of the project areas will become model farms where farmers both from Mayon and other areas could be provided training. The project will introduce the planting of Vetiver Grass (Morass) and Lemon Grass as hedgerows to prevent erosion and siltation. They are also good sources of aromatic oils used as ingredients for perfumery for soap, insecticides, and other products. It will also introduce abaca and pilinut as high value crops to be intercropped with coconut lands along the slopes of Mayon.

d. Model Rice Farms

The area near the foot of Mt. Mayon is the main rice producing area of the Province. However, its productivity has remained low because of low investments on farm inputs by the farmers, either because of lack of capital

or fear of losing large investment due to calamities that could wipe out the crops planted.

The Sabo project would provide a certain degree of security for the farmers from flooding or destruction. This model farm will be used to train farmers on a more intensive and productive rice farming system on a three planting seasons a year. For irrigated areas, rice-vegetable/legume-rice and for non-irrigated areas, rice-vegetable/legume-corn cropping patterns will be modeled.

e. Technical Support and Training Center

One of the reasons for the low productivity of the farmers is lack of technical knowledge. To increase the farm production, they need more advanced farming technologies through educational and training programs. For this purpose, a small training center enough to accommodate about 30 farmers will be established at the project area.

f. Soils Laboratory

The farmers in the project area have very little information on the fertility of the soil they till. Accurate information on what the soil needs is very important to maximize yields. Low cost and easy to operate computerized soil analysis equipment is now available. This laboratory can initially be operated by the project in cooperation with the Provincial Agricultural Office and later on donated to the Provincial Government for operation and maintenance.

g. Extension Activities

Farmers, having very little experience in formal education, find classroom type training insufficient to learn new technologies. It is therefore very important for them to have somebody demonstrate it for them on actual operations. In this case, other means of instructional methods should be explored to transfer skills to the farmers.

h. Cooperative Development

Because of the weak financial and economic capabilities of individual farmers, it has become necessary for them to form into cooperatives in order to pool their resources for better efficiency and productivity. In fact, many farmers lack the capabilities to manage cooperatives.

The Bicol Region is an example of an area where farmer cooperatives are needed most but unfortunately very few cooperatives succeed.

There is therefore a need for strengthening of cooperatives through technical support and education programs for the farmers. Particular attention should be given to the cooperatives especially in the initial stages, and guidance and education through hands on operation would be considered.

There are no established cooperatives in the project area. If the farmers are to be assisted, two main cooperatives will be organized:

The Upland and Coconut Farmers' Cooperative

This cooperative will be mainly composed by the more than 250 coconut farmers in the 811 hectares of coconut farms in the project area. Their capabilities will also be strengthened in order to own and operate the model projects plant on essential oil, and the warehouse and baling facility for abaca fibers.

The Lowland Farmers Cooperative

This cooperative will be composed of the more than 700 farmers tilling the paddy fields of the project area. They will be assisted and trained also to operate the feed mill, warehouse, and the piggery and poultry model projects. To strengthen these cooperatives, technical personnel will initially be provided to them by the project until they are capable enough to manage their enterprises.

i. Cooperative Financing and Linkage with Financial Institutions

While the initial development activities and facilities will be included as project expenditure, the finances necessary for the operation of the projects should be raised by the cooperative.

The farmers can raise cooperative funds for the projects through: (a) individual contributions and investments through cooperative membership fees or personal investments and deposits, (b) partnership with the Land Bank of the Philippines (LBP) and other companies to form joint venture, and (c) easy term loans from financial institutions or non-bank institutions.

j. Marketing Support Project

A marketing support group will initially be made composed of members detailed from the Department of Trade and Industry, Department of

Agriculture, and consultants and contractual staff from the project. Marketing agreements could be forged with existing companies and major players in the industry.

(8) Eco-Prevention and greenbelt Model Project

Bio-engineering, or the effective utilization of plants to prevent erosion and stabilize soil structures, is now being practiced all over the world. It is now regarded not only as ecologically sound soil structure protection but also as very low technology and low cost system that can be readily adopted by the residents and farmers of the project area.

The project will consist of putting up model sites as training venues for farmers, and training programs will be regularly held along the following topics: (a) general concept for water and soil retention on slopes, (b) general concepts for gully embankment and slope erosion control, (c) nursery development, and (d) training and extension project for upland farmers.

(9) Buffer Zone green Belt Area

The dike system that will be constructed on the project area sand pocket will consist of 1,100 meters of dam, 5,600 meters to Type B spur dikes and 600 meters of Type C spur dikes. The Type B and Type C spur dikes have unarmored top and back slope made of compacted earth. The exposed parts are susceptible to constant erosive action from rain and may cause rill erosion and pose bigger problems in the future.

To prevent erosion on the earth dikes and strengthen the tensile strength of the whole dike structure, a combination of grass and trees will be planted on a 25 meter strip along the 6,100 meter length spur dikes.

A total of 152,500 square meters of land will be covered with grass and pilinut planted on a 3 meters x 3 meters distance. The excess pilinut trees will just be later trimmed or cut by natural selection process.

9.4 Institutional Strengthening Programs

9.4.1 Provincial Disaster Management System Strengthening

(1) Objectives of the Project

This program is designated with a view to upgrading managerial and operational capability of the Provincial Government staff in charge of disaster management (especially PDMO and PDCC), so that they can properly cope with disasters and

take quick response actions in accordance with the Disaster Management Operation Manual.

(2) Components

a. Capability building activities will be undertaken for the Provincial officers and staff involved in the Provincial disaster management operations, especially those in the Provincial Management Office (PDMO) and other agencies concerned, through execution of periodical staff training. These training programs will be implemented by holding seminars and workshops to be conducted by higher DCC or the Asia Pacific Disaster Management Center (APDMC) based in the Philippines.

b. The disaster management training will cover a wide range of functions and skills. These include planning, organization, day-to-day management activities, counter-disaster operations, crisis management activities, logistic functions, recovery management, participation in major programs such as regional development prevention and mitigation, special skills applicable to rescue, first aid assessment, emergency relief and welfare, communications, information management and so on. These training components must be integral parts of Basic and Advance Disaster Courses.

c. These training coursed will be prepared by the higher Disaster Coordinating Council (DCC) and/or professional third parties (ex. Asian Pacific Disaster Management Center) taking into account the existing basis of competence of the target personnel. The annual training program will be made up in October before entering into negotiations about budget allocation.

d. To assure communications with the subordinate LGUs concerned (City/Municipalities and Barangays), an information network system will be established or improved by installing a set of the facilities and equipment such as radio transceivers or computer sets with internet communication connections.

e. The disaster management center needs to upgrade accuracy and reliability of the data and information on vulnerabilities to hazards, hazard areas and number of population residing in danger areas, etc., which are essential to the disaster-related activities and project planning. These are to be translated into maps using GIS software.

f. In this program, the following will be taken up as program component:

Policy and legal arrangements to cope with the current disaster-related issues such as optimum land use, enforcement of national building code, and so on.

- Institutional arrangement for mud and debris flow observation and monitoring for DPWH
- Coordination of existing rules and regulations related to public safety along Mayon danger zone enacted by the Sangguniang Panlawigan ng Albay (SPA)

Capability building of PDCC/PDMO offices and staff

- Establishment of rescue equipment for skills training and actual search, rescue and recovery operations
- Installation of internet system of communication and warning information within the MDCCs/CDCC of Albay
- Installation of appropriate warning information device at the barangay level
- Establishment of the early and accurate forecasting, timely warning and prompt and reliable evacuation system
- Reproduction of risk map along the Mayon area, utilizing a processing software designed for mapping and accurate data capture like GIS
- Improvement of training of equipment on disaster education and information campaign using Magnabyte
- Provision of emergency operation quarters for medical and non-medical personnel who will render 24 hours operation
- Undergoing of training and education on the following:
  - Advance disaster management
  - Vulnerability assessment and planning using GIS
  - Disaster management on environmental, socio-economic, meteorological, volcanological, and seismological aspects
  - Disaster management on local governance
  - Environmental safety
  - Skills training on environmental high angle slope rescue
  - Evacuation management with health and sanitation

Networking

- Consolidation of coordination framework and networking for disaster management (LGUs – DCCs – PDMO – NGAs - Private Sector/NGOs). Conferences for institutional arrangements leading to policy recommendations for clearer guidelines
- Reorientation of cooperation in disaster coping and conclusion of an agreement on response and recovery operations among the neighboring LGUs

at every level. Redefining their roles and responsibilities to avoid overlapping and duplication in order to maximize resources

Organization Development

- Restructuring of the provincial system for integrating disaster mitigation into area development. Improvement of working relationships between Disaster Coordinating Council and Development Council.
- Restructuring/Expansion of PDMO into Provincial Public Safety Office
  - Expansion of PDMO's function on public safety to augment the economic and financial status of the province for disaster prevention works and activities
  - Involvement of the institutionalized Provincial Public Safety Office (PPSO) in and expanded program to develop and implement a multi-sectoral approach to public safety and disaster management by organizing, utilizing and maximizing the local organic capabilities at both human and non human resources
  - Creation of programs and projects designed for implementation within the next five years

(3) Training Program and Estimated Cost for Capability Building

The estimated cost for administrative and operational programs are as follows.

Estimated Cost for Administrative Programs

(Unit : Million PHP)

1.	PPSO Extension /Field Offices	2.0
2.	Emergency Operation Quarters	1.0
3.	Institutionalization of Regional Education Center for Public Safety and Disaster Management	10.0
Subtotal		13.0

Estimated Cost for Operational Programs

1.	Emergency Ambulance Services	1.5
2.	Public Safety Education	0.8
3.	Traffic Management	1.2
4.	Patrol Motorcycle Project	0.4
5.	10-year Reforestation Project	20.0
6.	Research and Data Banking System	3.0
7.	GIS-run Risk and Resource Maps	0.5
8.	Organization of Municipal Emergency Response Intervention Team (MERIT)	1.8
9.	Strengthening of Communication and Warning System	2.0
10.	Public Information System	0.1
11.	Disaster Mitigation on Health Hazards at Evacuation Centers	0.5
Subtotal		31.8

Capability Building Cost

Grand Total (a + b) for Capability Building	44.8

9.4.2 Community-based Disaster Management Strengthening

(1) Objective

This program aims to extend the ongoing efforts to upgrade/strengthen the disaster management system of the City/Municipalities and Barangays concerned in the Study Area.

(2) Components

a. Capacity building will be made to the city/municipality and barangay staff in charge of disaster management, through execution of periodical staff training. These training programs will be implemented by holding seminars, workshops and drills especially on Search, Rescue and Recovery and Evacuation Management which includes Health and Sanitation.
b. The training program will be prepared by PDMO and/or professional third party considering the competence level of the target personnel. The training program will start from the Basic Disaster Management to Advance Disaster Management going into specific assets like Disaster Management Medical Aspects, Socio-Economic Aspects, Local Governance Aspects, and others. The target participants to the training will be the BDCCs, Media, Agencies, NGOs and Volunteers/Social Workers.
c. The disaster management training will include a wide range of functions and skills relating to planning, organization, day-to-day management activities,

counter-disaster operations, crisis management activities, logistic functions, recovery management, special skills applicable to rescue, first aid, assessment, emergency relief and welfare, communications, information management so on.

d. Improvement of information network system to assure quality communications among PDMO/PDCC, CDCC/MDCCs and BDCCs.
e. Establishment and strengthening of communication with other municipalities using internet communication facilities.
f. This program will incorporate the following disaster-related component:

Capability building

- Institutional consolidation of CDCC/MDCCs including BDCCs
- Strengthening of volunteer disaster operation groups through organizing and training
- Enhancement of disaster coping capacity through upgrading of the forecasting & warning and evacuation system through internet communication facilities
- Preparation of the comprehensive city/municipal land use plan including hazard mapping & resource assessment, key commodity development strategy
- Development of the integrated community disaster planning program

Advocacy

- Awareness promotion campaign and enlightenment on disaster management through seminars, workshops and drills for general public, including the disaster-related education at primary and junior schools
- Advocacy works through seminar, fora and symposia

Resettlement and Livelihood Development

- Resettlement community development program in association with livelihood programs and projects for 137 families from the 6 km-radius PDZ of Mayon Volcano at PHP100,000 each or a total for PHP13.7 millions.
- Research studies on resettlement development

(3) Training Modules and Estimated Cost for the Community-based Disaster Management Strengthening

Estimated Cost by Training

Training Title	Target Participants	Time Frame	Cost (PHP1,000)
1. Basic Disaster Management	PDCC, MDCC, CDCC, Media, NGOs 300 participants	5 days	450
2. Advance Disaster Management	DCCs, Agencies, NGOs 300 participants	5 days	600
3. Vulnerability Assessment and Planning Workshop	DCCs 100 participants	3 days	100
4. Search, Rescue and Recovery	Volunteers, NGOs, DCC Personnel 140 participants	30 days	1,120
5. Evacuation Management (includ. Health & sanitation)	DCCs, DECs, Relief Volunteers, Social Workers 300 participants	3 days	300
6. Disaster Management (D.M.) Medical Aspects	Rural Health Workers 100 participants	3 days	100
7. D.M. Environmental Aspects	DENR, LGUs 100 participants	3 days	100
8. D.M. Socio-Economic Aspects	DCCs 100 participants	3 days	100
9. D.M. Meteorological Aspects	DCCs 100 participants	5 days	175
10. D.M. Volcanological Aspects	DCCs 100 participants	3 days	100
11. D.M. Seismological Aspects	DCCs 100 participants	3 days	100
12. D.M. Local Governance	DCCs 100 participants	3 days	100
13. Road Safety	LGUs 100 participants	5 days	175
14. Sea Water Safety	LGUs 140 participants	5 days	175
15. Family Disaster Preparedness	DCCs 100 participants	3 days	100
16. Building Code and Fire Safety	DCCs, LGUs 100 participants	5 days	175
Total			**3,970**

CHAPTER 10 PROJECT COST ESTIMATE

10.1 Constitution of Project Cost

Project cost comprises (a) Construction cost, (b) Government administration cost, (c) Engineering services cost, (d) Land acquisition cost, (e) Physical contingency, and (f) Price contingency. The components of each cost are given as follows:

(1) Construction Cost

The construction cost is estimated by multiplying work quantity and unit price in principle, except for lump sum items such as preparatory works. The work quantity is estimated based on project layout, outline dimensions of structures, and proposed capacities of the facilities. The unit price of each work item is determined by referring to the unit price obtained from DPWH and the recent bidding data of similar projects in Philippines.

