tributary of the Abagao river also flows in the central area of the flat terrace. Rainfed paddy field expands at both banks of the tributary. Its' area is estimated at about 460 ha. In the southern boundary, the rainfed paddy field extends outside of the project area. The elevation of the rainfed paddy field ranges from 85 m to 95 m, and slope of rainfed paddy field is approximately 0.5%. The elevation of hilly areas is more than 100 m, and hill slope ranges from 3% to 20%.

6.1.4 Water Resources

(1) Catchment Area

The catchment area of the Tinago and the Abagao rivers are respectively estimated at 8 km^2 and 1.8 km^2. The vegetation of both catchment areas are coconut and grass land. At present, sever problem of soil erosion does not exist in both the river basins.

(2) Runoff

The seasonal runoff of both rivers are estimated at the diversion weir on dam sites as shown below. The runoff was estimated using the relationship between rainfall and runoff in adjacent river basins which have similar characteristics of river basin such as drainage area, size, and vegetation.

(Unit: ,000m^3)

Dam Site	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Diversion Dam	1,131	625	629	610	765	1,211	1,420	1,292	1,405	1,509	1,851	1,928	14,356
Dam 2	300	167	168	161	203	317	371	337	366	396	488	515	3,794

6.1.5 Agriculture and Farmers' Economy

(1) Land Use and Soils

Camalig Diversion lowland model project area comprises a total of 147 ha, out of which 130 ha are used for rainfed paddy cultivation and 17 ha for residential, roads and others type of build-up area (Ref. Figure 6.1.1). The soils of the area are classified as Legazpi series (Entisol). The predominant texture in the top 60 cm depth is sandy loam. The natural soil fertility is moderate with the pH ranging from 6.1 to 7.1. Due to the sandy nature of the soils, paddy rice in this area has been occasionally affected by shortage of water. In addition, the southern pat of the area is periodically affected by flash floods and has very poor drainage condition.

Dam No. 2 lowland model project area comprises a total of 610 ha. Out of the area, 395 ha are used for paddy cultivation, 137 ha for coconut land, 8 ha for annual upland crops, and 70 ha for residential, roads and others type of build-up areas. Some 364 ha of land are rainfed paddy field and only 31 ha are irrigated paddy field (Ref. Figure 6.1.2). The soils have clayey texture and moderate to high natural fertility. The land along the Abagao river, the water source of Dam No. 2, is poorly drained and is sometimes affected by flood of short duration.

(2) Land Holding and Tenure

The total number of paddy land parcels in the related barangays was 943 in Camalig Diversion area and 1,162 in Dam No. 2 area. On the average, an owner has around 1.3 land parcels. Per owner-family, a single lot nos. about two owners. The parcels of paddy land below 0.5 ha are roughly 70% in number or around 30-40% of the total paddy area. The average paddy land holding size per owner is 0.65 ha in Camalig Diversion area and 0.52 ha in Dam No. 2 area. This is further unevenly distributed among the land owners. On the average, one owner family has around two owners.

Item/Paddy Land		Camalig Diversion Area	Dam No. 2 Area	Study Area
Registered Area	(ha)	464	499	1,562
Registered No. of Parcel	(No.)	943	1,162	3,161
Registered No. of Owner	(No.)	713	952	2,519
No. of Owner Family	(No.)	385	520	1,369
Average Holding Size				
Per owner	(ha/owner)	0.65	0.52	0.62
Per owner family	(ha/family)	1.21	0.96	1.14
Median Holding Size	(ha/owner)	0.38	0.32	0.36

Source: Provincial office of DAR. As of the middle of 1995.

(3) Agricultural Production

The cropping pattern of rainfed and irrigated paddy rice is generally determined by rainfall pattern. The present cropping pattern of paddy rice for both lowland model project areas is shown below:

	1 st. Cropping Season		2 nd. Cropping Season	
	Planting	Harvesting	Planting	Harvesting
Paddy	May to July	Sept. to Nov.	Nov. to Jan.	Mar. to April

The yield of paddy rice is rather low and unstable. The average yield of paddy rice in irrigated area is 3.3 and 3.0 tons/ha during the first and second cropping seasons, respectively. In rainfed area, the average yield is 2.1 and 1.7 tons/ha for the first and second cropping seasons, respectively. The annual paddy rice production in Camalig Diversion and Dam No. 2 model area is estimated at 387 and 1,212 tons, respectively (Ref. Table 6.1.2). The major causes of low productivity are:

1) Uneven supply of water due to lack of irrigation and drainage facilities;

2) inadequate means for land preparation which prolongs the planting season;

3) low quality of paddy rice seeds;

4) inadequate farming practices such as fertilization weed control, insect and pest control; and

5) lack of past harvest equipment

(4) Farmers' Economy

The main occupation of a household head is either full-time farmer or part-time farmer cum part-time laborer. This accounts for 94% of the total households in Camalig Diversion area and 81% of the total households in Dam No. 2 area. Household heads mainly engaged in full-time handicraft area 4% and 9% of the total households in Camalig Diversion and Dam No. 2 model project area, respectively. More than 80% of the housewives are engaged in farming or handicraft in the both areas.

Total income of sampling households ranges from P31,500 to 59,400 in Camalig Diversion area and P24,800 to 51,700 in Dam No. 2 area. The livelihood of the households is equally dependent on farm and non-farm sources. The main source of farm income is crop sales comprising of 42 to 86% of the total farm income followed by livestock sales and farm labor employment. The main source of non-farm income is city labor employment which accounts for 10 to 66% to the total non-farm income followed by handicraft and loans. The dependence on farm labor is significant among the smaller operating households. The share of farming expenses to the total expenditure ranges from 17% to 29%. Food is a largest expenditure item of about 42% to 67% followed by education and clothing. The annual net reserve becomes larger according to scale of operating size as well as rights of land ownership and ranges from P900 for care-takers to P5,600 for large scale owner cultivators.

6.1.6 Irrigation and Drainage

(1) Existing Irrigation Schemes

Existing system were constructed by private farmers as shown below. The irrigation water is taken from the Abagao and/or its tributaries by these irrigation systems is to supplement irrigation for the first cropping season. Total irrigation area is roughly estimated at about 31 ha.

Primitive activities on water management and maintenance work are generally practical by the group. The maintenance cost of the irrigation facilities comes from the collection of water fee from the users. The fee is one(1) cavan/ha per season. However, when the users participate in maintenance work such as providing labor, the water charge is free.

	Barangay	Water Resources	Irrigation Facilities	Irrigation Area	Irrigated Crops
1	Inarado	Abagao river	Simple concrete structure	1	paddy
2	Inarado	Abagao river	Stone and Concrete weir Main canal L=160 Lateral Canals L=1.5	10	paddy
3	Inarado	Abagao river	Stone and Concrete weir Main canal L=200		paddy
4	Comun	Abagao river	Stone and Concrete weir Main canal L=200	9	paddy
5	Comun	Abagao river	Stone and Concrete weir	1	paddy
6	Binitayan	Tributary of the Abogao	Stone and Concrete weir	1	paddy
	Total		Stone and Concrete weir	31	paddy

(2) Flood Control Works of Ligban River

The DPWH has provided in its 1994 budget the rehabilitation of existing flood control facilities along the Ligban river. The rehabilitation work envisages the repair of existing flood control facilities constructed at the river sectionals approximately 300 m from upstream of the abandoned weir including dredging works to downstream of the Ligban river. The flood control component of the Camalig Diversion area is included in the DPWH rehabilitation plan for 1996.

6.1.7 Rural Infrastructure

(1) Road

The accessibility of the lowland model project area is considerably good owing to the national secondary road "Camalig-Comun-Inarado-Gapo-Penafrancia road", which traverses almost the center of the project areas. The entire section of this road is almost asphalt-paved and partly concreted. The road condition is generally good except for some sections which are under repair. In addition, three (3) provincial and barangay road, Ligban-Gotob-Taladong, Comun-Cotmon and Inarado-Alobo-Mabini, connect the adjacent barangays in the lowland model areas. However, these roads are earth fill (dirt) or macadam roads and in very poor condition.

(2) Rural Water Supply

Of the 12 barangays related to the lowland model project areas, about 33% of the population derive their domestic water supply from Levels I, II & III water supply systems.

These serviceable facilities, representing 25% of the systems are mostly shallow wells privately-owned by individual households and deep wells constructed by the DPWH. Only about 4% of the population is served by Level-II water supply system and the rest (4%) of the served population from Level-III facilities. Two (2) Level-II systems exist in the lowland model areas, one is located in barangay Gotob and the other is in barangay Inarado. In addition, the Level-III system of Camalig Water District serves about 26% of the people in barangay Ilawod.

(3) Electric Power Supply

Of the 12 barangays, 10 barangays were energized as of December 1995. However, the total number of house connections is only 43% of the total households in the model area. This figure is slightly lower than those of the entire Camalig municipality (53%) and Daraga municipality (75%).

(4) Public Transportation

Jeepneys and tricycles provide the common public transport service in the model areas. Some 20 units of authorized jeepneys operate between Inarado/Cotmon and Legazpi. Tricycles are more common in Camalig Diversion area because of the short distance from the poblacion of Camalig municipality.

6.1.8 Farmers and Rural Organizations

The present status of farmers organization which was clarified through the results of the public consultation and direct field investigation is that the existence of grassroot/farmers' organizations performing common concerns is available. These organizations do "bayanihan" (collective) work in the barangays. As for the maintenance of simple irrigation systems (e.g. stone and concrete weir) in barangays Inarado, Comun, Cotmon and Binitayan of Dam No.2 area, for instance, around 20 to 25 farmers in each barangay have grouped themselves together and collectively operate their irrigation facilities. These groups collect fees (about 1 cavan/ha/season) for the cleaning and repair of canals as the need arises. In Camalig diversion area, a small group comprising of 4 farmers in barangay Ilawod has also the same activity as in the 4 barangays covered in Dam No. 2.

Additionally, the JICA Study Team conducted a public consultation survey to encourage the involvement of the project beneficiaries at the planning stage. The public consultation included all the barangays within the 4 model project areas.

The public consultation was held from June to August 1996 and covered a series of public meetings at the barangay level and interview of 332 respondents in the two Lowland Model Project areas. Comments and suggestions from the intended beneficiaries to make the project design more relevant and responsive to their needs were solicited. The selection of the 332 farmers interviewed in the lowland model project areas was distributed proportionally to the total number of beneficiary farmers in each model area. All the blocks of each barangay within the model areas were included in the sampling design. Within a model area, the samples were also taken proportionally considering land tenure status and land holding size. Barangay officials and leaders were selected as respondents.

The objectives of the public consultation survey were to:

(1) promote the participation of prospective project beneficiaries and reflect their concerns and willingness in planning, implementation and operation of the proposed Model Rural Development Areas.

(2) collect additional primary data on the socio-economic condition of farmers beneficiaries in the model areas.

In the consultation meetings that were held by the JICA Study Team, the farmer beneficiaries exhibited their desire to actively participate in the implementation of the project. A number of issues and concerns were reflected. The most important findings of the public consultation in the Lowland Model Project areas are summarized as follows below (Ref. Tables 6.2.2 and 6.2.3):

- Ninety-seven (97%) percent surveyed farmers expressed willingness to give the necessary support for the project implementation.
- Nine-two (92%) percent were willing to allow the right-of-way for the canal construction.
- Ninety three (93%) percent expressed willingness to actively participate in the canal operation and maintenance.
- Eight-five (85%) percent view as acceptable the concept of lessee/sharecropper/ caretaker organization as irrigation service agent under the IA or separately.
- Seventy-nine (79%) percent of the respondents agree to the concept of post-harvest facility operation and maintenance by landless farm households. As for the organization to undertake its management, the IAs and IGs were identified as most suitable.
- Tractors are among the machinery primarily needed to improve productivity.
- The construction of irrigation/drainage infrastructure is overwhelmingly cited by the lowland farmer-respondent as top priority component of the project.

6.1.9 Constraints and Development Strategies

(1) Constraints

(a) Large proportion of landless farm households (67-71% of total) with minimal involvement in developmental activities.

(b) Low productivity of paddy rice under rainfed condition.

(c) Damages brought about by flood and inundation along the Ligban river in Camalig Diversion area.

(d) Lack of appropriate farming technologies brought about by weak structures and systems of agricultural extension delivery.

(e) Dormant and inactive farmers' cooperatives.

(f) Lack of good leaders for farmers organizations.

(g) Low level of savings' awareness among members of cooperatives.

(h) Low level of discipline among members of farmers organizations.

(i) Inaccessibility of farmers to formal credit. The farmers' recourse is ultimately the private traders who normally exact exorbitant interest rates (36-60%/annum).

(j) Inadequate support on post-harvest and market activities.

(2) Development Strategies

(a) Effective and efficient distribution of irrigation water to achieve the maximum potential irrigable area.

(b) Mitigation of flood control by providing adequate drainage facilities.

(c) Provision of appropriate farming technologies and related infrastructures and post-harvest facilities to improve production and marketing activities.

(d) Effective rural financial intermediation to expand the business and micro-enterprises activities of farmers' organization.

(e) New dimensions in the formation and strengthening of farmers' organizations to improve their viability and delivery of service. This will involve the participation of landless (tenants, caretakers, etc.) comprising about 60- 70% of the farm households in the project area.