1) Unit Price

The unit price is composed of two parts, (a) the direct cost consisting of the labor cost, material cost, and equipment expenses, and (b) the indirect cost consisting of overhead expenses, unforeseen contingencies, miscellaneous expenses, and contractor's profit, pursuant to the Department Order (DPWH) No. 30.

2) Preparatory Works

The preparatory works cover the contractor's preparation works such as temporary buildings with water and power supply system, temporary access road to the sites, dewatering works, and relocation works of obstacles. The cost for preparatory works is estimated at 5% of the total construction cost.

(2) Government Administration Cost

Government administration cost comprises mainly salary cost, equipment cost, and office running and maintenance cost. The cost is estimated based on the implementation schedule of the priority projects indicated in Chapter 11.

(3) Engineering Services Cost

The engineering services cost comprises mainly remuneration, transportation cost, and office running cost. The cost is estimated based on the implementation schedule of the priority projects indicated in Chapter 11.

(4) Land Acquisition Cost

This cost covers the land acquisition of (a) the sand pocketing area including construction area of sabo dam and training dikes, and (b) the construction area of channel improvement and pump drainage.

For the urban drainage project, the cost is estimated by using the latest zonal land market value of affected area.

On the other hand, for the sand pocketing area, there seems to be no land market value in the area. Therefore, the cost is determined by the following manner:

a. Assessment of annual net income based on the productivity for each agricultural field, and calculation of present value during the period of 30 years for the annual net income.
b. Calculation of present value during the period of 30 years for lease charge for each agricultural field.
c. Selection of lower value by comparison of these two present values.
d. It should be noted that the cost for the sand pocketing area should be examined in detail in the implementation stage of the project.

(5) Contingencies

The contingencies required for the project budgeting comprise (a) physical contingency to cover unforeseen changes of physical conditions and (b) price contingency to compensate future price escalation.

The rates of physical contingency is estimated at 10% of the total cost for construction cost, government administration cost, engineering services cost, and land acquisition cost.

The price contingency is estimated with the assumed price escalation rate of 2.34% per annum for foreign currency portion and 7.85% per annum for local currency portion. The rate of 2.34% is derived from the latest projection of MUV (Manufacturing Unit Value in G-5 countries) during 1999-2005 indicated by World Bank, while the rate of 7.85% is the average escalation rate of consumer prices during ten years in Philippines indicated by IMF.

10.2 Condition of Project Cost

(1) Basic Condition of Cost Estimate

The project cost is estimated with the following basic conditions and assumptions.

1) Base Year

The cost estimate is based on the price level as of December 1999.

2) Exchange Rates

Exchange rates used in the cost estimate are as follows:

US$ 1.0 = PHP 40.0 = ￥105.0

3) Value Added Tax

Value Added Tax (VAT) is not included in the cost estimate.

4) Construction Schedule

The periods of detailed design, selection of contractor, and construction works for each project is summarized below.

Summary of Implementation Schedule

(Unit: year)

Project Name	Detailed Design	Selection of Contractor	Construction Works
1. Yawa River System Sabo Project	1.25	1.00	2.50
2. Legazpi City Urban Drainage Project	1.25	1.00	2.50
3. Forecasting and Warning System Strengthening Project	1.00	1.00	2.00
4. Evacuation System Strengthening Project	1.00	0.50	2.00
5. Resettlement Site Development Project	1.00	0.50	2.00

5) Implementation Agency

The construction works for each project will be executed by the following implementation agencies.

Summary of Implementation Agency

Project Name	Implementation Agency
1. Yawa River System Sabo Project	DPWH
2. Legazpi City Urban Drainage Project	DPWH
3. Forecasting and Warning System Strengthening Project	
Monitoring system of volcanic activities	PHIVOLCS
Monitoring system of flood and mud flow	DPWH
Warning system	OCD
Repeater station system	DPWH
Inter-agency disaster mitigation network	OCD
4. Evacuation System Strengthening Project	
Evacuation center	DPWH
Emergency shelter	LGUs
Livestock Sanctuary	LGUs
5. Resettlement Site Development Project	
Banquerohan	Legazpi
Anislag	Daraga

(2) Local and Foreign Currency Portions

The cost estimate is made in local and foreign currency portions. The classification of local currency portion and foreign currency portion is as follows:

1) Local Currency Portion

The local currency (L.C.) portion covers cost of all labor costs, locally available materials, inland transportation for materials to be imported, government administration, local consultant fee, land acquisition, and contingencies for local portion.

2) Foreign Currency Portion

The foreign currency (F.C.) portion covers cost of materials and facilities to be imported, depreciation of construction equipment, foreign consultant fee, and contingencies for foreign portion.

(3) Detailed Cost Estimate Bases Set for the Feasibility Study

The Project cost in the Feasibility Study is estimated based on the more detailed estimate conditions as described in Sub-Section 10.1, compared with those set in the Master Planning. The features of the estimate conditions set in the Feasibility Study are summarized together with those in Master Planning, as follows.

Estimation Bases for the Master Plan and Feasibility Study

Cost Item	Master Plan	Feasibility Study
- Construction Cost	Unit price basis	Unit price basis (The same unit price as Master Plan)
- Government Administration Cost	% of the construction cost	Detailed cost estimate
- Engineering Services Cost	% of the construction cost	Detailed cost estimate
- Land Acquisition Cost	Market price basis	Actual lease charge and net income basis
- Physical Contingency	10% of the total of the above each cost item	10% of the total of the above each cost item

As for the construction cost out of the above cost items, the cost estimate is carried out based on the work quantities of each structure. Therefore, in case that part of the preliminary structural design proposed in the Master Plan is modified in the Feasibility Study, the construction cost in the Feasibility Study is revised in accordance with the final work quantities of each structure.

10.3 Cost Estimate by Sub-project

10.3.1 Yawa River System Sabo Project

The project cost is summarized below.

Project Cost for Yawa River System Sabo Project

(Unit: million PHP)

Description	F.C.	L.C.	Total
1. Construction Cost	164.4	547.9	712.3
2. Government Administration Cost	-	15.5	15.5
3. Engineering Services Cost	144.4	13.3	157.7
4. Land Acquisition	-	35.3	35.3
5. Physical Contingency	30.9	61.2	92.1
Subtotal (1 - 5)	**339.7**	**673.2**	**1,012.9**
6. Price Contingency	38.1	318.7	356.8
Total	**377.8**	**991.9**	**1,369.7**

10.3.2 Legazpi City Urban Drainage Project

The project cost is summarized below.

Project Cost for Legazpi City Urban Drainage Project

(Unit: million PHP)

Description	F.C.	L.C.	Total
1. Construction Cost	205.6	129.1	334.7
2. Government Administration Cost	-	10.6	10.6
3. Engineering Services Cost	62.2	8.7	70.9
4. Land Acquisition	-	15.7	15.7
5. Physical Contingency	26.8	16.4	43.2
Subtotal (1 - 5)	**294.6**	**180.5**	**475.1**
6. Price Contingency	35.4	83.4	118.8
Total	**330.0**	**263.9**	**593.9**

10.3.3 Forecasting and Warning System Strengthening Project

The project cost is summarized below.

Project Cost for Forecasting and Warning System Strenghtening Project

(Unit: million PHP)

Description	F.C.	L.C.	Total
1. Construction Cost	210.8	37.0	247.8
2. Government Administration Cost	-	9.8	9.8
3. Engineering Services Cost	51.7	7.3	59.0
4. Physical Contingency	26.3	5.4	31.7
Subtotal (1 - 5)	**288.8**	**59.5**	**348.3**
5. Price Contingency	33.8	25.3	59.1
Total	**322.6**	**84.8**	**407.4**

10.3.4 Evacuation System Strengthening Project

The project cost is summarized below.

Project Cost for Evacuation System Strenghtening Project

(Unit: million PHP)

Description	F.C.	L.C.	Total
1. Construction Cost	0.0	291.9	291.9
2. Government Administration Cost	-	9.1	9.1
3. Engineering Services Cost	34.4	6.2	40.6
4. Physical Contingency	3.4	30.7	34.1
Subtotal (1 - 5)	**37.8**	**337.9**	**375.7**
5. Price Contingency	3.3	127.4	130.7
Total	**41.1**	**465.3**	**506.4**

10.3.5 Resettlement Site Development Project

The project cost is summarized below.

Project Cost for Resettlement Site Development Project

(Unit: million PHP)

Description	F.C.	L.C.	Total
1. Construction Cost	4.7	202.5	207.2
2. Government Administration Cost	-	9.1	9.1
3. Engineering Services Cost	37.3	6.3	43.6
4. Physical Contingency	4.2	21.8	26.0
Subtotal (1 - 5)	**46.2**	**239.7**	**285.9**
5. Price Contingency	4.0	90.0	94.0
Total	**50.2**	**329.7**	**379.9**

10.4 Operation and Maintenance Cost Estimate

10.4.1 Yawa River System Sabo Project

The annual operation and maintenance cost comprises common expenses for operation, maintenance of structures, and dredging work cost for sand pocket. The common expenses for operation is estimated at PHP954,000, based on the salary for the administrator and vehicle running cost. The maintenance cost of structures is estimated at PHP6,719,000, based on the rehabilitation works required regularly for each structure. The dredging work cost is estimated at PHP13,555,000, based on the annual dredging works required for each sand pocket.

As a result, the total cost is estimated at about PHP21.2 million.

10.4.2 Legazpi City Urban Drainage Project

The annual operation and maintenance cost comprises common expenses for operation and maintenance cost of structures. The common expenses for operation is estimated at PHP1,974,000, based on the salary cost for the administrator and vehicle running cost. The maintenance cost of structures is estimated at PHP1,209,000, based on the rehabilitation works required regularly for each structure and facility.

As a result, the total cost is estimated at about PHP3.2 million.

10.4.3 Forecasting and Warning System Strengthening Project

The annual operation and maintenance cost comprises common expenses for operation and maintenance cost of facilities. The common expenses for operation is estimated at PHP1,164,000, based on the salary cost for the administrator and vehicle running cost. The maintenance cost of facilities is estimated at PHP24,772,000, based on the rehabilitation works required regularly for each system.

As a result, the total cost is estimated at about 25,900,000 PHP.

10.4.4 Evacuation System Strengthening Project

The annual operation and maintenance cost comprises maintenance cost of structures.

The total cost is estimated at about PHP1.0 million, based on the rehabilitation works required regularly for evacuation center, emergency shelter and live stock sanctuary.

10.4.5 Resettlement Site Development Project

The annual operation and maintenance cost comprises maintenance cost of structures.

The total cost is estimated at about PHP0.7 million, based on the rehabilitation works for major road and pathwalk, public buildings, and water/power supply system.

10.5 Supporting Program for Capability Building

Among the eight supporting projects and programs described in Chapter 10, the following three supporting programs are designated as the components of capability building for cooperative members, Provincial Government staff, and city/municipality and barangay staff.

(1) Organization and Strengthening of Multi-purpose Cooperatives with Micro-lending Components
(2) Provincial Disaster Management System Strengthening
(3) Community-based Disaster Management System Strengthening

The cost for capability building comprising these programs is summarized below.

Cost for Capability Building

(Unit: Million PHP)

Description	F.C.	L.C.	Total
1. Organization and Strengthening of Multi-purpose Cooperatives with Micro-lending Components			
Total	130.4	6.0	136.4
2. Provincial Disaster Management System Strengthening			
Total	130.4	67.2	197.6
3. Community-based Disaster Management System Strengthening			
Total	34.3	8.8	43.1
Grand Total	**295.1**	**82.0**	**377.1**

10.6 Summary of Estimated Project Cost

10.6.1 Total Project Cost

Total project cost for the priority projects is summarized below, with the supporting program for capability building.

Summary of Project Cost

(Unit: million PHP)

Project Name	F.C.	L.C.	Total
1. Yawa River System Sabo Project	377.8	991.9	1,369.7
2. Legazpi City Urban Drainage Project	330.0	263.9	593.9
3. Forecasting and Warning System Strengthening Proje	322.6	84.8	407.4
4. Evacuation System Strengthening Project	41.1	465.3	506.4
5. Resettlement Site Development Project	50.2	329.7	379.9
Subtotal	**1,121.7**	**2,135.6**	**3,257.3**
6. Supporting Program	295.1	82.0	377.1
Total	**1,416.8**	**2,217.6**	**3,634.4**

10.6.2 Disbursement Schedule

The following is the annual disbursement schedule of the priority projects during the period from 2000 to 2005 based on the implementation schedule of the priority projects indicated in Chapter 11.

Annual Disbursement Schedule

(Unit: million PHP)

Year	Foreign Cuurency Portion	Local Currency Portion	Total
2000			
2001	110.4	28.2	138.6
2002	68.3	116.2	184.5
2003	217.1	643.6	860.7
2004	408.3	841.5	1,249.8
2005	317.6	506.1	823.7
Total	**1,121.7**	**2,135.6**	**3,257.3**

CHAPTER 11 IMPLEMENTATION PLAN

As described in Chapter 7: Priority Projects for Feasibility Study, the following projects and programs have been presented as priority projects and supporting projects and programs.

(1) Priority Projects

- Yawa River System Sabo Project
- Legazpi City Urban Drainage Project
- Forecasting and Warning System Strengthening Project
- Evacuation System Strengthening Project
- Resettlement Sites Development Project

(2) Supporting Projects and Programs

- Organization and Strengthening of Multi-purpose Cooperatives with Micro Credit
- Hollow Block Production
- Agro-industry Development (Abaca, Pilinut and Coco Coir)
- Aggregate Production Plant Project
- Productivity Enhancement Programs in the Protected Area
- Provincial Disaster Management System Strengthening
- Community-based Disaster Management Strengthening

The details of each project are described in Chapters 8 and 9.

This chapter presents the following four issues:

- Issues in project implementation
  Description on basic idea on project implementation
- Implementing organization
  Description on implementation arrangement
- Implementation schedule
  Description on implementation schedule of the projects and programs
- Project cost sharing among implementing organizations
  Proposal on cost sharing plan among implementing organizations

11.1 Issues in Project Implementation

Local governments are expected to play a greater role in development activities. Considerable efforts in devolution have been made since the enactment of Local Government Code in 1991, however the process is incomplete. The progress in

devolution so far has been made mostly in social welfare, agriculture, environment and health sectors but less in public works sector. LGUs complain lack of finance due to inadequate revenue allotments from the national government. There are some confusions on the three levels of government – national, provincial and city/municipality – due to the absence of detailed guidelines on project implementation responsibility. Thus, the enactment of Local Government Code and subsequent devolution of responsibilities for local government resulted to a new dimension of implementation issues.

11.1.1 Project Implementation by LGUs and by National Government

(1) NEDA Policy Framework

Investment Coordination Committee of NEDA issued a "Policy framework for national government assistance for the financing of local government project with environmental and social objectives" in 1998. Though it will be the policy of national government to support the financing of devolved activities, NEDA admits that such support will be limited, temporary, and targeted at selected groups of LGUs.

National government pay due attention to the following three aspects when assessing the needs for financing and management intervention in infrastructure development projects.

1) Equity (National Minimum)

If LGUs are unable to provide the minimum level of services to their constituents, national government may intervene in its service provision. The eligibility of LGUs will be based on income class and on economic class (as may be measured by poverty incidence).

2) Externalities

Intervention by national government is justified by spatial externalities, or when benefits and/or costs of public services provided by an LGU are realized by non-residents.

3) Economies of Scale

The provision of some services can be made more cost-effective if the area designated for a service is larger than the jurisdiction of a single LGU.

LGU initiative in project implementation is important for the following reasons:

(1) it would make the recipient (LGU) a major stakeholder, (2) it can be a good indicator of the LGU's need for the project, and (3) it can influence the LGU's spending priorities to activities with positive externalities. The LGU counterpart would have to be large enough to force the LGU and the community to decide for themselves if the project is the best investment for their own resources. Counterpart from the community can be in-kind resources that can be supplied by its members such as labor, local materials, and right-of-way.

Recurrent operation and maintenance expenditures will be given low priority for national government grants. It is necessary to establish mechanisms to enable LGUs to collect user charges to raise revenue for the operation and maintenance of local public facilities.

(2) Cost Sharing Examples

1) Flood Control and Road

There are two actual cost sharing agreements reached between DPWH and LGUs. One is KAMANAVA Flood Control and Drainage System Improvement Project (Metro Manila), and the other case is the Butuan City (Mindanao) Circumstantial Road and Second Bridge. In the case of KAMANAVA Project, the Municipality of Malabon will collaborate in resettlement of people to be affected by construction works. The City of Butuan is agreed to shoulder the Road right of way acquisition cost of the project in the amount not exceeding 5 Million Pesos.

2) Irrigation and Agrarian Reform

<u>Southern Philippines Irrigation Sector (ADB)</u>

This project will construct and improve small to medium – scale irrigation systems, strengthen irrigation operation and maintenance. While executing agency of this Project is National Irrigation Administration (NIA), irrigators' associations as beneficiaries will contribute 25 % of total construction costs of newly constructed or rehabilitated irrigation facilities in order to generate a sense of ownership.

<u>Agrarian Reform Community Development (IBRD)</u>

This project has three components: a) community development and technical assistance, b) rural infrastructure, and c) agricultural and enterprise development. Oversight responsibility for the project rests with the Department of Agrarian Reform. Project costs are estimated at about US $ 106 million. The cost sharing plan is shown below.

Project Cost Sharing

(US$ million)

IBRD	50
Agrarian Reform Communities	20
Local Government Units	5
National Government	11
Land Bank of the Philippines	20
Total	106

*Agrarian Reform Communities refer to 80,000 households.

3) Summary of Cost Sharing Examples

In the Southern Philippines Irrigation Sector Project, and Agrarian Reform Community Development Project, LGUs and beneficiaries are expected to shoulder a part of project cost. In both cases, irrigation component is included. The direct beneficiaries can be identified. The beneficiaries are convinced of the return from their investment (contribution) in the project. In the cases of flood control and road projects LGUs' contribution is limited to pre-investment (resettlement and right-of way) stage.

11.1.2 Classification of Priority Projects and Supporting Projects and Programs

Based on the Philippine government policy, the Study Team classified the Priority Projects selected in the Master Plan depending on the potential for cost-recovery from user charges, its inter-LGU spillover effects and its local impact visibility. (in the table, Characteristics of Priority Projects and Supporting Projects and Programs on the following page)

As seen in this table, Sabo and Urban Drainage Project have less potential for cost recovery from user charge. In terms of inter-LGU spillover effects, Yawa River System Sabo Project may have medium level spill over effects because hazard area extends to Camalig, Daraga and Legazpi City, while Legazpi City Urban Drainage Project's beneficiary is limited to Legazpi City. Forecasting, Warning System, and Evacuation System likewise have low potential for cost recovery from users, however, their inter-LGU spillover effects are high. For those projects with low potential for cost recovery for users and especially for those with high spillover effects, national government funding/intervention is required.

National government intervention for Yawa River System Sabo, Legazpi City Urban Drainage, Forecasting and Warning System Strengthening projects is justified in view of its externalities and economy of scale.

Characteristics of Priority Projects and Supporting Projects and Programs

Group		Project	Potential for Cost Recovery from User Charges	Inter-LGU Spillover Effects	Local Impact Visibility	Government Intervention
PRIORITY PROJECTS	SABO/DRAINAGE	Yawa River System Sabo Project	Low	Medium	Low	• NG&LGU - Construction - O & M
		Legazpi City Urban Drainage	Low	Low	Medium	• NG&LGU - Construction - O & M
	FW&E	Forecasting and Warning System Strengthening	Low	High	Medium	• NG - Construction - O & M
		Evacuation System Strengthening	Low	High	Low	• NG&LGU - Construction - O & M
	RESETTLEMENT	Resettlement Site Development	Medium	Low	High	• LGU - Construction - O & M
SUPPORTING PROJECTS AND PROGRAMS	RESETTLEMENT	Supporting Programs for Resettlers - Cooperatives - Holow Block - Agro-industry	Medium	Medium	High	• LGU&NG - Credit Assistance - Technical Assistance
	INSTITUTIONAL	Provincial Disaster Management System Strengthening	Low	Medium	Low	• LGU - Technical Assistance
		Community based Disaster Prevention Capacity Strengthening	Low	Medium	High	• LGU - Technical Assistance
	ECONOMIC DEVELOPMENT	Aggregate Production Plant	Medium	Low/Medium	Low/Medium	• LGU - Technical Assistance
		Mineral Water Development	Medium	High	High	- Technical Assistance
		Protected Area Development	Medium	Medium	Medium	- Technical Assistance

NG – National Government

LGU – Local Government Unit

However, LGUs financing and management intervention is also considered important. Efforts have to be made to encourage local ownership and adoption of participatory approaches in project design, implementation and O&M.

For those projects with medium level potential for cost recovery, local government units should take the initiative in project implementation. The projects of this category include Resettlement Site Development, Supporting Programs for Resettlers, Aggregate Production Plant, and Mineral Water Development.

These projects can expect cost recovery from users. For example, those people who settled to resettlement site can contribute to LGUs through Community Tax[1] and Real Property Tax. In addition to such taxing schemes, Legazpi City has a plan to charge 50 Pesos per month as Operation and Maintenance charge for Banquerohan resettlement site.

For Supporting Programs for Resettlers, training costs shall be borne by beneficiaries (resettlers).

Business tax collection is expected from aggregate production, mineral water and agro-industry. Business tax is 100% retained at city/municipality. In the case of Legazpi City, a share of business tax to total revenue is approximately 10% in 1998.

In case of aggregate production, tax on sand, gravel and other quarry resources can also be expected.

11.2 Implementing Organization

11.2.1 Profile of Related Organizations

Table "Profile of Related Organizations" describes the related organizations' mandate, budget, and number of staff, number of engineer or professional staff and project implementation experiences. As seen in the table, as national government agencies, DPWH only has project implementation in various sectors including flood control, road, bridges, drainage, sabo and school building.

While the Local Government Code of 1991 stipulates the transfer of responsibility of service delivery to LGUs, LGUs still do not have sufficient capacity for project implementation. Neither Legazpi City nor Daraga Municipality has capacity to implement Yawa River System Sabo, Legazpi City Urban Drainage Project,

[1] Collected Real Property Tax is shared among Province (35%), City/Municipality (40%), and Barangay (25%), Community Tax is retained 100% at City/Municipality.

Forecasting and Warning System Strengthening Project. There are several constraints:

1) They do not have experience in Sabo, Drainage and Forecasting projects;
2) They do not have sufficient number of engineers to plan and manage the projects, - Legazpi City has licensed 18 engineers and Daraga, only 1 engineer-;
3) Their annual budget is small – Project cost for Yawa River System Sabo Project is seven times bigger than Legazpi City's annual budget.

Legazpi City and Daraga Municipality citizens are direct beneficiaries of the project. However, Legazpi City and Daraga Municipality's contribution to the Yawa Sabo and Urban Drainage Projects will be limited to land acquisition due to the above mentioned constraints (capacity of LGUs).

Profile of the Related Organizations

Organizations	Mandate	Annual Budget (98) Million-pesos	Number of Staff	Number of Engineer / Professional	Project Experience	Remark
DPWH	Provision of technical services for the planning, design, construction, maintenance and/or operation of infrastructure facilities	27,253	18,395	5,171	Flood control, Road, Bridges, Drainage, School, Sabo	Expertise in Multi-sector
DPWH Regional Center		N/A	207	76		
DECS	Supplies school buildings as evacuation center	35,782	503,439	498,772	School management	
PHIVOLCS	Issues advisories on earthquake and volcanic activities	120	236	194	Earthquake, Volcano	
- Lignon Hill and Buang		N/A	10	3		
PAGASA	Observe and report the weather of the Philippines and specified adjacent areas, issue forecasts and warnings of weather and flood conditions affecting national safety, welfare and economy	360	1,382	1,374	Weather, Flood forecasting	
- Legazpi		N/A	12	2		
OCD	Coordination of the activities of the government and private sectors to ensure maximum utilization of resources for the protection and preservation of the populace and property during emergency	57	239	186	Coordination of disaster operation including Warning	
- Region V		N/A	5	3		
DTI	coordination, promotion, facilitation and regulation of the country's trade and industry	1,620	3,232	3,026	Trade and Industry	
DSWD	Organizes relief and rehabilitation activities with DCCs	1,471	2,627	2,063	Relief and Rehabilitation	
- Field Office V		N/A	98	87		
NHA (Region V)	Assesses housing requirements of displaced persons, provides emergency or temporary housing	N/A	25	5	Resettlement, socialized housing	Livelohood assistance for resettlers
ALBAY	Efficient and effective provision of infrastructure facilities to service the needs of the residents including but not limited to provincial roads and bridges, inter-municipality water works, drainage and sewerage, flood control	321	637	30	Road, Bridge, Irrigation, Resettlement	1st. Class LGU
LEGAZPI	All the services and facilities of the municipality and province, and adequate communication and transportation facilities	231	533	18	Resettlement	1st. Class LGU
DARAGA	Efficient and effective provision of infrastructure facilities to service the needs of the residents including but not limited to municipal roads and bridges, water supply systems, dikes, drainage and sewerage	51	365	1	Resettlement	1st. Class LGU

Mandate of NG agencies is drawn from various Executive Orders for Departments and agencies, and also drawn from PD1566.
Mandate of LGU is based on Section 27 (Basic Services and Facilities) Local Government Code of 1991.
N/A - data not available

11.2.2 Implementation Arrangement

(1) Summary of Implementation Agency

The implementing arrangement by project cycle is given in Table "Implementation Arrangement of Priority Projects" and "Implementation Arrangement of supporting Project and Programs".

Implementing organizations for the priority projects are summarized below.