6.2 Upland Model Rural Development Project Areas

6.2.1 Location

The upland model project areas are located in rolling hill areas, about 2 to 3 km from the national road, Daraga - Putiao, and administratively located at barangays Magogon and San Ramon. Barangay Magogon will be designed for corn-based model and barangay San Ramon will be analyzed for the coconut-based model (Ref. Figure 6.2.1 and 6.2.2). The Magogon and San Ramon areas comprise three (3) and six (6) blocks, respectively.

6.2.2 Demography and Social Status

The composition of the farm households is summarized below:

(Unit: %)

Classification	Magogon Area	San Ramon Area
Owner	42.5	40.8
Non-cultivator	0	11.8
Cultivator	42.5	29.0
Tenant	35.9	51.6
Lessee	4.2	7.5
Share-Cropper	31.7	44.1
Care-takers	21.6	7.6
Total	100.0	100.0

The 1995 total population and number of households in Magogon upland model area were estimated at 496 and 127, respectively. In San Ramon, the total population and households were estimated at 1,337 and 257, respectively. The average family size was calculated at 3.9 in Magogon area and 5.2 in San Ramon area. The population density was estimated at 2.1 and 1.7 persons/ha, respectively. The demographic features are summarized as follows (Ref. Table 6.2.1):

Item	Magogon Area	San Ramon Area	Study Area (41 barangays)
Area (ha)	240	785	10,613
Population (1995)	496	1,337	51,563
Farm	469	1,282	46,407
Non-Farm	27	55	5,156
Household Number (1995)	127*	257	9,638
Farm	120	246	8,674
Non-Farm	7	11	964
Population Growth (%/year) 1980-90*	-1.81	-0.13	0.74
Family Size (1995)	3.9*	5.2	5.3
Population Density(/ha, 1995) Total population*/total area	2.1	1.7	4.9

*: Based on the barangay census.

The economy of the upland model project areas is generally dominated by agriculture, especially production of copra and corn. With exception of copra drying, there are practically no agricultural processing factory. The handicraft works, using abaca and other plant materials, are done by rural women in the both areas. It is one of the important sources of cash income in the areas.

6.2.3 Topography

(1) San Ramon Area

The area is covered by rolling hills with coconut trees, grassland and upland field. The altitude of the area ranges from 60 m to 90 m. Majority of the hill slopes are less than 25%, with several undulation. Small depression areas are found along the small hills. The Ogod river flows down along the boundary of the project area. The vegetation of the hill slopes is mainly coconut and grass. The top soils are not thick, and out-crops of weathered rocks are existing.

(2) Magogon Area

The general topographic condition is substantially similar to those in the San Ramon Upland Model Development Project area. Majority of the hill slopes, however, ranges from 5% to 25%.

6.2.4 Water Resources

The annual runoff discharge was based on the results of the runoff analysis at Dam No. 5 of Ogod river in Barangay San Ramon, roughly estimated at 2.0 MCM/km^2 in rolling hill areas as shown below.

The annual rainfall in the study area is approximately 2,600 mm/ear. Evaporation was estimated at about 1,700 mm based on evapo-transpiration estimated by the Penman method. Considering balance between rainfall and evaporation, the drying condition is assumed to continue for about 6 months in the dry season. The development of small water impounding bodies is essential to meet additional water demand.

(Unit: ,000m^3)

Dam Site	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Dam No.5 (8 km^2)	1,331	742	748	716	904	1,408	1,647	1,499	1,627	1,762	2,170	2,287	16,841
per km^2	166	93	94	90	113	176	206	187	203	220	271	286	2,105

6.2.5 Agriculture and Farmers' Economy

(1) Land Use and Soil

The Magogon upland model project area comprises the entire barangay of Magogon with a total land area of 240 ha. About 190 ha or 79.2% are used for coconut production, about 20 ha for open land upland crop cultivation, mainly corn; 5 ha for rainfed paddy fields; and 17 ha for fallow land covered by shrubs/grasses. The area planted to intercropping is insignificant, estimated at only 10% of the total intercropped coconut area (Ref. Fig. 6.2.1). The soils of Magogon upland model project area are classified as Bascaran series (Alfisol). The dominant texture of the surface and sub-surface soil horizons is sandy clay loam, with the pH between 6.2 to 7.0. The content of organic matter in the surface horizon is low (1.2%).

The San Ramon upland model project area comprises the entire barangay a totaling 785 ha. About 534 ha or 68% are used for coconut production, 21 ha for paddy field; 130 ha for upland crops, mainly corn; 84 ha for fallow lands, and the rest are residential and miscellaneous areas. Coconuts intercropped with annual crops are scattered along this area (Ref. Fig. 6.2.2 and 6.2.3). The soils of San Ramon area are classified as Libon clay series (Inceptisol), with instruction of Bascaran series. The dominant soil texture is clay. The pH in the surface layer varies from 6.1 to 6.5. The content of organic matter varies from low to medium (1.8 to 2.8%).

(2) Land Holding and Tenure

On the average, an owner has around 1.3 and 1.6 land parcels in Magogon and San Ramon upland model project areas, respectively. The number of coconut land parcels below one ha is roughly 50% or around 16-29% of the total coconut area. The average agricultural land holding size per owner is 1.54 ha in Magogon area and 2.58 ha in San Ramon area. On the average, one owner family has around two owners.

Item/Agricultural Land Total		Magogon	San Ramon	Study Area
Registered Area	(ha)	229	807	10,177
Registered No. of Parcel	(No.)	201	489	11,578
Registered No. of Owner	(No.)	149	313	7,831
No. of Owner Family	(No.)	74	126	-
Average Holding Size				
Per owner	(ha/owner)	1.54	2.58	1.30
Per owner family	(ha/family)	3.09	6.40	-
Median Holding Size/Coconut land	(ha/owner)	1.00	1.15	0.73

(3) Agricultural Production

For both Magogon and San Ramon upland model project areas, the average yield of copra is about 1 ton/ha. The coconut fields are poorly maintained and farmers do not apply fertilizers. About 35% of the farmers cultivate small areas of rainfed paddy rice. Some 65% of the farmers in Magogon and 45% in San Ramon upland model project areas cultivate corn either in open lands or intercropping under coconuts. Almost all corn growers follow the corn-fallow-corn cropping pattern. Carabao is the only means for land preparation.

More than half of the farmers use hybrid seeds provided by dealers or purchased in the market, while the rest use corn from the previous harvest and seeds provided under the GPEP. The application of fertilizer and pesticides is a common practice, although the amount used is relatively small. Corn farmers apply between 17 to 25 kg/ha of N, and 8 to 12 kg/ha of both, P and K. The average yield of corn in the area is 1.5 and 1.0 tons/ha for the first and second cropping seasons, respectively. The estimated total annual production of corn is about 100 tons in Magogon and 484 tons in San Ramon (Ref. Table 6.2.1).

(4) Farmers' Economy

The main occupation of household heads is full time farmer or part time farmer cum part time labor which account for 82% in Magogon area and 74% in San Ramon area. Household heads mainly engaging in full time handicraft are 14% and 15%, respectively. The share of housewives engaging in farming or handicraft is 46% in Magogon area and 74% in San Ramon area. Other main occupation of housewives is sari-sari store keeping which accounts for 5% and 9% in the respective area. Full time housewives account for 44% and 15%, respectively.

Total income of sampling households ranges from P34,200 to 77,300 in Magogon area and P38,500 to 60,200 San Ramon area. The livelihood is primarily dependent on farming, with coming from livestock sales, crop sales and farm labor employment. The main source of non-farm income is city labor employment which accounts for 28% to 100% to the total non-farm income. The share of farming expenses to the total expenditure ranges from 9% to 37%. Food is a largest expenditure item at 36% to 73% of total expenditures followed by education and clothing. The annual net reserve becomes larger according to scale of operating size as well as rights of land ownership and ranges from P2,800 for care-takers to P8,200 for large scale owner cultivators.

6.2.6 Rural Infrastructure

(1) Road

The provincial roads, including portions of barangay roads connect the upland model project areas with the national road. These roads represent the access roads to the two (2) model areas with a 3.2 km length to Magogon and a 3.6 km to San Ramon. These access roads are mainly earth fill (dirt) roads and in very poor condition because of poor maintenance.

(2) Rural Water Supply

In the two barangays of Magogon and San Ramon, about 41% of the population derive their domestic water supply from Level-I water supply systems. Majority (40%) of these serviceable facilities are public shallow wells (14 units) and deep wells (2 units) constructed by the DPWH. Only about 1% is served by private owned shallow well (4 units). On the other hand, a considerable number of the unserved population (59%) derive their domestic water supply from open dug wells, unimproved springs and creeks, all of which are questionable sources, especially in terms of quality.

(3) Electric Power Supply

Barangay San Ramon was already energized in August 1994. However, the total number of house connections is only 12 households (or 5% of the total households in the barangay). This is because the power supply is mostly available for the houses located along the main roads. Further, some households although located within the power supply distribution lines cannot afford their monthly electric charges. Barangay Magogon is not energized at present though, according to ALECO the expansion program from barangay Maopi to barangay Magogon is already funded by CDF and will be done within 1996.

(4) Public Transportation

Jeepneys provide the common public transportation services in the model areas. The total 5 units of authorized jeepney operate between San Ramon and Daraga/Legazpi, while only one (1) unit operates between Magogon and Daraga. Because of poor road conditions, those jeepneys sometimes can not reach the final destination, particularly in the rainy season. Owing to such poor road conditions, the actual fares in jeepneys traversing the model areas is on the average, about 30% higher than the official rate.

6.2.7 Farmers and Rural Organizations

The present status of farmers organization in the upland model project areas was clarified trough the results of the public consultation and direct field investigation. In Magogon model area, the primary farmer organization is the Magogon Farmers' Multipurpose Cooperative. The Magogon cooperative is proposed to be the main institution to be strengthened for the promotion of upland corn-based farming. There are serious efforts among the officers to expand its capital base by increasing the membership to include the landless and wage laborers and raise the share capital for each member. The cooperative is also planning to put up its warehouse for the use of its members.

In the San Ramon model area, the potential organization which will be considered is the CARP beneficiaries association occupying a 37-ha lot to be soon distributed by the DAR. Another organization being considered is an association of landless farmers to maintain the proposed production farm to be put up the 44-ha which was recently distributed by the DAR to 25 CARP beneficiaries.

The consultation meetings held by the JICA Study Team were primarily composed of two (2) major activities, namely: the conduct of consultation meetings per model area and at the barangay level and the undertaking of interview survey to 22 respondents in Magogon model project area and 46 respondents in San Ramon model project areas. The farmer beneficiaries exhibited their desire to actively participate in the implementation of the project. There were general consistency on the acceptability of the project with respect to introduction of new concepts and ideas on how to promote rural development. A number of issues and concerns were reflected. The most important findings of the public consultation in the Upland Model Project areas are summarized as follows below (Ref. Tables 6.2.2 and 6.2.3):

- Ninety three (93%) percent will give support for the implementation and operation of the project.
- Ninety (90%) percent are willing to participate actively in the formation/strengthening of farming-marketing service cooperative.
- Fifty one (51%) percent are willing to plant inter-crops.
- Lack of financial resources, time constraints and presence of stray animals were among the reasons cited for the absence of inter-crop.
- Shortage of income and less employment opportunities are two of the main reasons for the out migration of young residents from the barangay.
- Agricultural enhancement ranks first in the priority requirements for sustainable development of the barangay. Rural infrastructure development and increased employment opportunities were second and third priority.
- While being a major practical issue from a social acceptability point of view, eighty-eight (88%) percent of the upland farmers expressed agreement to the concept of barangay cluster formation.

- Inter-village road appears number one in the priorities for village infrastructure improvement. Potable water supply and rural electrification ranked second and third, respectively.
- Eighty-seven (87%) percent of the respondents are agreeable to the concept of nucleus farming.
- Seventy-two (72%) percent agree to the concept of collective ownership of the nucleus farm.
- Technical and marketing support were the main government support identified as urgent for the establishment of a nucleus farm.

6.2.8 Constraints and Development Strategies

(1) Constraints

(a) Limited farm opportunities. This is brought about by the extreme dependence of farmers on coconut and corn farming.

(b) Inaccessibility of remote barangays due to the deteriorating conditions of existing rural roads.

(c) Predominant proportion of landless farmers. Around 57 to 59% of total farm households belongs to this category.

(d) Lack of appropriate farming technologies and marketing efforts.

(e) High possibility of soil erosion.

(f) Dormant and inactive farmers' cooperatives.

(g) Lack of good leaders for farmers organizations.

(h) Low level of savings' awareness among members of cooperatives.

(i) Low level of discipline among members of farmers organizations.

(2) Development Strategies

(a) Establishment of ecologically sound and sustainable farming.

In addition inter-cropping under coconut areas with suitable crops (e.g. abaca, coffee, pili, etc.) should significantly improve the vegetative cover of the uplands.

(b) Provision of infrastructure facilities to closely link production and marketing activities.

(c) Formation of landless organizations.

The organization of the landless families into a viable institution to perform related farming services such as operation of nursery, post-harvest equipment, handicraft

center, and cultivation of coconut lands under absentee land ownership, offers a practical route to involve such group into the development process.

(d) Establishment of CARP beneficiary organization.

The support services to be given to them necessitate joint and collective management so as economies of scale can be achieved.

(e) The Nucleus Farm

The concept of a nucleus farm is proposed to be established in Magogon and San Ramon areas, the 2 model project areas for the uplands. The nucleus farm cum nursery, including the post-harvest and other facilities is planned to be operated collectively by the farmers' organization.

Intensive farming, especially inter-cropping in the uplands is by no means easy to introduce unless there is focus of support services to the farmers. To cope with this situation, a concerted effort among the farmers will have to be encouraged by bringing them together to work under the guise of a nucleus farm. While the nucleus farm will be established, this will not prevent the individual farmers to cultivate their own farms. As a matter of strategy, the idea will be introduced on a small scale, about 1 to 3 ha-farm, and its role will gradually be expanded until its spill over effects to the outlying areas are felt by the farmers.

The proposal on nucleus farming is not common in the Philippines. The concept is being promoted among large-scale rubber plantations in Mindanao. These are the farms acquired under the CARP. There are problems being encountered, notably in the collective management of production farms. The CARP beneficiaries still prefer individual cultivation. However, in the management of the post-harvest facilities, these are jointly managed by the CARP beneficiaries cooperatives.

In the case of the WLIRDP, the response to acceptance of nucleus farming was posted at 80%. The 20% prefers individual cultivation, mainly because of doubts of the associations capacity to manage the farms efficiently. In order not to create false expectations among the prospective beneficiaries in Magogon and San Ramon upland model project areas, the recommendation is to do it on a small-scale by allocating a small portion of their farm under joint farming with the other farmers and allow the beneficiaries to continue cultivating their farms individually. The post-harvest facilities and other on-farm facilities will be jointly managed by the association. This approach is seen as the practical means to realize the concept of nucleus farming.

(f) New dimensions in the formation and strengthening of farmers' organizations to improve their viability and delivery of service.

This will involve the participation of the landless (tenants, caretakers, etc.) comprising about 60- 70% of the farm households in the project area. Another aspect is the formation of coconut landowners associations (i.e. absentee and non-cultivator) who will simply assign the cultivation of their farms to a cooperative under a trust agreement. This will be a positive step towards intensification of coconut farms in the upland.

6.3 Project Areas for Rural Infrastructure Development

6.3.1 Rural Road

(1) Location

Five (5) rural trunk roads with a total length of 32.1 km are proposed for rehabilitation and upgrading. Of the road network, 11.4 km are provincial roads and the remaining 20.7 km are barangay roads. The locations of these roads are shown in Figure 6.3.1.

Proposed Roads

Road No.	Passing Barangay	Length (km)		
		Prov. Rd.	Brg. Rd.	Total
1	Comun - Cotmon - Del Rosario - Panoypoy	7.0	0.0	7.0
2	Ilawod - Ligban - Gotob - Taladong	0.0	5.4	5.4
3	Anislag - Maopi - Magogon - Panoypoy	2.2	4.2	6.4
4	Bascaran - Burgos - Mabini - Kinawitan - Panoypoy	0.0	5.7	5.7
5	Mayon - San Ramon - Bigao - San Vicente Grande	2.2	5.4	7.6
	Total	11.4	20.7	32.1

(2) Beneficiaries

The proposed road network for rehabilitation and upgrading will benefit 20 barangays with a total population estimated at 23,525 people and 4,397 households as shown below:

Beneficiaries of Proposed Roads

Road No.	Beneficiary Barangay	No. of Barangays	Population */	Household */
1	Comun, Cotmon, Del Rosario, Panoypoy	4	5,215	1,019
2	Ilawod, Ligban, Gotob, Taladong	4	4,819	933
3	Anislag, Maopi, Magogon, Panoypoy	4	5,082	821
4	Bascaran, Burgos, Mabini, Kinawitan	4	4,383	872
5	Mayon, San Ramon, Bigao, San Vicente Grande	4	4,026	752
	Total	20	23,525	4,397

Note: */ Estimated 1995

(3) Present Condition of the Facilities

Of the proposed roads, the provincial road of an estimated length of 11.4 km is mainly gravel paved, while the barangay roads with a total length of 20.7 km are earth fill (dirt) roads. These roads are severely damaged and in poor condition because of poor maintenance. Insufficient drainage facilities such as side ditches and crossing drains in the slope portions are the major causes of damage.

(4) Constraints

The main constraint is limited funding support. This leads to poor maintenance. Indicative of this observation are non-functional drainage facilities and heavily damaged road sections. The actual activities of the government are concentrated on priority activities. It is observed, however, that the inputs for actual maintenance are always short of the total requirements.

6.3.2 Rural Water Supply

(1) Location

The rural water supply component will focus on the rehabilitation of four (4) existing Level-II water supply systems. These are located in barangays Gotob and Taladong in Camalig municipality and barangays Inarado and Gabawan in Daraga municipality as shown in Figure 6.3.1.

(2) Beneficiaries

The existing Level-II water systems were originally constructed to serve 211 households covering about 1,161 persons. However, due to deteriorating facilities, these systems presently serve only 163 households involving about 898 persons. The actual water supply coverage is reduced by about 23%, as shown below.

Beneficiaries of Proposed Level-II Water System

Water System	Beneficiary Population (Household)	
	As Built	At Present
Gotob Level-II System	132 (24)	149 (27)
Taladong Level-II System	319 (58)	286 (52)
Inarado Level-II System	545 (99)	369 (67)
Gabawan Level-II System	165 (30)	94 (17)
Total	1,161 (211)	898 (163)

(3) Water Users Associations

Water users associations have been formed in barangays Inarado, Gabawan, Gotob and Taladong covered by Level II water supply. In view, however, of the weak structure of these

organizations coupled by the non-follow up of technical support from concerned agencies, the associations in Inarado, Gabawan and Taladong became inactive. Several factors have been noted to cause the inactiveness of these associations, among which are weak leadership, poor management, water pilferage, non-payment of water fees and R-O-W for water source.

(4) Present condition of the facilities

All of the Level-II water systems in the project areas need rehabilitation to function effectively. The water supply facilities were constructed by the DPWH through the OECF funded Rural Water Supply III Project in the 1980s. The systems have either remained as Level-II or partly converted to Level-III. The inventory of such facilities is given below.

Existing Facilities of Proposed Level-II Water System

Level-II System	Gotob	Taladong	Inarado	Gabawan
No. of Spring Intake Box	4	1	4	2
No. of Ground Level Reservoir	1	2	1	1
Total Length of GI Pipe (m)	394	969	1,141	106
Total Length of PVC Pipe (m)	781	1,735	1,380	600
No. of Communal Faucet	4	2	8	2
No. of Individual Connection	19	48	20	1

(5) Constraints

Physical constraints include (a) Water leakage from pipes, joints, valves and pilferage; (b) Contaminated water; (c) Insufficient capacity of the reservoir; and (d) Absence of water flow records. The institutional constraints cover: (a) Absence of periodic maintenance; (b) Absence of water delivery schedule; (c) Absence of water rights; (d) Lack of discipline among members (e.g. non-payment of fees, non-cooperation); (e) Inadequate skills and knowledge on O&M; and (f) Lack of government support to monitor and render technical assistance on O&M.

CHAPTER 7 THE PROJECTS

7.1 Camalig Diversion Lowland Model Rural Development Project

7.1.1 Agriculture

The agricultural development plan for Camalig diversion lowland model area aims to improve the farming practices on paddy production, increase cropping intensity and yield of paddy rice, after the assurance of irrigation water supply and improvement of drainage conditions. Mungbean cultivation is proposed to be introduced in well drained areas after the harvesting of the first paddy rice season. The proposed cropping pattern is rice-Mungbean-rice, aiming to attain a cropping intensity of about 235% (Ref. Figure 7.1.1). To increase the cropping intensity it is necessary to use hand tractors to intensity land preparation activities. At present about 10% of land preparation is done through the use of hand tractors. It is proposed to increase this coverage to some 30% of land preparation activities.

The recommended farming practices for irrigated paddy rice cultivation are summarized below:

1) Use of certified seeds of rice varieties with short growing period and strong resistance to pest, such as IR 60,
2) Pre-germination treatment of seed,
3) Efficient management of irrigation water,
4) Adequate amount and timely application of fertilizer, and
5) Effective control of insects and diseases, making emphasis on the introduction of Integrated Pest Management and adequate control of weeds.

Paddy rice yields of 5.5 tons/ha in the first season and 5.0 tons/ha in the second season are projected at full project development. The target yield of Mungbean is projected at 1.2 tons/ha. The expected annual production of paddy rice and Mungbean at full project development are summarized below (Ref. Table 7.1.1).

Item	Present/Without Project			With Project			Increment
	1st Cropping	2nd Cropping	Total	1st Cropping	2nd Cropping	Total	
Paddy							
Area Harvested (ha)	114	87	201	130	130	260	59
Yield (ton/ha)	2.1	1.7	1.9*	5.5	5.0	5.25*	3.35
Production	239	148	387	715	650	1,365	978
Mungbean							
Area Harvested (ha)	-	-	-	45	-	45	45
Yield (ton/ha)	-	-	-	1.2	-		1.2
Production	-	-	-	54	-	54	54
Cropping Intensity	88	67	155	135	100	235	80

Note: * Average annual yield

The estimated available labor in the blocks related to each lowland model area is sufficient to cover the labor requirement for the respective paddy field areas.

7.1.2 Irrigation and Drainage

(1) Irrigable Area

The irrigable area is estimated at 130 ha taking into account water resource development, land capability and current area of rainfed paddy.

(2) Irrigation Water Requirement

The irrigation water requirement was estimated by using the formula described below. Potential evapotranspiration is calculated by Modified Penman method based on climatic and rainfall data obtained at the Guinobatan station.

$$IR = (Kc \times ETo + P + N + LP - RE) / Ef$$

where,

IR	:	Irrigation water requirement
Kc	:	Crop coefficient
ETo	:	Potential evapo-transpiration
P	:	Percolation
N	:	Nursery requirement
LP	:	Land preparation requirement
RE	:	Effective rainfall
Ef	:	Overall irrigation efficiency

The seasonal irrigation water requirements were estimated at 713 mm during the first cropping season of paddy and 676 mm during the second season of paddy.

(3) Design Discharge of Irrigation Canal

The design discharge of the irrigation canals and related structures was estimated by multiplying the irrigation area with peak irrigation water requirement. The peak irrigation water requirement was estimated at 1.21 lit./sec./ha and the design discharge of the intake structure was placed at 0.16 m^3/sec. The design discharges of the main and lateral irrigation canals are illustrated in an irrigation flow diagram (Figure 7.1.1).

(4) Diversion Weir and Settling Basin

The diversion weir is designed as an Ogee type. The length of the weir is 22 m and the height is 0.5 m. The intake water level is EL. 112.00 m, taking into consideration the minimum required water level at each turnout and settling basin. The manual gate operation is planned at the diversion weir. Aprons are provided in upper and down streams of diversion

weir. Further flood protection dikes will be provided at about 300 m in the upper stream and 240 m in the downstream of both banks in order to control floods. The typical sections of diversion weir as shown in Figure 7.1.3.

(5) Design Flood Discharge and Drainage Requirements

The design flood discharge of the diversion weir was determined at 81 m^3/sec. involving a 50-year flood analysis, taking into consideration conditions of back water and flood control in the upper stream area from the weir. The design flood water level was estimated at EL. 113.90 m. The drainage requirements are broadly divided into 2 levels, (i) drainage requirement in irrigation area (paddy field); and (ii) drainage requirement in upland fields (hilly areas) outside of the project area.

The drainage requirement in the irrigation area was estimated by applying the maximum daily rainfall of 90% probability and 3-day drainage period. The maximum daily rainfall was projected at 304 mm, and the drainage requirement was estimated at 9.8 lit./sec. The drainage requirement in hilly area was estimated by the rational method, at 12.5 m^3/sec/km^2. The design discharge of main drain was determined by multiplying the drainage area with drainage requirement. The design discharges of main and flood channels are illustrated in Figure 7.1.4.

(6) Canal Layout

The irrigation water will be drawn through a diversion weir at the Tinago river. Siltation of suspended water particles will be removed at the settling basin and flushed out to the Ligban river. The irrigation canal network will consist of one (1) main canal of approximately 2.3 km, 2 lateral canals of approximately 3.3 km and about 60. related structures. The main and the lateral canals are designed as concrete lined canals to sustain effective water usage. The measuring devices of irrigation water are designed as broad crest weir at the turnout structure and as staff gauge at the division box. The main canal network will be connected with on-farm development canal system such as main farm ditch and supplementary farm ditch. The drainage canal network will consist of 3 main drains and tertiary drains. The farm road with 3 m-width will be provided along the main canal network. A link road will be laid out to connect the other existing roads to facilitate transport of agricultural products.

Furthermore, the flood channel of about 1.4 km will be constructed provided along the Ligban river to flush out flood and mud flows from Mayon volcano. Protection dike of about 3.3 km will also be provided at the inundated area to protect flooding. The canal layout is illustrated in Figure 7.1.5, and the salient features of the canal layout are summarized in Table 7.1.2.

(7) On -Farm Development

On-farm facilities consisting of main farm ditch, supplementary farm ditch, farm drain, drainage ditch and small related structures will be provided. The command area of the main farm ditch is at about 20 ha, and divided into 4 to 5 sub-command areas of supplementary farm ditch. The main farm and supplementary farm ditches are designed as earth canal with trapezoidal section.

(8) Short-cut of Ligban River Course

Heavy sedimentation and siltation occur at the upper stream causing flooding of residential areas at the left bank of the river. Furthermore, at the downstream of the river, the river course is unstable due to heavy sedimentation during typhoon seasons. To solve these problems the river course will be modified as shown in Figure 7.1.5.