Project/Program	Implementing Organization
Yawa River System Sabo	DPWH
Legazpi City Urban Drainage	DPWH
Forecasting and Warning System	
Monitoring System of Volcanic Activities	PHIVOLCS
Monitoring System of Flood and Mud Flow	DPWH
Warning System	OCD
Repeater Station System	DPWH
Inter-agency Disaster Mitigation Network	OCD
Evacuation System Strengthening	
Evacuation Center	DPWH
Emergency Shelter	LGUs
Livestock Sanctuary	LGUs
Resettlement Site Development Projects	
Banquerohan	Legazpi
Anislag	Daraga

Implementation Arrangement of Priority Projects

Projects	Oversight Responsibility	Detailed Design	Selection of Contractor	Land Acquisition	Construction / Installation of equipment	O &M
Yawa River System Sabo Project	DPWH	DPWH	DPWH	Legazpi City, Daraga	DPWH	DPWH
Legazpi City Urban Drainage Project	DPWH	DPWH	DPWH	Legazpi City	DPWH	DPWH
Forecasting and Warning System Strengthening Project						
- Monitoring System of Volcaninc Eruption	PHIVOLCS	PHIVOLCS	PHIVOLCS	N/A	PHIVOLCS	PHIVOLCS
- Monitoring System of Flood and Mud Flow	DPWH	DPWH	DPWH	N/A	DPWH	DPWH
- Warning System	OCD	OCD	OCD	N/A	OCD	OCD
- Repeater Station System	DPWH	DPWH	DPWH	N/A	DPWH	DPWH
- Inter-agency Disaster Mitigation Network	OCD	OCD	OCD	N/A	OCD	LGUs
Evacuation System Strengthening Project						
- Evacuation Center	DPWH	DPWH	DPWH	N/A	DPWH	DECS
- Emergency Shelter	LGUs	LGUs	LGUs	LGUs	LGUs	LGUs
- Livestock Sanctuary	LGUs	LGUs	LGUs	LGUs	LGUs	LGUs
Resettlement Site Development Projects						
Banquerohan Phase I and Phase II	Legazpi	Legazpi	Legazpi	N/A	Legazpi	Legazpi
Anislag	Daraga	Daraga	Daraga	N/A	Daraga	Daraga

N/A = Not applicable

Implementation Arrangement of Supporting Projects and Programs

Projects	Oversight Responsibility	Advisory	Preparatory Works	Detailed Design	Selection of Contractor	Construction / Installation of equipment	Operation
Supporting Programs for Resettlers							
Organization and Strengthening of Multi-Purpose Cooperatives with Micro-Credit	Legazpi, Daraga	DSWD, LBP, TLRC	Legazpi City, Daraga	N/A	N/A	N/A	Cooperative
Hollow Block Production	Legazpi City, Daraga	TLRC	Cooperative	Cooperative	Cooperative	Coopearive	Cooperative
Agro-industry Development							
- Abaca Production and Handicraft	Legazpi City, Daraga	FIDA	Cooperative	Cooperative	Cooperative	Coopearive	Cooperative
- Pilinut Processing	Legazpi City, Daraga	DA	Cooperative	Cooperative	Cooperative	Coopearive	Cooperative
- Coco Coir Production	Legazpi City, Daraga	CDA	Cooperative	Cooperative	Cooperative	Coopearive	Cooperative
Study Area Economic Development							
- Aggregate Production Plant	DPWH	DPWH	Private Sector	Private Sector	Private Sector	Private Sector	Private Sector
- Mineral Water Production Plant	DTI		Private Sector	Private Sector	Private Sector	Private Sector	Private Sector
- Protected Area Development Project	DPWH	DA / DTI	DPWH	DPWH	DPWH	DPWH	DPWH
Institutional Strengthening for Disaster Prevention Capacity							
- Provincial Disaster Management System Strengthening	Albay		Albay	N/A	N/A	Albay	Albay
- Community-based Disaster Management Strengthening	Legazpi City & 9 Municipalities		Legazpi City & 9 Municipalities	N/A	N/A	Legazpi City & 9 Municipalities	Legazpi City & 9 Municipalities

N/A = Not applicable

(2) Recommendation for Implementation

1) DPWH and LGU collaboration

Legazpi City and Daraga Municipality's participation in implementation of Yawa River System Sabo Project is recommended. As examined above, the two LGUs' capacity to implement the project is insufficient at the moment. The Philippine Government's idea is to devolve the activities of the national government to LGUs. It is useful to make the LGU a major stakeholder to identify if the project is best investment.

Therefore, engineers from the LGUs should be involved in the project planning and management. It would contribute to the LGUs project management capability enhancement. DPWH should propose an arrangement enabling the LGUs' engineers' participation.

2) Force Account System for Yawa River System Sabo

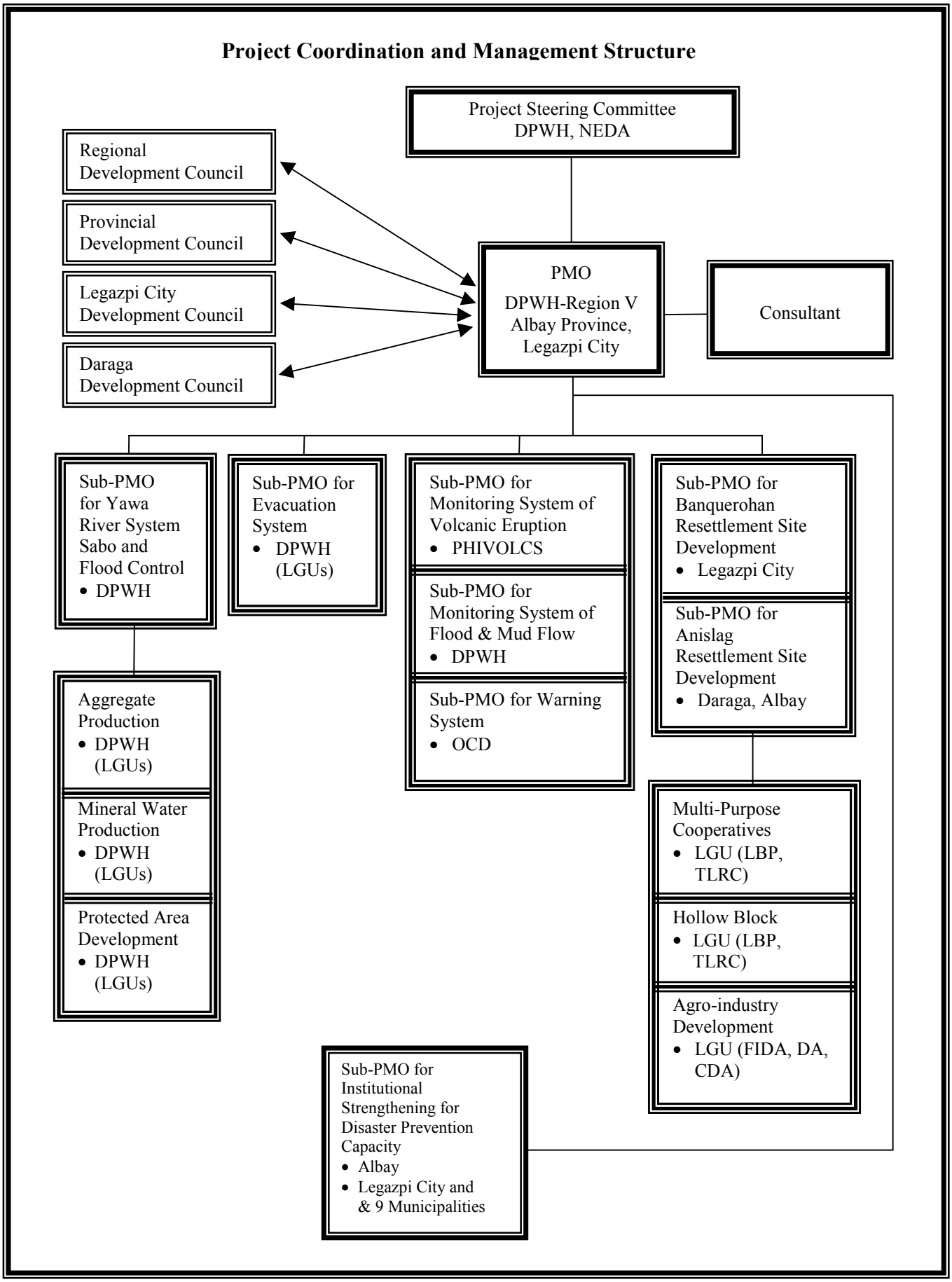
Cost estimate and implementation schedule are prepared on the contract basis in this Report.

However, force account system is proposed for Yawa River System Sabo Project. Though DPWH has many experiences in Sabo, flood control and drainage projects, they have not implemented such projects in force account system. Therefore, it is recommended for DPWH to implement the project in force account system as means of capacity building for project management though the project cost is over one thousand million pesos.

11.2.3 Project Coordination and Management

There are five core projects proposed as priority projects. Supporting projects and programs are presented to complement the Priority Projects. Following figure presents overall project coordination and management structure. Project Steering Committee consists of DPWH and NEDA at national level. Project Management Office (PMO) will be established in DPWH Region V. Consultants will be assigned to PMO as the engineers defined by FIDIC. PMO monitors and supervises all the projects and programs. For each project and program, Sub-PMOs will be established.

Project Coordination and Management Structure



11.3 Implementation Schedule

Implementation schedule of priority projects and supporting projects and programs is summarized in the following figures.

11.4 Project Cost Sharing by Implementing Organization

Project cost sharing will be made according to Implementation Arrangement. Tentative cost sharing plan for priority projects is given in the following tables.

Implementation Schedule of the Priority Projects

	Projects and Programs	(1999 - 2005)						
		1999	2000	2001	2002	2003	2004	2005
PRIORITY PROPOJECTS	*Sabo Facility Construction*							
	Yawa River System Sabo Project							
	Urban Drainage							
	Legazpi City Urban Drainage Project							
	Forecasting, Warning and Evacuation							
	Forecasting and Warning System Strengthening Project							
	Evacuation System Strengthening Project							
	Resettlement Site Development Project							
	Resettlement Site Development Projects							

Notes :

- Feasibility Study
- Financial Arrangement
- Selection of Consultant
- Detailed Design
- Selection of Contractor
- Construction Works and/or Installation of Equipment
- Preparatory Works

Implementation Schedule of the Supporting Projects and Programs

	Projects and Programs	(1999 - 2005)						
		1999	2000	2001	2002	2003	2004	2005
SUPPORTING AND INSTITUTIONAL PROJECTS AND PROGRAMS	*Supporting programs for Resettlers*							
	Organization and Strengthening of Multi-purpose Cooperatives with Micro Credit							
	Hollow Block Production							
	Agro-industry Development (Abaca, Pilinut and Coco Coir)							
	Proposed Projects for Study Area Economic Development							
	Aggregate Production Plant Project							
	Mineral Water Development Project							
	Protected Area Development Project							
	Institutional Strengthening Project for Disaster Prevention							
	Provincial Disaster Management System Strengthening							
	Community-based Disaster Management Strengthening							

Notes :

- Financial Arrangement
- Selection of Consultant
- Detailed Design
- Selection of Contractor
- Construction Works and/or Installation of Equipment
- Preparatory Works
- Operation

Project Cost Sharing for Yawa River System Sabo Project

(Unit: Million PHP)

Description	F.C.	L.C.	DPWH	Legazpi City	Daraga	Total
1. Direct Cost	164.4	547.9	712.3	0.0	0.0	712.3
2. Government Administration Cost	-	15.5	15.5	0.0	0.0	15.5
3. Engineering Services Cost	144.4	13.3	157.7	0.0	0.0	157.7
4. Land Acquisition	-	35.3	0.0	25.4	9.9	35.3
5. Physical Contingency	30.9	61.2	92.1	0.0	0.0	92.1
Subtotal (1 - 5)	**339.7**	**673.2**	**977.6**	**25.4**	**9.9**	**1,012.9**
6. Price Contingency	38.1	318.7	315.7	29.6	11.5	356.8
Total	**377.8**	**991.9**	**1,293.3**	**55.0**	**21.4**	**1,369.7**

Project Cost Sharing for Legazpi City Urban Drainage Project

(Unit: Million PHP)

Description	F.C.	L.C.	DPWH	Legazpi City	Total
1. Direct Cost	205.6	129.1	334.7	0.0	334.7
2. Government Administration Cost	-	10.6	10.6	0.0	10.6
3. Engineering Services Cost	62.2	8.7	70.9	0.0	70.9
4. Land Acquisition	-	15.7	0.0	15.7	15.7
5. Physical Contingency	26.8	16.4	43.2	0.0	43.2
Subtotal (1 - 5)	**294.6**	**180.5**	**459.4**	**15.7**	**475.1**
6. Price Contingency	35.4	83.4	105.7	13.1	118.8
Total	**330.0**	**263.9**	**565.1**	**28.8**	**593.9**

Project Cost Sharing for Forecasting and Warning Strengthening Project

(Unit: Million PHP)

Description	F.C.	L.C.	DPWH	PHIVOLCS	OCD	Total
1. Direct Cost	210.8	37.0	111.8	40.7	95.3	247.8
2. Government Administration Cost	-	9.8	5.0	1.5	3.3	9.8
3. Engineering Services Cost	51.7	7.3	30.1	8.9	20.1	59.0
4. Physical Contingency	26.3	5.4	16.2	4.8	10.8	31.7
Subtotal (1 - 5)	**288.8**	**59.5**	**163.1**	**55.8**	**129.4**	**348.3**
5. Price Contingency	33.8	25.3	30.1	8.9	20.1	59.1
Total	**322.6**	**84.8**	**193.2**	**64.6**	**149.5**	**407.4**

Project Cost Sharing for Evacuation System Strengthening Project

(Unit: Million PHP)

Description	F.C.	L.C.	DPWH	*LGUs	Total
1. Direct Cost	0.0	291.9	260.8	31.1	291.9
2. Government Administration Cost	-	9.1	8.5	0.6	9.1
3. Engineering Services Cost	34.4	6.2	37.8	2.8	40.6
4. Physical Contingency	3.4	30.7	31.7	2.4	34.1
Subtotal (1 - 5)	**37.8**	**337.9**	**338.8**	**36.9**	**375.7**
5. Price Contingency	3.3	127.4	121.6	9.1	130.7
Total	**41.1**	**465.3**	**460.3**	**46.1**	**506.4**

*LGUs' cost sharing is proposed for Emergency Shelter and Livestock Sanctuary, LGUs refer to Legazpi City and 9 Municipalities. The detail is given in Table below.