7.1.3 Rural Infrastructure

Three (3) components are proposed for rural infrastructure development, namely: i) upgrading of rural road; ii) improvement of farm road, and iii) rehabilitation of Level-II rural water supply.

i) The proposed rural road is a barangay road traversing the eastern part of the model area from north to south (Ligban-Gotob) with a total length of 2.9 km. The 4.5 m-width road will be concrete paved with 1.0 m-shoulder on both sides. The construction of the Ligban bridge to replace the existing Ligban spillway will be also included in this proposal.

ii) A total of 5.4 km of farm road including link roads will be constructed in the model area. These roads will be used for: (a) operation and maintenance of irrigation facilities; (b) transport of agricultural inputs and outputs, and (c) other socio-economic activities. These farm roads will be gravel-paved with a width of 2.0 m and shoulder of 0.5 m on both sides.

iii) The Gotob Level-II system will be rehabilitated as a component of the model project. A total length of 700 m pipeline will be expanded in barangay Ligban. With additional service connection of 7 communal faucets, a total of 196 persons will additionally benefit from the water supply system.

7.1.4 Post-Harvest and Marketing

Production and marketing center will be established in Camalig diversion lowland model project area in order to promote proper irrigation based farming and post-harvest and marketing activities. The Center will be managed by the Irrigators Service Association (ISA) explained in Chapter 7.1.5. The location of the center will be along barangay road in Ligban.

The ISA will provide custom services such as land preparation and threshing to the members of the Irrigators Beneficiaries Association (IBA) using hand tractor and thresher. A selected NGO will provide management skills to the ISA in order to enhance their capabilities in providing the services. The scale of rice post-harvest facilities will be designed based on: the quantity of paddy rice procured as fees (irrigation service fee; ISF) and (amortization fee; AF) assumed at 5 cavans/ha/year; quantity of custom milling (20% of the future paddy production); and warehousing and marketing services (10%). The required capacities of the warehouse, drying floor and rice mill, and number of farm machinery were estimated as follows:

Center Components	Number	Capacity	Area (m^2)
1. Farm Machinery			
Hand-tractor	2	6 HP	
Thresher	2	6 HP	
2. Sun-Drying Floor			560
3. Semi-Mechanical Dryer	1		10
4. Rice Mill	1	0.6 ton/hour	50
5. Warehouse			143
Paddy	1	88 ton/paddy	93
Others			50

The ISA will manage the Production and Marketing Center and provide integrated irrigation farming services to the IBA members covering:

1) O&M of the irrigation and drainage facilities including water management
2) Collection of ISF and AF in kind and amortization business
3) Custom services for land preparation and threshing using introduced hand tractors and threshers and other farming activities
4) Farm input procurement and distribution
5) Paddy drying, milling and storage

7.1.5 Farmers' Organization

At present there are no formal irrigators association (IAs) in Camalig Diversion Model Project area. The existing IA nearby the areas have poor performance to attain their duties on water management, canal maintenance and collection of water fees. The IAs are traditionally

viewed as collecting agents with minimal business perspective. Usually the persons directly involved in water management and canal maintenance are the caretakers who have not incentives for doing the job well. On the other hand, the majority of land owners do not participate directly in farming activities and are more business oriented.

The idea of forming new kinds of irrigator organizations was presented during the Public consultations and 80% of the farmers accepted it. The proposal of farmers organization in Camalig Diversion, as shown in Figure 7.1.6, is to spin-off a new organization exclusively performing a service. This will be called the irrigators service associations (ISAs), and the original IAs will now be called irrigators beneficiaries associations (IBAs). The ISAs will be service organization eventually to become a service cooperative. The majority members of the ISAs are the landless who are believed to represent a sizable proportion in the project area (about 70% of total farm households). All services relative to collection of ISF, water distribution, canal maintenance and operation of post-harvest facilities will be handled by the ISAs. The IBAs, on the other hand, will undertake production enhancement activities.

Special efforts will be made to ensure the viability of the ISAs and IBAs. The management skills of the ISAs and IBAs will be strengthened by government institutions and NGOs. The National Irrigation Administration (NIA) will assist in the aspect of water management and canal maintenance; DA, MAS and BUCAF will assist on crop production, while an NGO will assist in building financial and administrative skills.

7.1.6 Project Costs and Benefits

(1) Projects Costs

(a) Basic Assumptions

Construction costs such as labor, construction materials, and equipment were estimated at the price level of August 1996. These costs were based on conditions of local competitive bidding (LCB). Engineering and administration costs were assumed at 10% and 2%, respectively of the direct construction cost. Physical contingency was assumed at 10% of the sum of the direct construction, engineering, procurement of O & M equipment, administration and land acquisition costs. Price contingency was assumed at 2.0% per annum for foreign currency portion and 6.0% per annum for the local portion.

(b) Project Cost

The total project cost is estimated at 47.82 million pesos as shown below. The O & M cost is estimated at 462, 600 pesos per annum. The detailed cost is shown in Table 7.1.3.

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	19,772	12,420	32,192
1.1 Irrigation and Drainage Facilities	9,172	4,359	13,531
1.2 Rural Infrastructure Facilities	9,880	7,752	17,632
1.3 Production and Marketing Centers	720	309	1,029
2. O & M Equipment	96	24	120
3. Engineering Cost	2,414	805	3,219
4. Administration Cost	0	644	644
5. Land Acquisition and Compensation Cost	0	2,494	2,494
6. Physical contingency	2,228	1,639	3,867
7. Price Escalation	1,650	3,631	5,281
GRAND TOTAL (P 1,000)	26,160	21,657	47,817

(2) Project Benefits

The main benefits will be increase in the production of paddy rice due to higher cropping intensity and better yields. The harvested area devoted to paddy rice will increase from 200 ha to 260 ha. At full project development, the incremental volume of paddy production is estimated to reach 990 tons/year. The cultivation of Mungbean to about 45 ha will result in the production of about 55 tons/year. The incremental gross value of production from crop production is estimated at 9.2 million pesos/year. Furthermore, in view of intensified farming activities, additional labor of about 3,800 man-days/year will be generated

7.2 Dam No. 2 Lowland Model Rural Development Project

7.2.1 Agriculture

The agricultural development plan including cropping pattern, forming practices, etc. in this area will be essentially similar to that of Camalig diversion area. The projected annual production of paddy rice and mungbean at full project development are summarized below (Ref. Table 7.1.1).

Item	Present/Without Project			With Project			Increment
	1st Cropping	2nd Cropping	Total	1st Cropping	2nd Cropping	Total	
Irrigated Paddy							
Harvested Area (ha)	26	22	48	190	190	280	232
Yield (ton/ha)	3.3	3.0	3.15*	5.5	5.0	5.25*	2.1
Production	86	66	152	1,045	950	1,995	1,843
Rainfed Paddy							
Harvested Area (ha)	313	237	550	205	185	410	(140)
Yield (ton/ha)	2.1	1.7	1.9*	3.0	2.6	2.8*	1.1
Production	657	403	1,060	615	481	1,096	36
Mungbean	-	-					
Harvested Area (ha)	-	-	-	135	-	135	135
Yield (ton/ha)	-	-	-	1.2	-		1.2
Production	-	-	-	162	-	162	162
Cropping Intensity (%)	86	65	151	134	100	234	83

Note: * Average annual yield

7.2.2 Irrigation and Drainage

(1) Irrigation Area

The potential irrigable area was estimated at 190 ha based on water resource development. However, the supply of irrigation water can be expanded to by adopting rotation of irrigation system. This will bring the total irrigation area to about 395 ha.

(2) Irrigation Water Requirement

The irrigation water requirement was estimated in the same manner as mentioned in section 7.1.2.(2). The seasonal irrigation water requirements were estimated at 527 mm for the first season and 472 mm for the second season.

(3) Design Discharge

The peak irrigation water requirement was estimated at 1.04 lit./sec./ha. The design discharge of the intake structure is about 0.2 m^3/sec. The design discharges of the main and lateral irrigation canals are illustrated in an irrigation flow diagram (Figure 7.2.1).

(4) Dam and Reservoir

Based on information of the detailed topographic maps of the reservoir area, the reservoir storage curves were prepared as shown in Figure 7.2.2. The normal high water (N.H.W.L.) and low water levels (L.W.L.) of the dam were determined at EL. 108.5 m and EL. 100.5 m, respectively. The active storage capacity was estimated at 680,000 m^3, and dead storage capacity was assumed at 20,000 m^3. The surface water area of the reservoir was estimated at about 40 ha in the N.H.W.L. and 4 ha in the L.W.L. The design flood water level (D.F.W.L.) was determined at E.L. 109. 0 m, and the free board spillway is 1.0 m above the

D.F.W.C. The dam was designed as earth fill dam of homogeneous type. The slopes of the upstream and downstream were estimated at 1:3.0 and 1:2.5, respectively. A rock riprap of 1.0 m will be constructed at the upstream slope, while a toe drain will be built at the downstream slope to sustain stability of seepage. The dam height was calculated at 16.8 m at the center of the dam axis, and the length of the dam was estimated at 278 m. The crest width of dam was estimated at 6 m and pavement of 5 m-width will be constructed. The emergency spillway will be provided at the right bank of the reservoirs, and the intake tower will be built at the left abutment of the dam. The operation of the power intake gate is designed to use electric power. The typical sections of the dam are shown in Figure 7.2.3 .

(5) Design Flood Discharge of Emergency Spillway

The design flood discharge for the dam was estimated at 48 m^3/sec based on a probable flood of 200 years. The flood discharges will be released through the emergency spillway and the intake tower. Approximately 33 m^3/sec of water will be released through the emergency spillway, and 15 m^3/sec of water, through the intake tower. The emergency spillway is designed as side spillway-type with a crest length of 51.0 m.

(6) Access Road and Flood way

The access road of the dam will connect to an existing barangay road and will cross the flood way. A bridge will be constructed at crossing point of the flood way. The access road measuring 0.9 km will have a 4.5 m-width and will be paved with gravel. Flood way with earthen and trapezoidal section will be built to straighten out existing Abagao river course. The design flood discharge was estimated 48 m^3/sec.

(7) Drainage Requirement and Design Discharge

The same drainage requirements as described in the section 7.1.2 (5) were adopted in this plan. The design discharges of the main and lateral drains are illustrated in Figure 7.2.4.

(8) Canal Layout

The irrigation water will be drawn by the intake tower of the dam and conveyed through the main canal network. A side spillway will be built at about 110 m downstream, from the outlet of the intake tower to divert excess water. The measuring devices will be provided at the downstream of the side of the spillway as shown in Figure 7.2.5.

The main canal network will consist of one (1) main canal, 11 lateral canals and about 160 related structures. The length of the main and lateral canals was estimated at 22 km. The

drainage canal network will consist of 2 main drains and 9 lateral drains, and the total length was estimated at 17 km. A flood way will be constructed at about 4 km from the downstream of the side spillway to barangay Comun area. The flood way will use the existing course of the Abagao river. The crossing structures such as culvert, railroad bridge and cross drain will be constructed at 7 sections of the canals and drains. The railroad bridges will be built at 2 sections of the floodway. The farm road with a 3 m-width will be provided along the main canal network, including link roads of approximately 1.8 km (Ref. Table 7.1.2).

(9) On -Farm Development

The design concept of on-farm development is the same as those in Camalig diversion low land model development project.

7.2.3 Rural Infrastructure

Three(3) components are proposed for the rural infrastructure development: namely i) upgrading of rural road, ii) improvement of barangay and farm road, and iii) rehabilitation of Level-II rural water supply.

i) The proposed rural road is a provincial road traversing the western part of the model area from north to south (Comun to Cotmon) with a total length of 1.6 km. The 6.1 m width road will be concrete paved with a shoulder of 1.0 m on both sides.

ii) A total of 20.2 km of farm road including link roads will be constructed in the model area. These roads will be used for operation and maintenance of irrigation facilities and transport of agricultural products. The farm roads will be gravel-paved with a width of 2.0 m and a shoulder of 0.5 m-width on both sides. In addition, a barangay road of 3.2 km will be improved with gravel pavement of 4.5 m-width.

iii) The rural water supply Level-II rehabilitation is proposed to be in barangay Inarado. A total length of about 5.2 km pipeline will be expanded. With additional service connection of 19 communal faucets, a total of 532 persons is expected to benefit from the water supply system.

7.2.4 Post-Harvest and Marketing

As in Camalig area, production and marketing centers will also be established in the Dam No. 2 lowland model project area in order to promote proper irrigated based farming and post-harvest and marketing activities. The location of the center will be near the junction of national road and barangay road going to Mabini in Inarado. The required capacities of the

warehouse, drying floor and rice mill, and number of farm machinery were estimated as follows:

Center Components	Number	Capacity	Area (m^2)
1. Farm Machinery			
Hand-tractor	4	6 HP	
Thresher	4	6 HP	
2. Sun-Drying Floor			1,360
3. Semi-Mechanical Dryer	1		10
4. Rice Mill	1	1.0 ton/hour	50
5. Warehouse			280
Paddy	1	215 ton/paddy	230
Others			50

The ISA will manage the Production and Marketing Center and provide integrated irrigation farming services to the IBA members same as in Camalig area.

7.2.5 Farmers' Organization

The background and needs in the formation of the ISAs and IBAs in Dam No. 2 area is the same as in Camalig diversion area. The mode of organizing farmers in Dam No. 2 model project area is also the same as in Camalig area (Ref. Fig. 7.1.6).

7.2.6 Project Costs and Benefits

(1) Projects Costs

The basic assumptions of cost estimation are essentially the same as those described in the Section 7.1.6 (1). The total project cost is estimated at 166.99 million pesos as shown below. The O & M cost is estimated at 824, 800 pesos per annum. The detailed cost is shown in Table 7.2.1.

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	74,446	41,585	116,031
1.1 Irrigation and Drainage Facilities	64,088	32,442	96,530
1.2 Rural Infrastructure Facilities	9,006	8,563	17,569
1.3 Production and Marketing Centers	1,352	580	1,932
2. O & M Equipment	144	36	180
3. Engineering Cost	8,702	2,901	11,603
4. Administration Cost	0	2,321	2,321
5. Land Acquisition and Compensation Cost	0	4,663	4,663
6. Physical contingency	8,329	5,151	13,480
7. Price Escalation	6,488	12,232	18,720
GRAND TOTAL (P 1,000)	98,109	68,889	166,998

(2) Project Benefits

The primary benefits will be increase in the production of paddy rice due to improved cropping intensities and higher yields. The harvested area devoted to paddy rice will significantly increase from 598 ha to 770 ha. At full project development, the total volume of incremental paddy production is estimated at about 1, 900 tons/year. The cultivation of mungbean to about 135 ha will result in the production of about 160 tons/year. The incremental gross value of production from crop production is estimated at about 18.6 million pesos/year. In addition, labor from farming will increase due to intensified activities. The additional farm labor is estimated at 8,200 man-days/year.

7.3 Magogon Upland Corn-Based Model Rural Development Project

7.3.1 Agriculture

The agriculture development plan for Magogon upland model area aims to:

1) Increase the yields and total production of corn and coconut through the improvement of farming practices, such as land preparation, fertilization, pest control, replanting coconut trees of low productivity, etc.;

2) Diversification of agriculture production through the planting of mungbean in corn areas, intercropping of coffee and pili under the coconut areas, and the introduction of poultry to be managed by the existing cooperative.

The land use plan for Magogon upland model area is summarized below (Ref. Project Map).

(unit: ha)

Land Use	Present/Without Project	With Project Condition
Coconut land	186	185
coconut only (without intercropping)	166	129
inter-cropping with corn	20	19
inter-cropping with coffee, pili	nil	37
Open land	37	34
upland crops	20	34
grass/shrub	17	0
Protected marginal land	-	3
Rainfed paddy field	5	5
Existing railroad project of PNR	4	4
Others (residential, roads)	8	9
Total	240	240

The proposed cropping pattern for annual crops is corn-mungbean-corn (Ref. Figure 7.3.1). Particular emphasis will be placed on the promotion of better land management including soil conservation measures to restore soil fertility. Integrated pest management concept will be among the main subject for agricultural extension activities in the corn-based model area.

A demonstration farm will be established for the extension service to introduce appropriate farming practices. A nursery for propagation of coconut, coffee, and pili seedlings will be established in the nucleus facilities. The target area for replanting coconut trees is estimated at 47 ha. The area proposed for planting coffee and pili (as permanent shade tree) is estimated at 37 ha. The target areas for coconut replanting and coffee/pili planting will be completed in a period of about 7 years from project initiation (Ref. Table 7.3.1).

The estimated crop production in Magogon upland model area at full project development is summarized as follows (Ref. Table 7.3.2).

	Present/Without Project			With Project Condition		
Crop	Harvested Area (ha)#1	Yield (ton/ha) #2	Production (ton/year)	Harvested Area (ha)#1	Yield (ton/ha)#2	Production (ton/year)
Coconut	186	1.0	186	185	3.5	648
Corn	84	1.2	99	108	2.8	308
Paddy rice	10	1.9	19	10	2.8	28
Mungbean	-	-	-	54	1.2	65
Coffee	-	-	-	37	1.5	55
Pili	-	-	-	37	2.0	74

#1 Two cropping seasons #2 average annual yield

The proposed poultry farm of the existing cooperative will be under a contract growing scheme with poultry integrators. The integrator will provide the chicks, feeds, and medicines,

while the farmers will provide the labor and infrastructure facility. It is proposed to initiate the scheme with 5,000 chicks per growing cycle.

7.3.2 Rural Infrastructure

Three (3) components are proposed for rural infrastructure development, namely: i) upgrading of rural road; ii) improvement of barangay and farm roads; and iii) construction of deep well.

i) The proposed rural road is a barangay road connecting Magogon to barangay Panoypoy in the west and barangay Maopi in the east with a total length of 4.2 km. The road will be concrete paved with a 4.5 m-width. The construction of Panoypoy bridge is included in this proposal.

ii) A total of 1.6 km of barangay road and 1.8 km of farm road are proposed in Magogon area. Both roads will be gravel-paved with a 4.5 m-width for barangay road and 2.0 m for farm road.

iii) Under the proposed nucleus facilities, one (1) deep well will be required to provide a steady supply of potable water. The proposed deep well will be equipped with an electric pump, a 6-m elevated tank of fabricated stainless steel with a capacity of 2 m^3 and distribution pipe lines.

7.3.3 Production and Marketing Facilities

The nucleus facilities will include post-harvest, marketing, handicraft sub-center, poultry cage for broiler and nursery for producing seedlings of coffee, coconut and pili as a shade tree. The facilities will be operated by the Magogon Farmers Multipurpose Cooperative, initially assisted by a NGO. The location of the facilities is in the barangay center along the barangay road from Magogon to Panoypoy. The proposed components and their capacities were formulated on the basis of the production plan as follows:

Center Components	Number	Capacity	Area (m^2)
1. Sun-Drying Floor	1		380
2. Semi-Mechanical Dryer	1		10
3. Processing Facility			
Corn sheller	1	0.5 ton/hour	
Coffee dehuller	1	0.2 ton/hour	
Feed mill	1	0.5 ton/hour	
Rice mill	1	0.2 ton/hour	
4. Warehouse	1		163
Corn/Coffee		125 ton/paddy	113
Others			50
5. Poultry Cage	1	5,000 birds	47
6. Handicraft Sub-Center	1		50
7. Nursery	1	(40 x 25 m)	1,000

The marketing linkages will be established or strengthened to ensure sufficient profitability for the farmers. Corn grits and rice bran will be used for poultry farming. The cooperative could sell corn grits instead of corn grain to Santo Domingo Peoples Cooperatives. Under contract growing scheme, broilers will be purchased by the San Miguel Corporation or Swift Corporation which have poultry dressing plants in Anislag and Libod, respectively. The coffee beans will be sold directly to the buying station in Legazpi city under the Nestle Philippine Inc.

7.3.4 Farmers' Organization

The existing Magogon Farmers Multipurpose Cooperative will be strengthened in the promotion of upland corn-based farming. The cooperative will expand its membership, preferably from the landless to generate additional capital for it to be able to undertake the expanded activities under a nucleus type of management. Figure 7.3.2 shows the scheme of the farmers organization in Magogon area. It has actually started this campaign for additional membership. The cooperative will establish marketing tie-ups with formal marketing institutions to acquire new skills and information to enhance its business perspective.

The strengthening of the cooperative will be done by a federation and/or any reputable NGO. It is envisaged that the cooperative will be assisted until it has gained the necessary skills to manage properly the facilities. The Magogon Farmers Multi-Purpose Cooperative will be strengthened in cooperation and assistance by the DA, MAS, DAR, PCA, and BUCAF on inter-cropping production skills. Managerial skill will be provided by a selected NGO such as SADOPECO or others institutions preferred by the farmers. An added activity is for the cooperative to manage coconut farms mostly owned by absentee landowners. The cooperative can enter into an agreement with the landowners under an arrangement where fixed rentals will be paid for the cultivation of such lands. This is expected to intensify the cultivation of coconut

lands currently left idled because of uncertainty in the sharing of income derived from crops other than coconut.

7.3.5 Project Costs and Benefits

(1) Projects Costs

The basic assumptions of cost estimation are essentially the same as those described in Section 7.1.6 (1). The total project cost is estimated at 36.86 million pesos as shown below. The O & M cost is estimated at 966,800 pesos per annum. The detailed cost is shown in Table 7.3.3.

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	15,397	11,474	26,871
1.1 Rural Infrastructure Facilities	14,101	10,919	25,020
1.2 Nucleus Facilities	1,296	555	1,851
2. Engineering Cost	2,015	672	2,687
3. Administration Cost	0	537	537
4. Land Acquisition and Compensation Cost	0	38	38
5. Physical contingency	1,741	1,272	3,013
6. Price Escalation	1,122	2,595	3,717
GRAND TOTAL (P 1,000)	20,275	16,588	36,863

(2) Project Benefits

The main benefits will be increases in the production of copra, coffee, pili and corn which is a major annual crop. The increases, especially in coconut will be due mainly from better farming practice, replanting old coconut trees, and inter-cropping. The current area of coconut land of 186 ha will be intensively cultivated with other tree crops and field crops. The annual production from coffee and pili is estimated at 55 tons and 75 tons, respectively. Corn production will significantly increase from 100 tons to about 308 ton. The incremental gross value from crop production is estimated at 9 million pesos/year. Poultry production, as a supplementary farming activity, is expected to generate gross earnings of about 200 thousand pesos/year. Over-all, the additional farm labor to be generated from these intensified farming activities is estimated 14,500 man-days/year.

7.4 San Ramon Upland Coconut-Based Model Rural Development Project

7.4.1 Agriculture

The agriculture production plan for San Ramon Upland Coconut-based Model area aims to: 1) increase the yield of coconut through a gradual replanting of coconut trees of low

productivity and improvement of husbandry of coconut plantations; and 2) promotion of abaca production, as inter-crop under the coconut lands and in open lands.

The land use plan for San Ramon upland model area is summarized below (Ref. Table 7.4.1 and Figure 7.4.1).

(unit: ha)

Land Use	Present/Without Project	With Project Condition
Coconut land	534	529
coconut only (without intercropping)	481	183
inter-cropping with annual crops #1	53	29
inter-cropping with abaca, pili	nil	317
Open land	214	210
annual upland crops	130	20
perennial upland crops (abaca, pili)	nil	190
grass/shrub	84	0
Protected marginal land	-	7
Lowland rainfed paddy field	21	21
Existing railroad project of PNR	4	4
Others (residential, roads, etc.)	12	14
Total	785	785

#1 At present the annual crop is mostly corn, with project condition corn will be excluded

The initial project activities will concentrate on an area of about 81 ha presently in process of land distribution under the CARP. Demonstration farm and nurseries are proposed to be established in this lot for the propagation of seedlings of coconut, abaca, and shade trees. The area will also be used to demonstrate the cultivation of abaca (Ref. Fig. 7.4.2). The proposed cropping pattern for San Ramon model area is shown in Fig. 7.4.3.

Coconut trees of low productivity will be replanted. The preferred coconut varieties for replanting are the hybrid PCA 15-1 and 15-2, Baybay Tall, San Ramon Tall, or any other variety that could be recommended by PCA for this area. Abaca is strongly recommended for intercropping with coconut as well as in the existing open lands. The cultivation of corn will be limited in a radius of 500 meters from the areas devoted to abaca, to avoid possible transmission of diseases to the abaca plantations. Special attention will be given to proper farming practices for both, coconut and abaca to attain high yield. The anticipated crop production in San Ramon upland model area at full project development is summarized as follows (Ref. Table 7.3.2).

Item	Present/Without Project			With Project Condition		
	Harvested Area (ha)#1	Yield (ton/ha) #2	Production (ton/year)	Harvested Area (ha)#1	Yield (ton/ha)#2	Production (ton/year)
Coconut	534	1.0	534	529	3.5	1,850
Corn	400	1.2	480	0	-	0
Paddy rice (Upland)	nil			70	2.0	140
Mungbean	-	-	-	49	1.2	59
Eggplant				15	7.0	105
Abaca	-	-	-	507	2.6	1,318
Pili	-	-	-	190	2.0	380

#1 Two cropping seasons #2 average annual yield

7.4.2 Rural Infrastructure

Four (4) components are proposed for rural infrastructure development namely i) upgrading of the rural roads, ii) improvement of barangay and farm roads, iii) construction of deep well, and iv) extension of electric transmission line.

i) The proposed rural road is partly provincial and barangay road connecting San Ramon area to the national road at Mayon. The total length is 3.6 km. The road will be paved with concrete with a width of 6.1 m for provincial road and a width of 4.5 m for barangay road.

ii) A 1.6 km of barangay road is proposed to connect San Ramon with the Canarom barangay road. The construction of a new bridge, crossing the Ogod river is proposed to link the San Ramon area with San Ramon-San Vicente Grande barangay road. In addition, farm roads with a total length of 1.6 km are proposed in San Ramon area. Both roads will be gravel-paved with a width of 4.5 m for barangay road and a width of 2.0 m for farm road.

iii) To provide a steady supply of potable water, two (2) deep wells will be required, to cover the water requirement of the proposed nucleus farm and production farm. Each deep well will be equipped with an electric pump, a 6-m elevated tank of fabricated stainless steel with a capacity of 2 m^3 and distribution pipe lines.

iv) An extension of 2 km of the single-phase distribution line from San Ramon to the proposed nucleus and production farms is proposed to supply the power requirement of the post-harvest and other electricity operated facilities.