Summary of Project Cost Sharing for Resettlement Site Development Project

(Unit: Million PHP)

Description	F.C.	L.C.	Legazpi City	Daraga	Total
1. Direct Cost	4.7	202.5	120.5	86.7	207.2
2. Government Administration Cost	-	9.1	5.4	3.7	9.1
3. Engineering Services Cost	37.3	6.3	25.7	17.9	43.6
4. Physical Contingency	4.2	21.8	15.3	10.7	26.0
Subtotal (1 - 5)	**46.2**	**239.7**	**167.0**	**118.9**	**285.9**
5. Price Contingency	4.0	90.0	55.5	38.5	94.0
Total	**50.2**	**329.7**	**222.4**	**157.5**	**379.9**

Summary of Project Cost Sharing for Priority Projects

(Unit: Million PHP)

Project	DPWH	PHIVOLCS	OCD	Legazpi City	Daraga	*LGUs	Total
1. Yawa River System Sabo	1,293.3			55.0	21.4		1,369.7
2. Legazpi City Urban Drainage	565.1			28.8			593.9
3. Forecasting and Warning System	193.3	64.6	149.5				407.4
4. Evacuation System Strengthening	460.4			4.1	1.2	40.7	506.4
5. Resettlement Site Development				222.4	157.5		379.9
Total	**2,512.1**	**64.6**	**149.5**	**310.4**	**180.1**	**40.7**	**3,257.3**

*LGUs refer to Municipalities of Camalig, Guinobatan, Ligao, Malilipot, Sto. Domingo and Tabaco

Summary of Project Cost Sharing for Evacuation Shelter and Livestock Sanctuary by LGUs

(Unit: Million PHP)

LGU	Bacacay	Camalig	Daraga	Guinobatan	Ligao	Malilipot	Malinao	Sto. Domingo	Tabaco	Legazpi	Total
Number of Shelter & Sanctuary	LS-1	ES-2, LS-1	ES-1	ES-2, LS-1	ES-1, LS-1	ES-2, LS-1	LS-1	ES-3, LS-1	ES-3, LS-1	ES-2, LS-1	ES-16, LS-9
1. Direct Cost	1.93	3.33	1.70	3.33	2.63	3.33	1.93	4.02	4.02	3.33	29.55
2. Government Administration Cost	0.04	0.07	0.04	0.07	0.06	0.07	0.04	0.09	0.09	0.07	0.64
3. Engineering Services Cost	0.19	0.32	0.16	0.32	0.25	0.32	0.19	0.39	0.39	0.32	2.84
4. Physical Contingency	0.16	0.27	0.14	0.27	0.21	0.27	0.16	0.33	0.33	0.27	2.39
Subtotal (1 - 4)	**2.32**	**3.99**	**2.03**	**3.99**	**3.15**	**3.99**	**2.32**	**4.82**	**4.82**	**3.99**	**35.42**
5. Price Contingency	0.60	1.03	0.53	1.03	0.81	1.03	0.60	1.25	1.25	1.03	9.15
Total	**2.91**	**5.02**	**2.56**	**5.02**	**3.97**	**5.02**	**2.91**	**6.07**	**6.07**	**5.02**	**44.57**

ES- Emergency Shelter
LS- Livestock sanctuary

CHAPTER 12 OPERATION AND MAINTENANCE

12.1 Basic Concept

It is necessary to have an operations and maintenance plan before commencing construction/installation of equipment in order to achieve sustainable disaster prevention capacity. Thus, implementing organization for each project is required to provide an O&M plan before any disbursement begins. An annual review of O&M activities and needs will be carried out by PMO.

12.1.1 Operation and Maintenance of Priority Projects

(1) Yawa River System Sabo Project

1) Scope of Works

Scope of works for O&M of sand pocket are assumed as follows:

- Maintenance dredging to remove deposit
- Regular river survey including deposition in sand pocket
- Monitoring river deposit mining
- Regular inspection of sabo structure
- Longitudinal profiling and Cross – sectioning survey

2) Dredging capacity

Dredging work by backhoe and dump truck is contemplated considering the physical properties and the conditions of the sites.

(Excavation)	- Bulldozer (22t) with ripper and Backhoe
(Excavation and hauling)	- Bulldozer and Backhoe
(Hauling)	- Backhoe

Adopted Equipment: Backhoe (Bucket Capacity 1.2m^3)

Work capability of Backhoe for Dredging work is as follows. (Source: Japanese Construction and Equipment Handbook)

Earthwork Volume (Backhoe) = (3600.q.K.f.E)/Cm (m^3/h)

q :	Loading Volume/1 cycle (m^3)	q = 0.98.qo = 1.18m^3
qo :	Nominal Bucket Capacity	1.2m^3
K :	A coefficient of Bucket	0.98
F :	Bulking Factor	1
E :	Production Efficiency	0.6 (Normal Condition)
Cm:	Cycle Time	30 sec

Earthwork Volume : (3600*1.18*0.98*1*0.6)/30 = 83.3 (m^3/h/car)

(Conveyance) - Dump truck

Adopted Equipment: Dump truck (11t)

E : Production Efficiency 0.9

(Normal Condition in case of Dump track)

Transportation distance: Round way (3 - 4 km)

(Maintenance of spoil bank yard) Bulldozer 11 t

Possible Dredging Volume per Round (Pawa-Burabod)

Equipment	Number	Dredging Capacity
Backhoe 1.2 m^3	1	83.3 m^3/h
Dump Track 11t	6	14.4m^3/h×6=86.4 m^3/h
Dredging Capacity/Party		83.3 m^3/h

Possible Dredging Volume per Round (Anoling, Budiao)

Equipment	Number	Dredging Capacity
Backhoe 1.2 m^3	1	83.3 m^3/h
Dump Track 11t	3	32.0m^3/h×3=96.0 m^3/h
Dredging Capacity/Party		83.3 m^3/h

As a result of the above, a work party in the Pawa-Burabod river and the Anoling, Budiao river consists of the following equipment.

The Pawa-burabod river: Backhoe 1, Dump Truck 6 and bulldozer 1

The Anoling and Budiao river: Backhoe 1, Dump Truck 3 and bulldozer 1

In case of working 8 hours a day, a work party which is composed of backhoe and dump truck is required the following total number of working days.

Work Volume of Dredging Work

Work Volume	Number of Party	Dredging Capacity (m^3/h)	Dredging Volume (m^3)	Total Number of Days (days/year)
Pawa-Burabod	1 (1 BH, 6 DT)	83.7 (83.3×1)	13,200	21
Anoling, Budiao	1 (1 BH, 3 DT)	83.7 (83.3×1)	146,600	220
Total	1 (2 BH, 9 DT)	167.4	159,800	241

BH: Backhoe

DT: Dump Track

3) Organization and Staffing

Required manpower is estimated as follows:

Required Number of Staff and Cost

Personnel	Pawa-Burabod Sand Pocket	Anoling, Budiao Sand Pocket	Labor Cost (PHP/day)
Site Supervisor	1	1	400
Administrator	1	1	300
Back hoe operator	1	1	350
Bulldozer operator or Pay Loader operator	2	1	350
Dump track driver	6	3	300
Guard	2	1	250
Total	13	8	

4) Implementation of the Maintenance Works

The necessary maintenance works almost double the present dredging work done by DPWH and the present capacity of DPWH might not be sufficient to accommodate the works. The implementation is rather irregular and sporadic depending on debris runoff and is preferable to be completed within short period. In the light of this, it is recommended that the implementation be carried out under a contract basis rather than the force account basis.

The estimated required budget for the maintenance works are 21.2 million PHP a year.

(2) Legazpi City Urban Drainage Project

1) Scope of Works

The operation and maintenance works are required for the following structures and facilities.

a. River channels
b. Pumping station
c. Retention ponds

In particular, it is of extreme importance that the emergency drainage equipment of pumping station starts and is operable in situations such as during floods and heavy rain.

Therefore, the operation and maintenance works for pumping station extend to the following categories to achieve the proper operation of pump drainage.

a. Facilities : Sustaining the reliability
Easiness of operation

b. Operation	:	Assured operation Sustaining capability of operators
c. Check and repair	:	Sustaining function of facilities Prevention of malfunction Repairing parts
d. Environmental conservation	:	Reduction of noise and vibration Reduction of air pollution Disposal of garbage Harmonious facility to the surroundings

2) Operation of Pumping Facilities

The operation of Tibu and Macabalo Pumping Stations with floodgates, in case of storm rainfall, high tide or in combination is summarized hereafter.

When the sea water level reaches El. +1.61m which is HWL (High Water Level) measured at Legazpi Port, Tibu and Macabalo floodgates are closed to prevent backwater from the sea into the those rivers.

After closing the floodgates, the following procedures are applied to the pump stations.

If the riverside water level is higher than the sea water level, the pump stations start operation until the sea water level becomes lower than HWL. Then, the floodgates are open to drain river flow by gravity.

The operation periods of pumps at Tibu and Macabalo rivers is not set for certain months because a clear line cannot be drawn between rainy season and dry season in Albay Province. The pump stations are to be operational all year round.

3) Organization and Staffing for Operation and Maintenance

a. Organization

After completion of the project construction works, all the drainage facilities, including the Tibu and Macabalo Pumping Stations, will be transferred to DPWH, Region V which is designated the agency responsible for operation and maintenance of the completed project facilities.

DPWH, Region V will remain an important organization, coordinating other agencies concerned and making higher level decisions.

For operation and maintenance, coordination with the Engineer's Office of Legazpi City is important, particularly for the Tibu and Macabalo Pumping Stations and their floodgates and retention ponds.

A telemeter or radio communication system is proposed to be established to achieve drainage operation using an integrated operation system.

Main activities for operation and maintenance are:

- Operation of the pumping station, floodgates and their operation
- Seasonal maintenance/rehabilitation of dikes, revetments, retention pond, etc.
- Daily patrol along the rivers, drainage channels
- Measurement and monitoring of rainfall, water level, flow discharge and water quality
- Compilation of data and information regarding flood and flood damage

b. Staffing

For the operation and maintenance of the project, the required number of staff will be as shown below.

Required Number of Staff at Tibu and Macabalo Pumping Stations

Personnel	Macabalo Pumping Station	Tibu Pumping Station
General Manager	1	-
Administrator	2	-
Technician (Electric)	2	1
Technician (Mechanical)	2	1
Operator	3	3
Office boy, Dump truck driver	4	2
Guard	3	3
Total	17	10

Note: General Manager and administrators are responsible for both pumping stations.

4) Operation and Maintenance Cost

The operation and maintenance costs and economic life for the project are considered in terms of economic cost as shown below.

Operation and Maintenance Cost and Economic Life for the Project

Item	Rate for O&M Cost (%)	Annual O&M Cost Maintenance/ Repairing	Annual O&M Cost Operation/ Administration	Economic Life
1. Civil Works	0.3	30%	70%	50 yr
2. Gate Facilities	1.0	40%	60%	30 yr
3. Pump Facilities	2.0	50%	50%	15 yr

Note: Replacement cost is the same amount as initial investment cost.

(3) Forecasting and Warning System Strengthening and Evacuation Project

1) Target system of OMR

- The proposed system comprises the following systems:
- Monitoring and forecasting system
- Warning system
- Evacuation system

The proposed monitoring and forecasting system comprises the following systems for the target hazards to be monitored:

- Eruption monitoring system
- Typhoon monitoring system
- Mud and debris flow monitoring system
- Flood monitoring system

Existing system is adopted as it is for the typhoon monitoring and the prevailing OMR is supposed to be appropriate. And no additional input is necessary for the system.

An inter agency disaster information system is proposed as the core warning system in addition to the prevailing warning disseminating system. VHF radio telephones are provided to enforce the communication between MDCC and BDCC.

Improvement of the existing evacuation center is proposed, and the emergency shelters and the provision of a livestock sanctuary are proposed.

2) Scope of Works

Works requisite to the OMR incurred by the new proposals or proposal of alterations are as follow:

<u>Eruption monitoring</u>

OMR for 3 telemetered seismograph and 1 repeater station, data processing unit, 1 supervisory control and monitoring equipment, GPS and deformation assessment system, elaboration and calibration of the assessment software

<u>Mud and debris Flow monitoring</u>

OMR for 14 telemetered rainfall gauging stations, 2 repeater stations and 1 system supervisory control and monitoring equipment, data processing unit and elaboration and calibration of the assessment software

Flood monitoring

OMR of 6 telemetered water level gauging stations and 1 tidal gauging station, 1 supervisory control and data processing unit and calibration and elaboration of the assessment soft ware

Warning system

OMR of inter agency disaster information network (IADIN) and VHF radio and elaboration of database for server

(4) Evacuation system

OMR of evacuation center, shelter and livestock sanctuary

1) Responsible agencies

The agency responsible for the OMR of each system is assumed on the basis of the present practice and the covering discipline as follows:

Eruption monitoring	PHIVOLCS
Mud and debris	DPWH
Flood	DPWH
IADIN	OCD
VHF	LGU
Evacuation center	DECS
Shelter	LGU
Livestock sanctuary	LGU

2) Necessary inputs for the OMR

Necessary inputs are manpower, material, spare parts and miscellaneous expenditures.

The manpower inputs for each system are estimated below:

Manpower Inputs by System

System	Manager	Engineer	Administrator	Technician	Labor
Eruption Monitoring	1	1	1	1	1
Mud and Debris and Flood	1	3	1	4	4
Inter Agency Disaster Network	1	-	1	1	-
VHF Radio System	-	-	-	1	-
Evacuation Center	-	-	-	5	5
Shelter and Livestock Sanctuary	-	-	1	3	4

The necessary work force is assumed including part time input.

Material input and spare parts requirement including miscellaneous expenditure are estimated to be as follow:

Monitoring system	9% of installation cost
Warning system	9% of installation cost
Evacuation center	0.1% of construction cost

3) OMR cost

The estimated OMR costs are as follow:

Forecasting and Warning system	28.7 million PHP
Evacuation, shelter and L. sanctuary	1.0 million PHP

(5) Resettlement Site Development Project

1) Scope of Works

Maintenance and repair works of the public facilities in the resettlement site will be carried out according to the following procedure and rules.

- Repair inspection of the public facilities within the site:
- Reporting on the trouble and preparation of an inventory of the facilities to be rehabilitated:
- Identification of the authority in charge (depending on the kinds of facilities and works needed, and their degrees in trouble): and
- Implementation of the maintenance and/or repair works

The responsibilities for the respective maintenance and repair works will be made as follows:

- Roads and pathways (LGUs/Resettlement Committee concerned):
- Water Supply system (Local Water Districts):
- Drainage System (LGUs/Resettlement Committee concerned):
- Electric power supply system (ALECO):
- Public buildings
    a. School (DECS)
    b. Chapel (Resettlement Committee/Community)
    c. Public Hall (Resettlement Committee/Community)
    d. Health and day care center (LGU/ Resettlement Committee)
    e. Productivity center (Resettlement Committee/Cooperative)
    f. Multi-purpose warehouse (Resettlement Committee/Cooperative)
    g. Park and open space (Resettlement Committee/Community)

Regarding the O&M cost for the Resettlement Sites, majority of the people interviewed in "People's intention survey" answered that they were willing to pay 60 PHP monthly. There are approximately 1,600 households to be dwelled in Banquerohan and Anislag Resettlement Sites.