7.4.3 Production and Marketing Facilities

The nucleus facilities will be made in the production farm (7.0 ha) and nucleus farm (1.4 ha), respectively and include a nursery for propagating seedlings of abaca, coconut and pili as a shade tree; organic fertilizer house (only at the production farm); abaca stripping house; fiber classification and warehouse; handicraft center at the production farm and sub-center at the nucleus farm. These facilities at the production farm will be managed by the Association of landless farmers in barangay San Ramon, while the nucleus farm will be managed by the CARP beneficiaries association involving 26 farmers. Each association will be full-fledged as cooperatives in the future. The proposed facilities and their capacities were formulated on the basis of the production plan as follows:

Center Components	Number	Capacity	Area (m^2)
I. Production Farm (7.0 ha)			
1. Organic Fertilizer House			
Building	1		65
Coconut husk crasher	2	63.0 kg/hour	
2. Stripping House			
Building	1		80
Defibering machine	1	12.5 kg/hour	
Spindle stripping machine	8	10.0 kg/hour	
Engine	2	4.5 HP & 23.0 HP	
3. Fiber Classification and Warehouse			
Building	1		90
4. Handicraft Center and Office			
Building			230
Weaving loom	12		
Sewing machine	4		
Heavy-duty sewing machine	1		
5. Workshop			
Building	1		25
Hand-tractor	1	10 HP	
6. Nursery			
Abaca seedbed			3,000
Shade trees/coconut			7,000

Center Components	Number	Capacity	Area (m^2)
II. Nucleus Farm (1.4 ha)			
1. Stripping House			
Building			40
Defibering machine	1	12.5 kg/hour	
Spindle stripping machine	4	10.0 kg/hour	
Engine	2	4.5 HP & 12.0 HP	
2. Fiber Classification and Warehouse			
Building	1		90
3. Handicraft Sub- Center			
Building			65
Weaving loom	4		
Sewing machine	1		
Heavy-duty sewing machine	1		
4. Nursery (0.3 ha)			
Abaca seedbed			1,000
Shade trees/fruit trees/coconut			2,000

The production farm will be utilized as a supply center of seedling for abaca, shade trees, and coconut to cover the entire San Ramon area and neighboring barangays in the future. The nucleus facilities at the production farm will function as extension center for abaca production and processing technologies including handicraft manufacturing. The distribution of seedling with organic fertilizer and planting of abaca with proper upland farming technologies will be made by the landless farmers association. The abaca stripping and classification services to the abaca producers and enhancement of handicraft manufacturing will also be promoted. In the future, the landless association managing the production farm will accumulate capital to pay amortization and use for other agri-business investments. The establishment and management of the production farm will be a key factor for the active participation of landless farmers in the project. This is estimated represent around 60% of the farm household in the area.

On the other hand, the nucleus farm will be a model for upland coconut-based abaca farming to be managed by the CARP beneficiaries and owner-cultivators. Collective ownership of the nucleus farm covering nursery, demonstration farm and facilities will provide a suitable condition for the formation and strengthening of farmer organizations. Effective dissemination of technology among them is expected to be facilitated.

The marketing of copra and abaca fiber is well developed. In the area, there is shortage of abaca fibers, because about 80% of households are engaged in handicraft using abaca fiber and there are two paper companies, ALINDECO and ISALOG Pulp and Paper, which are using large volume of abaca. The market of copra in the area is dominated by Legazpi Oil Company through a tide-up with local traders. These marketing shall be sustained and furthermore strengthened it linkage with NGOs mentioned above to ensure sufficient profitability for the farmers.

7.4.4 Farmers' Organizations

Figure 7.4.4 shows the scheme of farmers organization in San Ramon model area. A CARP beneficiary organization will be formed to manage the nucleus farm for abaca production. In addition, landless farmers in nearby blocks will be organized to manage the proposed production farm, including other services. This association is similar to the concept of the ISAs.

A significant proportion of coconut lands is owned by absentee landowners or non-owner cultivator in San Ramon area. The formation of an association among this group will be considered. The coconut landowners association can assign the cultivation of their lands to the landless farmers association described earlier under a trust agreement where the latter can pay fixed rentals for the use of the farmer's farms. The landless farmers association can manage the farm under a nucleus arrangement. This will be a mechanism to intensify diversification in coconut lands.

Furthermore, as for the supporting system to the farmers' organization, government institutions such as the DA, MAS, DAR, PCA, and FIDA will work in a coordinated manner to provide technical assistance on crop production, while NGOs like ALINDECO will provide the skills and know-how on production and management.

7.4.5 Project Costs and Benefits

(1) Projects Costs

The basic assumptions of cost estimation are essentially the same as those described in Section 7.1.6 (1). The total project cost is estimated at 35.98 million pesos as shown below. The O & M cost is estimated at 1,999,800 pesos per annum. The detailed cost is shown in Table 7.4.2.

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	15,145	11,092	26,237
1.1 Rural Infrastructure Facilities	13,135	10,231	23,366
1.2 Nucleus Facilities	2,010	861	2,871
2. Engineering Cost	1,968	656	2,624
3. Administration Cost	0	525	525
4. Land Acquisition and Compensation Cost	0	37	37
5. Physical contingency	1,711	1,231	2,942
6. Price Escalation	1,103	2,511	3,614
Total (P 1,000)	19,927	16,052	35,979

(2) Project Benefits

The main benefits will be increases in the production of tree crops and field crops due to expansion on inter-cropping area and improved farming activities. The current area of coconut land of 530 ha will be intensified with the cultivation of high value crops, notably abaca, pili and other field crops. The annual additional production of coconut, abaca, and pili is estimated to reach 1,300 tons, 1,320 tons and 380 tons, respectively. The annual incremental gross value of production of these crops is placed at 60.5 million pesos. Furthermore, in view of the intensified farming activities, the additional farm labor that will be generated is placed at about 115,000 man-days/year.

7.5 Upgrading of Rural Road Project

7.5.1 Development Plan

One of the components of the rural infrastructure development plan is the upgrading of the 32.1 km rural road as shown below. A total length of 12.3 km traverses the model development project areas while 19.8 km are located outside the model areas. The locations of the proposed rural road are shown in Figure 6.3.1.

Proposed Roads (unit: km)

Road No.	Passing Barangay	Project Category	
		A component of Model Project	Rural Road Upgrading Project
(1)-1	Comun - Cotmon	1.6	-
(1)-2	Cotmon - Del Rosario - Panoypoy	-	5.4
(2)-1	Ilawod - Ligban - Gotob	2.9	-
(2)-2	Gotob - Taladong	-	2.5
(3)-1	Anislag - Maopi	-	2.2
(3)-2	Maopi - Magogon - Panoypoy	4.2	-
(4)	Bascaran - Burgos - Mabini - Kinawitan - Panoypoy	-	5.7
(5)-1	Mayon - San Ramon	3.6	-
(5)-2	San Ramon - Bigao - San Vicente Grande	-	4.0
	Total	12.3	19.8

7.5.2 Design

The road standards of the DPWH were applied for the design of the cross section of the proposed provincial and barangay roads. Considering the intensity of rainfall in the area and prohibitive cost of maintenance work, the use of concrete pavement is proposed for both provincial and barangay roads. These concrete paved roads are also expected to be used as drying facilities for paddy by the local people. In addition, 3 bridges will be constructed at 3 river crossing points. The typical cross section are summarized below and shown in Figure 7.5.1.

Proposed Typical Cross Section (unit: m)

Road Category	Provincial road	Barangay road
Pavement	Portland Cement Concrete Pavement	
Pavement width (carriage way)	6.1	4.5
Shoulder width, */	1.0 x 2	1.0 x 2
Side ditch width, **/	0.50	0.50

Note: */ in both sides, **/ in some required portions

Side drains with sufficient capacity are indispensable to drain excess water from the road surface. Protection work of side drains such as lining by grouted rip rap will be proposed to prevent soil erosion . In addition to side drains, cross drains will be required according to topography. The pipe culvert type having a minimum diameter of 0.6 m will be utilized for this purpose.

7.5.3 Project Costs and Benefits

The total project cost on the rural road upgrading outside of the model areas is estimated at about 125.45 million pesos. The detailed project cost is shown in Table 7.5.1. The cost for maintenance activity was based on the PEO's annual maintenance work program divided into routine and periodic maintenance. The routine maintenance work includes patching, resurfacing, reshaping, vegetation control, clean and repair of culverts and minor repair of bridges.

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	49,872	39,914	89,786
2. Engineering Cost	6,734	2,245	8,979
3. Administration Cost	0	1,796	1,796
4. Land Acquisition and Compensation Cost	0	111	111
5. Physical contingency	5,661	4,407	10,068
6. Price Escalation	4,206	10,507	14,713
Total (P 1,000)	66,473	58,980	125,453

Main Route	
Length (km)	19.8
Maintenance cost (pesos/annum)	536,000
Beneficiaries Population	
- Direct beneficiaries*/	15,053
- Indirect beneficiaries**/	26,083

Notes */ Barangays, where the proposed road is directly traversing

**/ Adjacent barangays, where the proposed road is traversing

The benefits of the proposed roads will essentially be the users of the roads. Direct beneficiaries are the people living in the barangays where the proposed roads are directly

traversing, while indirect beneficiaries are the people living in the adjacent barangays, where the proposed road traverses.

7.6 Rural Water Supply Rehabilitation Project

7.6.1 Development Plan

The Gotob and Inarado Level-II systems are located the model development project areas while Taladong and Gabawan Level-II systems are outside of the model areas. The details are summarized below.

Development Plan of Proposed Level-II Water System

Item	(unit)	Project Category		(Total)
		A component of Model Project	Rural Water Rehabilitation Project	
Proposed Level-II system		(1) Gotob system (2) Inarado system	(1) Taladong system (2) Gabawan system	
Present Beneficiaries	person	518	380	898
Additional communal faucets	nos.	26	15	41
Additional beneficiaries	person	728	504	1,232
Total beneficiaries	person	1,246	884	2,130

7.6.2 Design

(1) Water Requirement

The following design assumptions were applied for Level-II system.

- Planning year : Year 2010
- Design population : Present population x 1.12 (with annual growth rate = 0.74%)
- Average size of household : 5.5 persons
- No. served per faucet
  - Communal faucet : 5 households = 28 persons
  - Individual connection : 1 household = 5.5 persons
- Daily water consumption : 60 lit./capita/day
- Water demand
  - Average day demand : Design population x per capita water consumption
  - Maximum day demand : 1.3 x average day demand
- Transmission loss : 30%
- Hydraulic design : Hazen-Willams formula

(2) Possibility of Expansion

The possibility of expanding the distribution system was evaluated based on site investigations, existing past records, and other information relative to design. In the absence of long term discharge measurement records and considering seasonal fluctuation of groundwater flow, an 80% dependable flow was adapted in evaluating water availability. The topography condition was also examined to clear the required pressure for transporting water by gravity

system. The maximum utilization of the existing facilities was also considered. Considering these three (3) design limitations, the design discharge is summarized below.

Potential Discharge for Extension

Water System	Gotob	Taladong	Inarado	Gabawan
Results of discharge measurement (lit/s)	0.48 *a	2.67 *b	1.10	0.24
Design discharge of water source (lit/s)	0.40	0.60 + (0.44) *c	0.90	0.20
No. of existing communal faucets (nos.)	3	2	8	2
No. of existing individual faucets (nos.)	19	48	17	1
Required discharge for existing facilities (lit/s)	0.20	0.32	0.33	0.06
Potential discharge for extension (lit/s)	0.20	0.28	0.57	0.14
No. of communal faucets for expansion (nos.)	7	10 + (3) *c	20 *d	5

Note: *a including additional potential water source
*b adjacent potential source temporarily diverted to damaged intake spring box
*c (0.44)& (3) for barangay Mina (max. demand for the total population of 565)
*d including one (1) communal faucet for replacement of pipeline

(3) Proposed Rehabilitation Work

The proposed rehabilitation work in each system is summarized in Table 7.6.1.

7.6.3 Project Costs and Benefits

The total project cost of the rural water supply rehabilitation is estimated at 1.49 million pesos. The project cost is summarized below. The O&M cost was estimated at 17,000 pesos per annum, based on the DPWH standard. The O&M cost includes routine and replacement costs. The major routine activities are inspection of the facilities, conditions of water distribution, minor repair, collecting water charge and management. The replacement cost, to be considered every 10 years, will be essential to replace worn out facilities.

The beneficiaries of the water supply system will be members of the water users association.

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	736	343	1,079
2. Engineering Cost	81	27	108
3. Administration Cost	0	22	22
4. Land Acquisition and Compensation Cost	0	0	0
5. Physical contingency	82	39	121
6. Price Escalation	67	101	168
Total (P 1,000)	966	532	1,498

	Beneficiaries	
Projects	Taladong	Gabawan
Beneficiaries Barangays	Taladong, Comun, Mina	Gabawan
Population	650	234
Household	117	42

7.6.4 Water Users' Associations

Water users associations have been formed in barangays Inarado, Gabawan, Gotob and Taladong covered by Level II water supply. In view, however, of the weak structure of these organizations coupled by the non-follow up of technical support from concerned agencies, the associations in Inarado, Gabawan and Taladong became inactive.

The main issue here is the problem of leadership and management among the existing water user associations. Since the 4 water user associations have already acquired their juridical status, there is no intention to supplant them. Instead the proposal is to reinforce them following the experiences of the Gotob rural water user association. The experiences of the Gotob water user association that are worth replicating are strong and skilled leadership; discipline among members; and establishment of clear policies and procedures. It should be mentioned that the operation and maintenance of rural water supply is always the responsibility of the concerned association. This is a pre-condition for the establishment and rehabilitation of rural water supply projects. The Gotob water user association is functioning well and has the potential to act as a trainor for the 3 other water user associations. The matter of strengthening with respect to the kind of specific subjects and training to be introduced is proposed to be decided after an exhaustive assessment of the training need has been made. One of the important measures is for the MEO to constantly monitor and assist the associations on the technical aspect of preventive maintenance.

7.7 Integrated Support Service Project

7.7.1 Main Activities

The integrated support services project will essentially comprise of upgrading the training and extension facilities of FTC/BUCAF, municipal agricultural services of Camalig and Daraga and provincial agricultural services. The FTC/BUCAF will cover the renovation of the mess hall and provision of assorted equipment. The Camalig municipal agricultural services will envisage the establishment of a municipal training center in Camalig Poblacion. The center will be provided with assorted equipment, mainly for demonstration and minor training services. The municipality of Daraga has an existing farmer training center located at the rooftop of the municipal hall. It only requires minor repairs and refurbishing with some equipment to effectively function as a training facility. The provincial agricultural services will also require improvement of its equipment. Vehicles, mainly motorcycles will be given to municipal extension agents to enhance their mobility.

The total cost is estimated at about 9.0 million pesos as shown below. The detailed cost is shown Table 7.7.1.

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	372	160	532
2. Procurement of Equipment	5,739	1,435	7,174
3. Engineering Cost	40	13	53
4. Administration Cost	0	11	11
5. Land Acquisition and Compensation Cost	0	1	1
6. Physical contingency	615	162	777
7. Price Escalation	271	221	492
GRAND TOTAL (P 1,000)	7,037	2,003	9,040

The improvement of the FTC/BUCAF training center is essential to perform effectively its mandate of training extension agents who in turn will teach the farmers/farmers' organizations with appropriate farming technologies. Re-equipping and further training of the municipal extension agents is also necessary to improve their accessibility and skills as well in disseminating modern and appropriate technologies.

7.7.2 Participatory Approach in Rural and Farmers' Organizations

The issue of organizing the proposed farmers' organizations is very critical to the long-term viability of these institutions. The process and what structure these farmers' organizations should follow are elements that will answer the question of how the farmers' organizations will

function effectively. The participatory nature will cover the entire spectrum of activities from pre-organization to the integration phase as such there will be an active involvement of the community not only in planning, policy-making but in execution as well. There will be a matching of the timing of the physical activities of the WLIRDP relative to the formation of the ISAs, IBAs, CARP beneficiaries, landless associations and water users associations. Through this means, it is expected that conflicting interests will be minimized.

The approach is clearly depicted in Figure 7.7.2. Coordinating with NIA, DAR, CDA, MEO, BUCAF and NGO, the Institutional Development Division under the Project Management Unit (PMU) proposed in Chapter 8 will provide the organizational assistance to the respective model project areas. This will be initiated before detailed design works of the model projects. To realize this, professional and skilled staff by initially detailing volunteer graduates from the BUCAF university to nurture the farmers' associations will be done. This will form part of the service of the BUCAF as participating agency in project execution. Except Magogon area, the following support activities as organization build-up will be scheduled:

1) Public consultation (presentation of the project plan and collection of beneficiaries' opinions),
2) Identification of beneficiaries and members of the farmers' association,
3) Collection of membership agreement from the farmers,
4) Meeting for association set-up,
5) Assignment of BUCAF graduates to the association,
6) Training and workshop for member farmers,
7) Election of the association's officials,
8) Training and workshop for the association's officials, and
9) Registration of the association (Security Exchange Commission or CDA).

Before the detailed design stage, Magogon Cooperative should be assisted for expansion of membership to the landless farmers, creation of members' consensus on the new cooperative activities, and members' project planning activities. Support staff, which will be recruited from the progressive cooperatives such as SADOPECO or NGOs, should be assigned at the Magogon Cooperative by the Institutional Development Division.

In and after the detailed design and construction stage, the Institutional Development Division and Agricultural Support Division should provide the following technical and management assistance:

1) Assignment of support staff from the progressive cooperatives of NGOs,
2) Participation of association/cooperative in bidding,
3) Formation of association's/cooperative's sub-groups by cluster of blocks,

4) Training on farming technologies, facilities' O&M, processing and marketing, management of association/cooperative, etc.

The farmers' organizations will be designed to have a semi-corporate charter as the activities such as operation of production and post-harvest centers, nucleus and production farms and collection of ISF/AF, etc. will all be treated as profit centers. Although the plan is to eventually see these organizations as full-fledged cooperative in the future, the key to their viability and cohesiveness is that they should earn modest profit and deliver quality service to their members. The integration phase will witness the transformation of the farmers' organizations into mature cooperatives. This is where the integrated support services project becomes relevant.

CHAPTER 8 PROJECT ORGANIZATION AND IMPLEMENTATION

8.1 Proposed Project Organization

The implementation of the WLIRDP will be vested within the framework of the PGA. It is suggested that an organizational body directly affiliated to the PGA will be established. The proposed organizational body will be called the Western Legaspi Rural Development Project Office directly attached to the PGA. The proposed organizational framework is given in Figure 8.1.1. There are 2 structures central to the organizational framework:

(1) The Inter-Agency Project Coordinating Committee (IAPCC)

The IAPCC is proposed to be the policy-making body which will resolve policy issues affecting project implementation. It will discuss and approve work plans and budgets for the project. The IAPCC is proposed to be chaired by the Provincial Governor and its members will be high level staff (regional director) or local chief executives from agencies directly participating and/or providing staff complement in the execution of the project. The membership, as shown in Figure 8.1.1, may be expanded depending on the exigency of the service of an agency that may be called upon by the chairman.

The IAPCC is the highest policy making body of the executing agency. It is therefore important that whatever decisions reached by the IAPCC should be considered final and executory. It should decide as a collegial body. Being a policy making body, no one among its members should intervene in the current operations of the project, particularly the PMU. One of the most important tasks of the IAPCC is the approval of the counterpart budget. Prior to construction work, it is also necessary for the IAPCC to appoint a competent project manager to the PMU.

The coordination with the NGOs is shown in the proposed organizational framework (Ref. Fig. 8.1.1). Under the proposed IAPCC, the NGOs will be equally represented as this body is multisectoral. The NGOs will thus participate in the deliberation of polices that will ensure transparency and efficient execution of project activities.

(2) The Project Management Unit (PMU)

The PMU, as shown in Figure 8.1.2, will be the implementing organizational body. Its existence is time-bound and co-terminus with the envisaged activities of the project. It will be run by a competent and professional project manager. The PMU will be staffed with middle-level personnel, preferably drawn from the various offices of the PGA, MGCD and other line agencies to ensure continuity of activities the moment project intervention phases out.

Personnel detailed to the PMU, on a full time basis, can continue the activities of the project the moment they return to their mother agencies. Consolidating the staff under the PMU is essential in order to train them, particularly those in the provincial and municipal offices in project planning, coordination and supervision. To the extent that the PMU will enjoin the services of the other agencies, it is recommended that memoranda of agreement (MOAs) will be forged with the participating agencies to ensure that agreements are binding and executory. It is strongly suggested that the PMU will jointly implement the physical and social infrastructure components with concerned agencies as depicted in Figure 8.1.2. It is also further recommended that the organizations to be established at the farmers' level will assume responsibilities for the maintenance of post-harvest facilities and other equipment provided.

The NGOs will handle strengthening of activities related to community organizing of the ISAs, IBAs, landless associations, etc. which include social preparation, credit transfer, and capital build-up. In project execution, the NGOs through the Farmers Committee will advise the PMU. In addition, the farmers organization under the management assistance of an NGOs assigned at the relevant farmer organizations will participate in all activities related to project execution ranging from bidding, construction of infrastructure facilities to actual turn-over of facilities (Ref. Fig. 7.7.1). The government agencies, in the same manner, will do training on technology development. This delineation of responsibility will be one of the major tasks of the Institutional Development Division of the PMU. This division will see to it that the institutionalization of NGO efforts will be integrated in project execution.

8.2 Implementation Issues Requiring Further Attention

(1) Displacement of 22 houses in Dam No. 2

The construction of the Dam No. 2 will involve the inundation of 40 ha involving around 22 houses in barangay Lacag. This is going to be a sensitive issue despite the tremendous benefit that the Dam No. 2 is expected to offer. The consultation held with the affected families who are mostly landowners indicated in general their willingness to be compensated for the damaged properties. The tenants (about 3 families) whose only tangible assets are their houses are also willing to be compensated but they should, as a matter of their right, be given lands under the CARP program. The DAR explores the possibility of including these tenants as eligible beneficiary of the CARP in a nearby barangay. The other possibility is to integrate these families in the resettlement area acquired by the PGA for Mayon victims. Accordingly, the PGA acquired around 22 ha in barangay Anislag and the resettlement will require only 8 ha. The program as reported will include core housing and livelihood assistance for the victims which can also be applied to these potential victims.

(2) Just compensation for R-O-W

This is an issue given the policy that properties acquired under the communal irrigation system for tertiary canals need not be repaid as such constitutes the equity of the affected farmer-beneficiaries. This policy is not, however, the practice for other public infrastructure project notably provincial and barangay roads. The implementation of this policy under the communal irrigation system will surely face an administrative problem depending on the extent of the property being damaged or acquired. While the IAs will be requested to resolve this issue with their members, the application of this policy need not be rigid. It is suggested that just compensation be applied by substituting incentives to be given to affected farmers. Such incentives can take the form of deferred payment of ISF until the total cost for damages is fully compensated, outright payment of properties following expropriation proceedings for public infrastructure projects, and priority for employment during construction work. While, the subjects mentioned above are not discussed among the agencies concerned, such as NIA, local government, etc..

(3) Cost Recovery for Facilities, Post-Harvest and Other Equipment

The investment cost for the irrigation facilities, post-harvest, farm machinery and equipment to be constructed and provided to farmers' organizations will be recovered. The farmers' organizations and/or cooperatives will amortize the investment cost of such facilities. The motorcycles to be given to municipal extension agents should, as a rule, be also repaid. The mechanism for recovering the cost of such facilities within the framework of the provincial and municipal is not yet established. This will probably be the first time that the PGA and MGCD will experience this case. In communal irrigation system, and following the current policy of the NIA, the direct cost of the Camalig diversion weir will have to be repaid by the IAs. In Dam No. 2, the cost to be amortized by the IAs will only include the irrigation facilities and structures excluding the dam and its appurtenant structures. The same policy on communal irrigation system can be adopted. Full cost recovery should also be applied to the other facilities. During the survey period, the counter agency, NIA has explained the policy to the farmers' group concerned. For purposes of control and accountability, a clear and simple system of collection and remittance should be established so that all amortization payments will be plowed back to the provincial and municipal coffers.

(4) Subdivision of CARP Coconut Lands/Uplands

There are serious flaws in the current practice that the DAR is awarding lands in the uplands. The manner of awarding on the basis of actual tillage to original occupants creates inequalities as it completely ignores economic potential or productivity consideration. The defects in the current subdivision survey are: arbitrarily imposed grid system resulting in farm

lots with boundary lines along steep slopes; and parcelation of lots of equal gross sizes but lying on different land forms, and caused by current budgetary problem and practical system of subdivision survey. This issue is central to the model area in San Ramon and a counterproposal will be introduced to correct this basic flaw.

(5) Ensuring the Rights of the Landless

The incidence of landless in the project area is very high. Around 70% of the farm households are considered landless. Available lands under the CARP for distribution are not that abundant given the problem of hereditary succession and further land fragmentation. The chance for this group of people to be given land is rather limited. But this should not preclude them to participate in the development process. On the contrary, the more that they should be brought into the mainstream of development as this is a matter of right. The formation of landless group into a viable organization and permitting them to render a service to the farmers organizations, IAs and cooperatives should be given due attention. This is an intervention to be introduced in the project.

8.3 Project Implementation Schedule

The implementation of the project, is estimated to be completed in about 5 years as explained bellow (Ref. Fig. 8.3.1):
First year will be mainly for setting up the organizational structures for project execution and information dissemination through public consultation with the farmer beneficiaries.

Second year will be devoted to planning and design work for the infrastructure facilities to be constructed, notably the irrigation and rural road facilities; installation of post-harvest facilities in the upland model project areas and equipment for the use of training agricultural extension agents and farmers; and establishment of new farmers' organizations. The construction of the Camalig Diversion weir and Dam No. 2 irrigation component will begin in the middle of the third year and it is expected to be completed until the last quarter of the fourth year.

The third and fourth years will focus on the construction of the major infrastructure facilities. The same schedule will also coincide with the institutionalization of farmers' organization and intensive training for both the farmers and extension agents. This activity will continue until the end of the project.

The fifth year will begin the inter-phasing of the different stakeholders of the project. This is where the institutional component of the project becomes critical. Hence it should be emphasized that this is not a static phase but rather a continuing activity.

Even beyond the project's implementation schedule, there should be efforts to continue strengthening and training the farmers and farmers' organizations to introduce them to the dynamic state of modern farming and agri-business. After the project phases out, the mechanism to continue the activities initiated under the project and maintain and operate the facilities established must be sustained. This is the essence of setting up the PMU and the manpower complement coming from the various participating agencies. These staff are expected to continue the activities of the project the moment they go back to their mother agencies.

The formation of farmers' organizations during the pre-construction phase and beyond is a direct responsibility of the Institutional Development Division of PMU. The actual organization work will be done by an NGO assigned by PMU.