If this O&M charge of 60 PHP a month is realized, cost recovery from user charge is realized for the Resettlement Sites.

12.1.2 Total Budget for Operation and Maintenance

Total annual budget required for O&M of Priority Projects is 52.0 million PHP.

The summary of organizations responsible for O&M activities, required number of staff and cost is given below.

Organizations for O&M Activities -- Summary

Priority Project	Agency	Required Staff	Annual O&M Cost (million PHP)
Yawa River System Sabo	DPWH	21	21.2
Legazpi City Urban Drainage	DPWH	27	3.2
Forecasting & Warning System Strengthening	DPWH	13	12.4
	PHIVOLCS	5	4.0
	OCD	3	6.5
	LGUs	19	3.0
	Subtotal	40	25.9
Evacuation System Strengthening	DECS	-	0.9
	LGUs	-	0.1
Resettlement Site Development	Legazpi City	-	0.4
	Daraga	-	0.3
Total			52.0

For Evacuation System Strengthening and Resettlement Site Development Projects, no permanent staff for is envisaged. Maintenance work will be made on call basis as set in the O&M plan, though regular inspection by appointed staff is required.

The breakdown of annual O&M cost is shown in Chapter 10 Project Cost Estimate. Summary of Annual O&M cost by organization is given below.

Summary of Annual O&M Cost for Priority Projects by Organization

(Unit: Million PHP)

Project	DPWH	PHIVOLCS	OCD	Legazpi	Daraga	LGUs	DECS	Total
Yawa River System Sabo	21.2							21.2
Legazpi City Urban Drainage	3.2							3.2
Forecasting and Warning System Strengthening	12.4	4.0	6.5	0.3	0.3	2.4		25.9
Evacuation System Strengthening				0.01	0.01	0.05	0.9	1.0
Resettlement Site Development				0.4	0.3			0.7
Total	**36.8**	**4.0**	**6.5**	**0.7**	**0.6**	**2.4**	**0.9**	**52.0**

*LGUs refer to Municipalities of Camalig, Guinobatan, Ligao, Malilipot, Sto. Domingo and Tabaco

CHAPTER 13 PROJECT EVALUATION

13.1 Economic Evaluation

13.1.1 Basic Conditions

The basic conditions for economic evaluations are as follows:

(1) Economic Evaluation is carried out by comparison between "With-the-Project" and Without-the-Project with regard to benefit and cost.
(2) Economic evaluation is conducted for Yawa River System Sabo Project, Legazpi City Urban Drainage Project and Resettlement Site Development Project for Banquerohan and Anislag
(3) The period for evaluation is assumed to include the period for the implementation period for construction and 50 years including 30 years of project life after construction works.
(4) The social opportunity cost of capital in the Philippines is considered to be 15%.
(5) The indicators of economic evaluation are "Economic Internal Rate of Return" (EIRR), "Benefit Cost Ratio"(B/C) and "Net Present Value"(NPV).
(6) The discount rate of social opportunity cost of capital of 15% is adopted to figure out B/C and NPV.

13.1.2 Economic Benefit

(1) Yawa River System Sabo Project

In this project, Option 3 is taken into consideration for land use data. The benefit accrued for this project is composed of (a) direct damages, (b) indirect damages by mud and debris flow, and (c) development benefit. The values of damageable assets in the existing condition is shown in Table XXV 2.1.1 in Supporting Report (2) and the unit values of agricultural products and other assets are shown in Tables XXV 2.1.2 in Supporting Report (2) and XXV 2.1.3 in Supporting Report (2), Chapter XXV.

Benefit generated by mud and debris flow control is defined as the expected amount of average annual reduction of damages by the designed works.

Development benefit per annum for return period of 20-year is estimated in terms of difference or balance between revenue and cost generated from production. The productivity enhancement of agriculture was revised from two times in the Master Plan to three times of the present productivity condition.

(2) Legazpi City Urban Drainage Project

From the economic viewpoint, inundation depth and damaged assets were examined on the basis of field survey conducted by the Study Team during the second field survey in the Philippines for flood prone area. The tables concerning the field survey such as survey sheet, scale of samples, distribution of building in the flood prone area of Legazpi City are shown in Tables XXV 2.1.4 to 2.1.10 in Supporting Report (2), Chapter XXV. The benefit generated from this project is composed of direct benefit and indirect benefit by flood.

The damage rates for each item vulnerable to flood damage are determined in accordance with the inundation depth and duration. The damage rate by inundation depth for each kind of asset as the result of the field survey conducted by the JICA Study Team in the second field survey in the Philippines is shown in Table XXV 2.1.13 in Supporting Report (2), Chapter XXV. The estimates of annual average flood damages by return period according to the procedure mentioned above are shown in Table XXV 2.1.14 in Supporting Report (2), Chapter XXV.

(3) Resettlement Site Project

In Resettlement Site Project, the benefit generated from livelihood in resettled area is composed of two sites for resettlements: (a) Banquerohan and (b) Anislag. The annual benefits generated from the project are considered to be the balance (net benefit) between revenue and cost by production. The annual cost and revenue are shown in Table XXV 2.1.15 in Supporting Report (2), Chapter XXV.

13.1.3 Economic Cost

The project cost is converted from financial price to economic price. The basic conditions for conversions are the same as of the Master Plan. The disbursement schedule of the priority projects in economic price is shown in Table XXV 2.1.16 in Supporting Report (2), Chapter XXV.

13.1.4 Economic Evaluation

The indicators for economic evaluation for the three priority projects are figured out as follows.

Indicators for Economic Evaluation for Priority Projects

Name of Project	EIRR (%)	B/C	NPV (Mill. Peso)
Yawa River System Sabo Project	23.75	1.57	1,304.6
Legazpi City Urban Drainage Project	21.56	1.64	213.1
Resettlement Site Development Project - Banquerohan - Anislag	 16.21 15.27	 1.02 1.01	 8.7 1.3
Integrated Evaluation for All Priority Projects	17.77	1.17	676.9

Yawa River System Sabo Project has the highest economic viability of the three priority projects, but the other two projects also have high economic viability. The EIRR for the Resettlement Site Development Project for both sites of Banquerohan and Anislag are higher than the 15% as the opportunity cost of capital so they are economically viable.

The integrated economic evaluation is necessary to be conducted for all priority projects as a package proposed in the Feasibility Study to judge that the packaged project is feasible from the economic viewpoint. Then the benefit for three priority projects mentioned above and cost for all priority projects were integrated as one packaged project.

The EIRR was figured out to be 17.8%. It can be concluded that this packaged project proposed in the Feasibility Project has quite enough economic viability. Besides if the benefits of all projects could be estimated more accurately, this packaged project will have higher economic viability.

In this Study, the sensitivity analysis for Yawa River System Sabo Project as a case study was conducted with regard to EIRR as one of the indicators for economic evaluation and the GRDP growth rate of the study area. As the result of the analysis, it proved that the B/C ratio would equal to 1.0 and EIRR would equal to 15% when the average annual growth rate of GRDP of the study area would be realized by 4.18% during the period from 1999 to 2020. Therefore it can be concluded that this project will satisfy the minimum condition for the economic feasibility by being figured out to be 15% as an opportunity cost of capital by less growth rate of GRDP in the study area than the one of the targeted growth rate as 10.22% during the same period. The summary of the sensitivity analysis is shown in the following table.

The Summary of Sensitivity Analysis With Regard to EIRR and Growth Rate of GRDP for Yawa River System Sabo Project

Case No.	Contents of Case	Return Period	Average Annual Growth Rate of GRDP in the Study Area (1999-2020) [%]	Average Annual Growth Rate of Development Benefit in the Study Area of Yawa River System Sabo Project (1999-2020) [%]	EIRR (%)	B/C	NPV (Milli. Peso)
1	Base Case	20	10.22	9.36	23.8	1.57	1,304.6
2	B/C=1.0	20	4.18	3.83	15.0	1.00	0.0
3	Growth Rate of GRDP=2%	20	2.00	1.83	11.3	0.81	-396.2
4	Growth Rate of GRDP=4%	20	4.00	3.66	14.7	0.98	-36.0
5	Growth Rate of GRDP=6%	20	6.00	5.50	18.2	1.19	395.1

The economic cost and benefit cash flow for these priority projects are shown in Tables XXV 2.1.17 to XXV 2.1.21 in Supporting Report (2), Chapter XXV.

13.2 Social Evaluation

13.2.1 Yawa River System Sabo Project

The protected area from mudflow corresponding to 20-year return period is 23,66.4 ha and the population of 14,282 (2,621 of household) will get the benefit generated by this project. The protection from mudflow by this project will bring the following social impacts on this area..

- Activation of socio-economic activity by disaster preventions
- Mitigation of social anxiety and disorder
- Cutting off vicious circle of poverty by rising up of income level by economic development projects
- Improvement of fixation of population (especially labor force)
- Improvement of welfare supported by the improvement of financial affordability of the local government
- The social benefit for relocating people from construction sites for sabo dike depends on difference between the positive benefit and negative benefit.

13.2.2 Legazpi City Urban Drainage Project

The protected area from flood corresponding to 10-year return period is 1,070.1 ha and the population of 70,309 (13,334 of household) will get the benefit generated by this project. The protection from flood by this project will bring the following social impacts on this area.

- Activation of urban socio-economic activities such as transportation of commuter, business such as trade and commercial activities
- Improvement of sanitation
- Improvement of fixation of population (especially labor force)
- Improvement of welfare supported by the improvement of financial affordability of the local government

13.2.3 Resettlement Development Project

The beneficiaries of the Resettlement Site Development Project are as follows:

Beneficiaries of Resettlement Site

Indicators	Banquerohan	Anislag	Total
Area (ha)	45	22	67
No. of Population	5,618	3,366	8,934
No. of Household	1,060	635	1,695

The Resettlement Site Development Project is expected to realize the following social impacts.

- Improvement of living conditions including space of house lot, water, electricity and transportation
- The minimum discrepancy of social customs with the aboriginal residents and the people surrounding area of the resettlement area.
- Improvement of housing environment (security) by elimination of vulnerability
- The better facilities for sanitation with regard to sewerage and garbage disposal

CHAPTER 14 THE PILOT PROJECT

14.1 The Objective of the Pilot Project

The objective of the execution of the Pilot Project, is to identify the key issues to establish the forecasting, warning and evacuation systems in the Study Area.

14.2 Selection of Hazard

14.2.1 Candidate Hazard and Criteria of Selection

The hazard to be selected will be the one which is incurred by the eruption of Mayon Volcano and has the possibility to bring about considerable damages to the selected barangay. Such hazards are:

- Pyroclastic flow (including Nuee ardente)
- Lava flow
- Ash fall
- Mud and debris flow

In order to select one hazard, the Study established evaluation criteria in the light of the objectives and specifications of the Study as follows:

a. Hazard that will bring about a considerable damage should be selected.
b. Hazard that frequently occurs should be selected.
c. Hazard that occurs commonly all over the Study Area should be selected.
d. Hazard forecasting system thereof will contribute much should be selected.

14.2.2 Evaluation and Selection of Hazard

Those hazards were evaluated and it was found that the damages incurred by pyroclastic flow and mud and debris flow stand out above others in the Study Area. The former has claimed the most significant casualties repeatedly. In the case of the eruption in 1993, 70 people were killed by the pyroclastic flow. Meanwhile, the latter has devastated fertile wealthy land that otherwise would enjoy rich harvest and deprived the farmer of their volition. Further, it is rather often that mud and debris flow causes casualties.

This same eruption resulted in seven persons killed by mud and debris flow. Meanwhile, lava flow devastate lands by its debris. However, the area devastated is limited because of the high viscosity of the lava of Mayon volcano and mostly it does not reach to the fertile flat land. The high viscosity affects the movement of

lava flow. The slow movement of lava flow claims casualties seldom. According to the record, ash fall could be seen at each occasion of eruption of Mayon volcano. Ash fall of Mayon Volcano is, however, of small scale. So the damage incurred by it, is not significant. Along this line, it is concluded that either of pyroclasic flow and mud and debris flow should be selected for the Pilot Project.

Most eruptions are accompanied by pyroclastic flow in the case of Mayon volcano. According to records, 90.5% of the eruptions have been accompanied by pyroclastic flow. The volcano is exceptionally active and has erupted with an interval of about ten years recently. The occurrence frequency of mud and debris flow is higher than that of eruption. A mud and debris flow is triggered by the first heavy rain after an eruption. Additional flows can be triggered subsequently each time there is heavy rainfall by a typhoon of monsoon. The first lahar that accompanied the eruption in 1993 brought remarkable damage to the areas extend in the south-eastern slope of the mountain. No official record is available with regard to the occurrence of mud and debris flow, but to date it is confirmed that it has occured at least 11 times since 1993.

The heavy rainfalls of Typhoon Monang in 1993, Akang and Rosing in1994 and Mameng in 1995 caused lahar which affected 4,000 to 40,000 families. Mud and debris flow is the most frequent disaster in the Study Area related to the eruption of Mayon volcano.

The eruption of Mayon volcano is of Vulcanian type and pyroclastic flow may head for any direction of the slope. All the slope, accordingly, have the possibility to suffer the damage by the pyroclastic flow although recent occurrences of this disaster seem to concentrate to south to southeastern areas. Mud and debris flow have the possibility to occur through out the Study Area as well because the debris of pyroclastic flow and lava flow, the source of mud and debris flow, might silt on the slope arbitrarily as mentioned above. The old deposit might be weathered and liable to supply the source of mud and debris flow. Thus, mud and debris flow can be acknowledged as the common disaster in the Study Area.

PHIVOLCS has monitored the activity of Mayon Volcano. It disseminates warnings of five levels in accordance with the forecast through the assessment of the monitored data, seismicity, ash puff, crater glow, lava trickles, and others. The technical standards adopted by PHIVOLOCS are considered to be of a sufficient level although strengthening of facility might be necessary.

The JICA established telemetered rainfall and debris flow gauging stations to forecast mud and debris flow. The river channels to be monitored by the stations and the installed equipment are as follows:

River Channels		Observation Item	Installed Equipment
• Maninila river	:	rainfall	-
• Pawa-Burabod	:	rainfall	wire sensor
• Padang	:	rainfall	wire sensor
• Basud	:	rainfall	wire sensor
• Budia	:	-	wire sensor

Rainfall is the direct trigger of mud and debris flow. According to the data recorded in Japan, the effective cumulative rainfall and effective rainfall intensity are the imperative causes of mud and debris flow no matter what the geologic and topographic conditions are. Mud and debris flow affected by volcano, like Sakurajima in Japan, have close relation with effective rainfall as well. In most cases, the occurrence of mud and debris flow delays 2 to 3 hours to rainfall. This implies that a lead time of 2 to 3 hours might be secured if warning is disseminated on the basis of the measured rainfall. OCD once tried to disseminate warning on the basis of the information obtained by the system. However, the results were not successful according to the then staff of OCD in charge. The reason of this is not identified; however, the conceivable reasons are as follows:

- assumed initial data were kept and used although they were to be elaborated on the basis of the experienced data.
- a civil engineer was not involved despite the fact that this hazard is one of the main subjects of civil engineering.

The cooperation of OCD, DPWH, and the Study Team may improve the forecasting system, warning system and evacuation system to some extent. In the light of occurrence frequency and the contribution to improvement, the Study selected mud and debris flow as the target hazard of the Pilot Project

14.3 Selection of Barangay

14.3.1 Candidate Barangay and Selection Criteria

The proposed pilot project is to be conducted for one selected barangay. In this respect, most of the barangays located in the areas within 10km from the crater are

subject to the mud and debris flow because the topographic slopes thereof are steeper than 1:30.

To predict the flow direction of the next eruption is difficult. To point out the site in which the next eruption will deposit the debris of pyroclastic flow, Nuee ardente, or ash fall ,which are all source materials of mud and debris flow, cannot to be done. So other factors must be conceived to select the barangay. With this regard, the followings criteria or assumptions were established to select the Barangay for the Pilot Project:

1) Barangay located along or downstream reaches of the existing gullys should be selected because the mud and debris flow tend to travel along the depressed area such as a prominent gully .
2) Gullies that extend along the south to east slope should be highlighted because the hazards caused by the eruption with a small magnitude are controlled by the cone developed at the summit and will take the direction to south to south-east because the cone in this direction is broken off.
3) The barangay located along the channel which has been once monitored should be selected because the data and the experiences obtained thereby are useful to elaborate the standard to judge the warning.

Consequently, the barangays located in the downstream areas of Bonga and Basud gullies were selected as the candidates as follows:

Candidate Barangays for the Pilot Project

Gully	River	Barangay
- Budiao	Budiao	Budiao, Banadero, Busay, Culliat, Banag, and Tagas, Bagumbayan, Malobago, and Bogtong
- Bonga	Pawa-Burabod	Mabinit, Pawa, and Bonga
- Basud	Basud	Buyuan, Bigaa, and Padang

14.3.2 Evaluation of Gully and Barangay

The existing Bonga gully (channel) is most prominent and provides the deepest depression. The hazard travels this channel most probably. Basud channel follows Bonga gully.

Both rainfall and mud and debris flow are measured once in the downstream reaches of Bonga gully (Pawa-Burabod river) and Basud gully (Basud river). However, only a wire sensor is installed in the downstream reach of Budiao gully.

According to the preliminary surveys, the Pawa-Burabod river is considered to reserve the highest potential of mud and debris flow even now.

In this accord, the Bonga gully (Pawa-Burabod river) was adopted as the target of the Pilot Project. Of the three barangays located in the Pawa-Burabod river basin the Barangay Pawa extends over an area 9.5 to 10.5km from the crater. The remaining two barangays are located at 8 km and are supposed to be more critical with regard to evacuation.

Barangay Mabinit is located at the right bank of the Pawa-Burabod river. Meanwhile Bonga is located at the left bank. The site reconnaissance survey identified that the right bank is more critical against mud and debris flow as compared with the left bank. Consequently, Barangay Mabinit was selected as the target Barangay.

14.4 First Pilot Project (Evacuation)

14.4.1 Scenario

The proposed first pilot project conducts forecasting and warning using the facilities proposed by the Study. The project further conducts, evacuation of the selected Barangay: Mabinit. This forecasting, warning, and evacuation were conducted in line with the following scenario.

a. 1st warning/ROCD

OCD monitor the rainfall in the watershed area of the Pawa-Burabod river on the basis of the rainfall data transmitted from the rainfall gauging stations established on the right bank of the Pawa-Burabod river and the left bank of the Buyuan river. The rainfall depth in the watershed area is to be estimated automatically in accordance with the program installed in the data processor.

In case the combination of accumulated rainfall and rainfall intensity exceeds the designated value, the processor will disseminate the first warning to the staff of OCD. The first warning is to arouse the attentions of the staff of the agency. The responsible staff of the agency must sit in front of the monitor and watch the fluctuations of rainfall. Staff of ROCD will watch and wait for further development in accordance with the manual.

b. 2nd warning/ROCD, PDCC, MDCC, BDCC and individual person

The next warning will be disseminated automatically if the rainfall increase further, either accumulated rainfall or intensity or both, and exceed the designated value. The second warning is to urge to start the preparations for evacuation. The information will be transmitted through the existing VHF

radio system to the provincial and city DCC from ROCD. The information will be transmitted to barangay DCC from CDCC through cellar telephone. The BDCC disseminates the 2nd warning to individual person in accordance with the procedure stipulated in the Manual. Each family commence to prepare for evacuation in accordance with the procedure written in the Manual.

c. 3rd warning/ROCD, PDCC, CDCC, BDCC and individual person

The 3rd warning is to be disseminated when the occurrence of hazard is convinced. The information is to be transmitted from ROCD to PDCC, MDCC through VHF radio and to BDCC through cellar telephone. BDCC advises the individual person to evacuate. ROCD, PDCC, and CDCC will monitor evacuation through the communication system.

d. Release

When rainfall subsides and hazard is confirmed not to occur any more, release information is to be disseminated and all the staff and individual person may resume the ordinary activity.

14.4.2 Preparation

(1) Confirmation of the Availability of Resources

1) Forecasting Facility

The availability of the forecasting facilities were confirmed through field reconnaissance survey at the gauging station sites and the monitoring site in the office of ROCD. The survey identified some defects to be repaired prior to the execution of the pilot project. They are :

- Filter for rain gauge equipment should be replaced
- Liquid of battery should be supplemented
- Some IC board should be replaced
- IC of printer should be replaced
- Software for warning decision should be enhanced

2) Warning Facility

VHF radio equipment of ROCD, PDCC, CDCC, were all in good condition. Telephone, facsimile equipment of those agencies were all in satisfactorily

conditions as well. The survey revealed that no VHF radio is allocated in Barangay Mabinit.

3) Evacuation Facility

Legazpi city disaster coordinating council designated Albay Central School as the evacuation center for Barangay Mabinit. The evacuation center has sufficient room with an area of 3,600m^2 to accommodate around 800 evacuees. However, number of faucets, 9 and toilets, are not sufficient. The stocks of blankets, water, and food were just sufficient.

Barangay Mabinit designated five pickup points for evacuee. There are two pickup points without roof.

There are two evacuation routes: Kirikaw road on the west and Bonga road on the east. Both roads have one lane with a width of less than 4m and are partially paved.

CDCC possesses two trucks to carry evacuees. CDCC reserve the right to borrow buses and other vehicles owned by other agencies.

4) Organization and Staff

CDCC has established the procedure to organize Disaster Prevention Center at the most convenient site. The center will manage various disaster prevention teams as follows:

- Evacuation
- Warning
- Relief
- Security
- Communication
- Transportation
- Medical
- Information
- Evacuation camp

DECS, PNP, CSWDO, and other related agencies are to collaborate with the center in addition to city, Barangay OCD, DPWH, PAGASA, and PHIVOLCS. Red cross, BSBI, and other NGO are to be involved with the center. The staff are observed to be well trained.

Barangay has established BDCC comprising Purok leader. Information, warning are disseminated to each family by BDCC. It helps family to evacuate. However it has not prepared an operation manual for emergency activity. The staff of BDCC are well trained.

(2) Preparation of Resources

The specification for rehabilitation of forecasting facilities were prepared. The specifications are duly submitted to JICA to purchase. Preparation to rent VHF radio equipment for Barangay was carried out.

- Manual for the emergency activity of BDCC was prepared.
- Manual for the emergency activity of barangay people was prepared in visual style (comics).
- Manual for activity of ROCD against mud and debris flow was prepared.

(3) Preparation of Plan of Operation

Plan of operation was prepared to confirm the activities of the project. The contents of the plan of the operation are as follows;

- Background of the pilot project
- Objective of the pilot project
- Concept of the pilot project
    - Scenario
    - Participants
    - Facility and equipment
    - Observation and analysis
    - Time table
- Schedule
    - The date of preparatory meeting
    - The date of execution: 27 Nov. 1999

(4) Meeting and Others

As the preparation works, official meetings were held three times with CDCC, BDCC, DPWH and the Study Team as follows:

- Sept. 10 1999
- Nov. 19 1999
- Nov. 26 1999

The main objectives of the meetings were to obtain the common understanding on the procedures and the tasks by organization of the pilot project.

Workshop were held at the Barangay hall of Mabinit to explain the pilot project for the residents. BDCC, CDCC and the Study Team gave explanations. The other objective of the workshop was the explanation of emergency activity manual to the local people.

Through the meeting, following amendments of the plan of operation were agreed:

- Quasi-warning is to be issued because the rehabilitation of the forecasting equipment is not to be completed before 27 November 1999.
- The site for the evacuation center is shifted from Albay Central School to Gogon Elementary School because the former have been occupied by the evacuee due to the abnormal activity of Mayon volcano

14.4.3 Pilot Project

The pilot project is to introduce the system and equipment proposed by the Master Plan to the selected area prior to the substantial installation to the whole target area. This comprises:

- Forecasting method and equipment
- Forecasting software
- Warning method and equipment
- Operation manual for warning
- Disaster prevention organization
- Evacuation method and manual
- Management of evacuation center

On 27 November 1999, a quasi-warning was issued to CDCC as scheduled. And disaster prevention works were activated by the various agencies and the residents of Mabinit in line with the method and equipment proposed. The detailed time table is briefed as follows:

06:58 Level-1 warning was issued to the ROCD staff
ROCD staff in charge stationed in the office for watch and wait
06:59 ROCD staff requested PAGASA weather forecast bulletin and confirmed no climatic change
07:03 ROCD checked the availability of telephone, fax and VHF
07:30 Availability were confirmed
07:35 ROCD received quasi-level-2 warning
07:40 Mud and debris bulletin
07:45 Warning to CDCC and PDCC
07:50 CDCC operation centre

07:55 CDCC issued warning to BDCC
preparation of evacuation center
08:00 setting up of center clinic
setting up of CSWD office
setting up of registration desk
08:13 BDCC meeting
08:15 BDCC issued warning to residents upto 08:30
08:25 Arrival of medical team to Mabinit
08:35 Arrival of PNP to Mabinit
08:40 Set up of field clinic
08:41 ROCD received level-3 warning
08:43 CDCC receive level-3 warning
08:44 CDCC issue level-3 warning to BDCC
08:45 CDCC dispatch vehicle to Mabinit
BDCC evacuation order to residents
Residents move to pickup point
09:00 Arrival of the first vehicle to Mabinit
The final order of evacuation
09:15 Arrival of the last resident to the pickup point
09:30 Arrival of the first evacuee to evacuation center
09:35 Registration of evacuee
09:40 Room assignment
09:45 Orientation
10:39 Arrival of the last batch of evacuee
10:42 Distribution of food
13:20 Release
16:00 Return

The residents participating in the project was 507 persons from 174 families. The participation ratio is around 50% against the then population of 1,080 persons. Other agencies that participated were DECS, DPWH, PHIVOLCS, PAGASA, PDCC, and PDMO.

The prepared and used bulletin for warning of mud and debris flow is shown in Table 14.6.1. The location of the pilot project is shown in Figure 14.6.1.

14.4.4 Assessment

The proposed procedures and the prepared manuals functioned well in general. Their availability were confirmed through the simulation. There were a few events to be noted for the further enhancement as follows:

1) BDCC consumed 15 minutes to disseminate warning to each family by means of house to house visit although the 12 staffs in charge tried their best. The adopted method is reliable and not to be revised. In this connection, the problem is the communication between BDCC and the disseminating staff to provide the most updated information to the disseminator. All the disseminators who will scatter all over the Barabngay should be equipped with VHF radio terminal to receive the most updated information.

2) ROCD consumed 30 minutes to confirm the availability of the communication facility after receiving level-1 warning. This is because PDCC staff was not stationed yet at that time. This implies that the first warning should be sent to a 24-hour manned site like a guard house to shorten the time to 10 minutes.

3) BDCC spent 20 minutes to order evacuation after receiving the warning from CDCC. This should be shortened by 10 minutes.

4) It took 30 minutes by vehicle for about 6 km. This is because only Kirikaw road was passable and it was too narrow to cross two vehicles (come and go). The necessary time is estimated to be 15 minutes if Bonga road is available.

5) A defect of Bonga road was found when the first batch of evacuees were directed to the evacuation center. It is apparent that emergency response of DPWH to inspect infrastructure and the emergency rehabilitation infrastructure is important.

6) The time period for warning and evacuation may be shortened by 30 to 45 minutes in total.

14.5 Second Pilot Project (Emergency Response by DPWH)

14.5.1 Scenario

The proposed second pilot project aimed to conduct a simulation of emergency response in line with the Standard Operation Procedure (SOP) issued as Department Order 36/1988. Said emergency responses are based on forecasting and warning obtained from the system newly installed.

a. 1st warning

The DPWH region V monitors the rainfall in the Pawa-Burabod river basin on the basis of the telemetered rainfall data at Barangay Mabinit and Buyuan. The data processing unit of the telemeter issues the 1st level warning in case the features of observed rainfall exceed the 1st level warning line (WL-1) generated by the processing unit. The warning is relayed to the staff in charge. The staff in charge inform the situation to the department to organize Regional Disaster Coordinating Body (RDCB). The RDCB duly establish the Operation Center. The staff in charge sit in front of the monitor and watch and wait for the development as the monitoring team.

b. 2nd warning

The installed telemetered monitoring system issues 2nd warning in case rainfall exceeds the 2nd level warning line (WL-2) generated by the processing unit. The monitoring team relay the warning to the Operation Center. The Operation Center dispatch survey teams to inspect the conditions of infrastructures. Survey team send the information on the conditions of infrastructure as the surveyed results. Technical planning staff of the Operation Center design the measures of emergency response to reinforce the infrastructures. The Operation Center dispatch Repair and Restoration Team to the sites. The team repair the defects of infrastructures. The Operation Center disseminate the warning to the relevant MDCC and CDCC. It inform the warning to ROCD and PDCC as well.

c. 3rd warning

The Operation Center relay the 3rd warning to relevant DCCS and ROCD. The Center instructs all the staff and teams in accordance to respond to the request by DCCS and ROCD.

d. Release

The Operation Center issue release statement and send it to the relevant DCCS and ROCD when the snake curve goes down to the zone below the WL-1 and the rainfall is considered to subside. It send the statement to each team and staff dispatched to fields.

14.5.2 Preparation

(1) Confirmation of the Availability of Resources

1) Forecasting facility

The supervisory controller, monitoring unit, processing unit, and transmitter and receiver were checked in the office of the DPWH region V. The receiver did not function well and was replaced to new one. The system was confirmed to function well including peripheral unit like the printer. The staffs of planning division were assigned as the staff in charge to monitor lahar. Thus monitoring team of the Disaster Coordinating Body was established by three staff of the planning division. The team made an investigation tour to Mabinit and Buyuan rainfall gauging stations on June 6 and 7. The functions of two gauging stations were confirmed sound by the investigation.

2) Inspection facility

No vehicle and SSB telephone is available for the exclusive use for inspection. For the pilot project, the Study Team agreed to provide a vehicle for the inspection. However, one vehicle was made available by the district engineer's office.

3) Repair facility

The Regional Equipment Service (RES) made one dump truck available for the use of pilot project.

4) Organization and Staff

The participants of the pilot project are as follows:

Monitoring Team	:	Staff of planning division
Investigation Team	:	Staff of maintenance division Staff of district engineers office
Technical Planning Staff	:	Staff of planning division Staff of district engineer's office
Repair Team	:	Staff of equipment division

(2) Preparation of material

The main material for the pilot project is the fuel for the dump truck. The application and approval to consume the fuel was made by the maintenance division.

(3) Meeting

The first workshop was held to understand the monitoring system on June 5. The discussion focussed on the theory adopted to the software of the data processing unit. The participants thereto are the staff member of the monitoring team of the DPWH and two staffs from ROCD.

The second workshop was held to confirm the scenario and staffing of the pilot project on June 9. The plan of operation prepared by the Study Team and DPWH Regional Disaster Coordinating Body were materialized in the meeting. The participant are DPWH staffs assigned for Monitoring team, investigation team and repair team including the staffs from the district engineer's office.

14.5.3 Pilot Project

All the managing staff of the DPWH region-V were not available because of other meeting and the establishing of the Operation Center could not be conducted on June 13 when the second pilot project was held. The main activities of the project are dispatching of inspection team and repair team to the sites. The timetable of the project are shown below:

09:15 Assumed to have warning level 1
Monitoring team relayed the warning
Assumed to have established Operation Center

09:50 Assumed to have warning level 2
Monitoring team relayed the warning
Assumed to have ordered inspection

10:00 Survey team started the office to barangay Mabinit
District engineer's office started to the barangay Mabinit

10:15 Arrival of survey team to the barangay and commencement of inspection of evacuation road and the river channel

10:30 Information on the status was assumed to be sent by the survey team to the Operation Center. The survey team moved to the Padan river.

10:45 Decision was assumed to be made by the Operation Center and the repair team was dispatched to the site. The survey team moved to Padan.

11:00 The repair team arrived to the site.
11:30 Repair was assumed to be completed at Mabinit and the repair team was ordered to move to Padan.
11:45 The Repair team arrived to Padan.
12:00 Release statement was issued to all the team.

14.5.4 Assessment

The 3rd workshop was held to assess the pilot project on June 13. The participants are members of the monitoring team, the survey team and the repair team. The issues discussed therein are as follows:

- The alarm corresponding to the warning level 1 should be given to the site where a man stationed for 24 hours like a guard house.
- The guard house should have a facility to communicate with the members of the monitoring team to relay the level 1 warning to the members.
- To have a service vehicle is preferable for the members of the monitoring team to come to the office to monitor the system without delay.
- Survey team should prepare a manual to inspect infrastructures.
- Vehicles with 4 wheel drive are indispensable to survey along the mountain slope.
- Communication tool is indispensable to survey and to inform the surveyed results to the Operation Center.
- Inventory of hydrology and structure are fundamental to plan the emergency response.
- Transfer of competence to utilize heavy equipment and to consume fuel because the procedure in normal case is complicated and take time.
- Materials should be reserved and stocked in a specific places for the use of emergency.

CHAPTER 15 RECOMMENDATIONS

In the Study on Comprehensive Disaster Prevention around Mayon Volcano whose target is set at the year 2020, the JICA Study Team formulated its Master Plan and conducted the Feasibility Study on the priority projects selected in the Master Plan. To implement the proposed priority projects, it is highly recommended that the Philippine Government undertake them in consideration of the following suggestions.

15.1 Earlier Implementation of the Priority Projects and Their Preparations

As a result of the Feasibility Study, all the priority projects and programs proposed by the JICA Study Team have been verified to be viable in terms of economic and socio-environmental aspects.

Consequently, it is recommended for the GOP to promote these projects and programs as soon as possible.

(1) Preparations for Implementation of the Projects and Programs

1) Formation of a Consensus through Discussions in the Related Communities

The disaster prevention projects and programs need to be implemented with the consent of the government agencies concerned (both central and local) and the related people. Prior to their implementation, it is advised to hold a series of meetings so as to make a consensus among all concerned.

2) Enlightenment of the People and Participation of the Communities

In addition to involvement of the government agencies, it is suggested to make more Non-Government Organizations (NGOs) participate, and cooperate with them in enlightening the people and communities.

3) Promotion of the People's Self-preparedness

The disaster prevention activities depend on the willingness of the community members. So, it is recommended to activate the voluntary participation of the people into disaster prevention activities.

(2) Appropriation of the Budget

1) Cost Sharing between Central Government and Local Government Units (LGUs)

Implementation of all priority projects and programs proposed in this Study requires a good deal of funds. In principle, the required costs should be shared in proportion to the amount of benefits to be received among the concerned. However, the fund raising capacity of LGUs is still limited and is much less that of the communities. Considering such situation, it is indispensable to implement these projects with an initiative of the central government to lead them to successful realization. As far as this Study is concerned, the Philippine Government agrees that the relevant LGUs share at least 10% of the total project cost. In this regard, it is advised for both the central and local governments to sit together with a view to discussing in detail about the sharing of costs and works for the respective related projects.

2) Financial Assistance from International Institution or Foreign Country

To complement the financial deficit of the central government, it may be necessary to have recourse to a financial assistance from the international financing institution or foreign donor country. As the aid conditions of the above institution or country vary from one to another and its preparatory procedure takes time, it is suggested to start to sound the financing possibility and make a request at an early opportunity. In case that the Philippine Government makes a request for financing assistance, the following are supposed to be the basic conditions or requirements for foreign financial assistance:

a. The project or program should be justified to be feasible.
b. The project or program must be contributive to upgrading of the disaster prevention capacity of the people or its community, and improvement of their livelihood.
c. In principle, the local portion in the project or program cost is to be borne by the Philippine Government.
d. The Philippine Government commits the project implementation and it is to be done with its initiative (even though it depends on the technical and financial assistance).
e. After completion of the project or program, its operations and maintenance is to be properly done by the Philippine side, particularly the LGUs and the Implementing Agency.

Among these five conditions, the items a. and b. have been confirmed in this Study. As for the remaining items from c. to e., JICA Team understands that such conditions were understood and accepted by the Philippine side through a series of explanations and discussions with the high officials of the competent agencies.

(3) Establishment of the Implementation Structure

1) Institutional Arrangements

In the Philippines, the decrees provide for the duties and responsibilities of each agency concerned with regard to the forecasting and warning of volcanic eruption, typhoon, and flood, but no legislation stipulates for the monitoring of the mud and debris flow. It is therefore recommended to prepare an executive order, which prescribes the mandate of DPWH as its main executor.

2) Creation of the Implementation Organization

As the priority projects and programs proposed comprise various works and activities in both the structural and non-structural aspects, it is strongly recommended to establish an "integrated implementation system" which is able to manage the whole structure, by entrusting the supervisory management power to DPWH.

3) Involvement of the Consultants including External Intellectuals

In view of a wide scope of works and activities of the proposed projects and programs, several competent government agencies need to be involved in implementing them. As to the general supervision of the whole projects and programs implementation, it was confirmed in the Steering Committee meeting that the DPWH assume a role of the main executor.

Since the DPWH has no experience yet in supervising and managing such integrated or packaged projects and programs, it is advised to hire a group of Qualified Consultants. It is, therefore, recommended to entrust them (as "ENGINEER" as prescribed in the FIDIC regulations) with full powers at the initial stage of the project implementation. In proportion as the project progresses, the power will be gradually transferred to the main executor and all powers finally belong to the designated authority. In this case, Consultants will be responsible for the quality control of the works and also provide the advisory services on work schedule and financial control in the project management.

15.2 Immediate Execution of the Practicable Matters Using the Available Resources

It is really to be appreciated that the Philippine Government makes every effort to cope with the disasters and ensure the better life of the people with the limited resources. To improve further the current situations, it is proposed to undertake the following to the utmost extent.

(1) Collection and Preparation of the Basic Data

The biggest bottleneck in the conduct of this Study was the lack of basic data and information, which are instrumental in clarifying the issues and formulating the planning. The Master Plan study on comprehensive disaster prevention in the Study Area is to be reviewed every ten years. To undertake this review, it is indispensable to do it based on the reliable data and accurate figures. Consequently, it is strongly suggested to consolidate the data management system by collecting and storing properly the data and information regarding the following:

1) Socio-economic Statistics
   a. Population census
   b. Socio-economic indicators in the Area (by Province, City/Municipality and Barangay)
   c. Land use

2) Hydrological and River Flow Observations
   a. Rainfalls

   Stream and water level gauging

   River bed changes (longitudinal leveling and traversal sectional surveying)

   Excavation volume of the sediment

3) Disaster Records
   a. Real situations in times of disaster occurrences regarding society, economy and physical conditions
   b. Extent, intensity and impacts of the disaster (general situations of the disaster, calamity and stricken areas, affected people, toll, amounts of damage by sector and category, number of days in economic abeyance due to disaster, etc.)

c. Real state of evacuation (no. of evacuees by evacuation center, evacuation route, means of evacuation and its number , staying days in the shelter, procurement and distribution of emergency stockpiles, etc.)
d. Calamity fund (amount by fund source, date of defrayal, details of actual disbursement)

4) Records on Relocation and Resettlement
   a. No. of resettlers by resettlement site, no. of permanent settlers, no. of settlers who abandoned the site, dates of settlement and departure
   b. Inventory of resettlement site facilities and records on their rehabilitation

5) Records on Training and Drills
   a. Practiced evacuation drills
   b. Educational programs for the people
   c. Educational campaigns conducted for school pupils

6) Establishment of Database

(2) Strengthening of the Disaster Prevention Activities by the People, NGOs and Volunteers

In the Study Area, several NGOs have been actively involved in the disaster prevention activities and play a very important part not only in them but also in area socioeconomic development. To promote further their effective participation, it is suggested to clarify the tie-up system with them, especially in the following issues and fields of activities.

1) Surveying and Assessment of the Dangerous Areas and Information Networking
2) Awareness Raising of the People and Educational Campaign for the School Pupils
   a. Utilization of the education curriculum and teaching manual prepared as a result of technical assistance of the Italian Government
   b. Pictures (cartoons) and posters
   c. Essay contest
   d. Talks and presentations using photos, films, videos, etc.
   e. Others
3) Preparedness for Typhoon (clearing of drainage canals, cut-off of tree branches, etc.)
4) Reforestation
5) Practice of the Disaster Prevention Drills

6) Publication of the Information Bulletins and Accomplishment Reports
7) Others

(3) Inspection of the Disaster Prevention Facilities and Establishment of Emergency Response System

1) Periodical Inspections of the Disaster Prevention Facilities and Recordings (forecasting and warning, evacuation routes, evacuation centers, etc.)
2) Rehabilitation of the Disaster Prevention Facilities and Recording of the Emergency Responses

(4) Preparation of the Manuals for Disaster Coping

(5) Reliable Transmission of the Forecasting and Warning Information

1) Clarification of the Duties and Responsibilities
   a. PAGASA : Forecasts on weather, typhoon and flood in a broad area
   b. PHIVOLCS: Eruptions of Mayon Volcano
   c. DPWH: Mud & debris flows and flood in a local area
2) Accurate Data Collection and Forecasts
3) Timely Transmission of the Information
4) Periodical Inspections and O&M of the Facilities

(6) Grasp of the Land Use Situation

1) Survey for Grasping the Current and Future (Sustainable) Land Use
2) Update of the Land Tax Inventory
3) Preparation of the Land Use Maps and their Updating
4) Preparation of the Future Land Use Plan
5) Establishment of the Common Ownership System for the Collected Data and Records