CHAPTER 9 PROJECT EVALUATION AND ASSESSMENT

9.1 Economic Evaluation

9.1.1 Basic Assumptions

All prices were expressed in 1996 constant prices using the official exchange rate of US$ 1.0 = ₱ 26.0 = ¥ 108. The economic life of the respective projects is assumed to be 50 years, beginning from detailed design and construction work. The economic farm gate prices of traded agricultural inputs and outputs were based on their export or import parity prices derived from the World Bank Commodity Price Forecasts of August 1996. The long-run projected prices in 2005 at 1996 constant price was used in the analysis. Transfer payment such as tax, duty, subsidy, interest, etc. were excluded in estimating the economic cost and benefits. The shadow exchange rate for the Philippine peso was accounted for by applying the SCF (0.80). Financial construction costs were converted into economic values using the construction conversion factors (CCFs).

9.1.2 Economic Benefits

The economic benefits of the 4 model rural development projects comprise the following: (1) crop and poultry production accrued from new investments in irrigation, drainage, flood protection, improvement of farming practices and introduction of new production commodities such as mungbean, abaca, coffee, and poultry; (2) benefits from upgrading the rural road; (3) benefits from the rural water supply; and (4) benefits in terms of improved quality of the product due to post-harvest improvement including enhancement of handicraft manufacturing:

(1) Crop and Poultry Production

Crop production benefits are incremental net production values between the future with and without project conditions. Paddy and mungbean were considered as the major crops in the 130 ha and 395 ha in Canalig Diversion and Dam No.2 model project areas, respectively. In the upland model projects areas, corn, mungbean, paddy, coconut , coffee and pili nut were considered for Magogon model area, while abaca including the transition annual crops (upland rice, mungbean and eggplant), coconut and pili were applied for the San Ramon model project area. The growing of poultry was considered in Magogon model area. The benefits at full project development level are summarized as follows:

(Unit: ₱ '000)

Area	Net Production Value		Incremental
	Without Project	With Project	Benefit
I. Crop Production Benefit			
Camalig Diversion	967.4	6,071.6	5,104.2
Dam No.2	3,143.3	13,557.1	10,413.8
Magogon	1,024.1	7,371.1	6,347.0
San Ramon	3,036.9	42,884.1	39,847.2
II. Poultry Growing Benefit			
Magogon	0	359.5	359.5

(2) Post-Harvest Improvement Benefit

The benefits accruing from the improvement of post-harvest handling comprise threshing, drying, storage and milling of rice, corn and coffee and the added value from processed abaca fiber. Based on the future volume of paddy, corn, coffee and abaca fibers in the lowland and upland model project areas, the benefits from post-harvest improvement were estimated as follows:

Area / Item	Handling Quantity (ton)	Benefit (₱ '000)
1.Camalig Diversion Area		
Paddy	305.6	365.7
2.Dam No.2 Area		
Paddy	714.5	850.5
3.Magogon Area		734.3
Paddy	67.7	67.7
Corn	144.0	49.0
Coffee	68.4	236.6
Abaca	1.8	381.0
2.San Ramon Area		
Abaca	8.5	1,660.6

(3) Rural Road Upgrading Benefit

The volume of traffic in the future with project condition was estimated by taking the farm inputs, crops and other farm outputs, consumer, construction and other commodities that will be transported using the road network. Total transport cost saving was estimated at ₱ 29,475 thousand in the influence area covered by the rural road network of 32.1 km.

(4) Rural Water Supply Benefit

The incremental revenues to be collected from the beneficiaries between the present and future with project conditions was considered as the economic benefit. Based on the present O&M cost and future beneficiaries' affordability to pay water charges, the economic benefits at the respective sites were estimated as follows:

(Unit: ₱ '000)

Item	Gotob (Camalig Area)	Inarado (Dam No.2)	Taladong	Gabawan	Magogon	San Ramon
R.W.S Benefit	32.2	88.7	60.4	24.2	26.1	52.2

(5) Production Foregone

Existing farm lands will be acquired and will be used for the construction of the irrigation, drainage, and rural and farm roads. The agricultural production foregone defined as an annual net crop production value under without project condition, and the resettlement cost for the residents in the Camalig diversion site and the reservoir of Dam No.2 was accounted for negative benefit in the evaluation as follows:

Item	Unit	Quantity	Negative Benefit (₱ '000)
I. Lowland Model Project			
(1) Farm Land	ha		
Camalig Diversion		11.1	66.4
Dam No.2		82.3	420.6
(2) House	No.		
Camalig Diversion		10	1,600.0
Dam No.2		22	2,112.0
II. Upland Model Project			
(1) Farm Land	ha		
Magogon		2.5	6.8
San Ramon		2.4	6.5
III. Other Rural Roads		6.1	17.8

9.1.3 Economic Cost

(1) Initial Project Cost

The economic project cost consists of: (1) construction cost, (2) procurement of machinery and equipment, (3) engineering and administration costs, and (4) physical contingency. The cost for the integrated support service project was excluded in the economic evaluation. The economic project costs are summarized as follows:

Item	Economic Project Cost (₱ '000)
I. Camalig Diversion Model Project	29,697
Irrigation and drainage	12,313
Rural road	15,998
Rural water supply	354
Production and marketing center	1,032
II. Dam No.2 Model Project	103,703
Irrigation and drainage	85,377
Rural road	15,288
Rural water supply	1,102
Production and marketing center	1,936
III. Magogon Model Project	25,046
Nucleus facilities	1,856
Rural road	22,923
Rural water supply	267
IV. San Ramon Model Project	23,747
Nucleus facilities	2,878
Rural road	20,335
Rural water supply	534

(2) Operation and Maintenance Cost

The operation and maintenance costs covering irrigation and drainage, rural road, rural water supply, production and marketing centers, and nucleus facilities were converted into their economic values by applying the conversion factors to their respective components as follows:

(Unit: ₱ '000/year)

Item/Project	Camalig Diversion	Dam No.2	Magogon	San Ramon	Rural Infra. Develop.
Irrigation/Drainage	45.7	104.5	-	-	-
Rural Road	94.2	255.5	116.1	116.8	973.8*
Rural Water Supply	5.8	10.1	11.5	21.6	7.9 (Taladong) 4.3 (Gabawan)
Centers/	207.5	247.6	633.4	1,447.8	-

Note: * ; Included all rural road projects. N. Facilities; Nucleus facilities in the upland projects

(3) Replacement Cost

Machinery and equipment with shorter useful life than the project will be replaced after the assumed replacement period is over. The conversion of the financial prices to economic prices was made using the respective CCFs. The useful life and replacement cost for the respective projects are summarized as follows:

(Unit: ₱ '000)

Item/Project	Useful Life (year)	Camalig Diversion	Dam No.2	Magogon	San Ramon	Rural Infra. Develop.
Irrigation/Drainage						
Gates	25	208.6	221.8	-	-	-
O&M Equipment	15	96.0	144.0	-	-	-
Rural Road	25	3,184.3	4,165.4	4,410.7	4,467.6	37,236.6*
Rural Water Supply	10	56.0	154.1	41.9	84.0	99.2 (Taladong) 56.3 (Gabawan)
Centers/N. Facilities	10	134.4	187.2	568.1	75.9	-

Note: * ; Included all rural road projects. N. Facilities; Nucleus facilities in the upland projects

9.1.4 Economic Evaluation

The 4 model projects consisting of several components were evaluated depending on whether the respective project components were treated as self-contained project (stand alone) or considered as one integrated project. On the basis of the economic cost and benefit streams, the EIRRs were estimated as follows:

(Unit: EIRR %)

Model Project	Total Project	Stand Alone			
		Irrigation/ Drainage	PMC ND	Rural Road	Rural Water Supply
4 Model Projects	19.8				
Camalig Diversion	19.9	25.8	13.6	14.3	5.9
Dam No.2	9.9	10.1	27.1	6.3	5.7
Magogon	24.0	-	62.4	15.8	3.4
San Ramon	34.2	-	64.0	15.2	3.7

Note: PMC ; Production and Marketing Center/Post-harvest improvement in Camalig and Dam No.2
ND ; Nucleus development in Magogon and San Ramon

The evaluation results of the whole rural road project and the rest of the rural water supply projects taken as independent investments are summarized as follows:

(Unit: EIRR %)

Whole Rural Road	Other Part* of Rural Road	Taladong Rural Water Supply	Gabawan Rural Water Supply
16.3	18.8	6.7	3.4

Note: * Other part of rural roads outside of the model projects

Some components of the model projects indicated low economic viability. In general, however, the implementation of the 4 model projects, as a package, showed a favorable EIRR of 19.8%. Dam No.2 model project has an EIRR of 9.9%, which is below the estimated opportunity cost of capital of 15%. This is mainly due to the prohibitive cost of the dam and reservoir. This should not be construed as a poor investment, however, if the equity consideration of providing irrigation water to the potential irrigable area owned by small farm

households become the decision criterion. The NPV and B/C ratio discounted at the opportunity cost of capital are summarized as follows:

Item	4 Model Projects	Camalig Diversion	Dam No.2	Magogon	San Ramon	Whole Rural Road
NPV (₱'000 at 15% discount rate)						
Benefit	214,800	32,367	49,321	39,308	93,804	133,448
Cost	149,691	23,455	76,940	23,257	26,039	122,574
B - C	65,109	8,912	-27,619	16,051	67,765	10,874
B / C	1.43	1.38	0.64	1.69	3.60	1.09

The sensitivity of the 4 model projects from adverse economic changes was tested by using by using three assumptions: increasing the cost by 20%; decreasing the benefit by 20%; and increasing the cost by 10% and decreasing the benefit by 10%. In general, the model projects were insensitive to such changes. The results of the sensitivity test are summarized below:

Cases	Change in Variation	EIRR (%)	Sensitivity Indicator	Switching Value EIRR; 15%
4 Model Projects				
Base Case		19.8		
1.Cost increased	+20%	17.4	0.60	50
2.Benefit reduced	-20%	16.7	0.78	31
3.Cost increased	+10%	17.1		
Benefit reduced	-10%			
Camalig Diversion				
Base Case		19.9		
1.Cost increased	+20%	17.2	0.69	42
2.Benefit reduced	-20%	16.2	0.93	27
3.Cost increased	+10%	16.7		
Benefit reduced	-10%			
Dam No.2				
Base Case		9.9		
1.Cost increased	+20%	8.3	0.81	-
2.Benefit reduced	-20%	7.7	1.10	-
3.Cost increased	+10%	8.0		
Benefit reduced	-10%			
Magogon				
Base Case		24.0		
1.Cost increased	+20%	20.9	0.66	84
2.Benefit reduced	-20%	19.8	0.89	41
3.Cost increased	+10%	20.4		
Benefit reduced	-10%			
San Ramon				
Base Case		34.2		
1.Cost increased	+20%	31.1	0.45	373
2.Benefit reduced	-20%	29.9	0.63	72
3.Cost increased	+10%	20.4		
Benefit reduced	-10%	30.6		

9.2 Financial Evaluation

(1) Farm Budget Analysis

Farm budget analysis was made by assessing the anticipated change in income and expenses of 10 representative farm types in the 4 model projects. The future situation under the without and with project conditions was analyzed. Under the with project condition, non-farm incomes were assumed to be the same amount as those of the without project condition to be able to evaluate the direct impact on the farm income. Significant increase in income will be realized by every class of farm households at full project development. The household income for lowland owner cultivator was estimated to increase by 179 to 182% on average; 32 to 64% for lowland lesses/share croppers; 71 to 152% for upland owner cultivators; and 59 to 79% for upland lesses/share croppers. The net budget reserve was estimated to increase from 3.1 to 10.4 folds of those of the without project condition. The results of the farm budget analysis are summarized below (Ref. Table 9.2.1):

Item	Canalig Diversion Area			Dam No.2 Area		
	Owner Cultivator	Lessee/ Share Cropper	Care-Taker	Owner Cultivator	Lessee/ Share Cropper	Care-Taker
Without Project						
I. Income	41,948	38,241	39,930	34,298	40,378	41,760
II. Expenditure	38,443	35,119	38,970	31,765	37,920	40,850
III.Net Reserve (I - II)	3,505	3,122	960	2,533	2,458	910
With Project						
I. Income	116,935	62,896	57,210	96,745	62,018	55,330
II. Expenditure	84,768	52,082	51,840	70,345	52,763	50,900
III.Net Reserve (I - II)	32,168	10,815	5,370	26,400	9,255	4,430
Increment (%)						
I. Income	179	64	43	182	54	32
II. Expenditure	121	48	33	121	39	25
III.Net Reserve (I - II)	818	246	459	942	277	387
	Magogon Area			San Ramon Area		
Without Project						
I. Income	66,780	39,330	40,110	44,980	59,370	40,930
II. Expenditure	61,230	34,580	37,320	40,030	54,070	37,940
III.Net Reserve (I - II)	5,550	4,750	2,790	4,950	5,300	2,990
With Project						
I. Income	114,280	70,540	63,910	113,320	100,940	68,110
II. Expenditure	92,910	55,380	55,220	85,190	80,360	55,420
III.Net Reserve (I - II)	21,370	15,160	8,690	28,130	20,580	12,690
Change in Percent (%)						
I. Income	71	79	59	152	70	66
II. Expenditure	52	60	48	113	49	46
III.Net Reserve (I - II)	285	219	211	468	288	324

(2) Farmers' Capacity to Pay for ISF and AF

The rate of irrigation service fee (ISF) and amortization fee (AF) collecting from the farmers were set at 2.5 cavans/year (125 kg of paddy), respectively, 5 cavans/year in total taking the prevailing rate of national irrigation systems in the Region V. The farmers' capacity

to pay for ISF was assessed on the basis of the farm budget under with project condition. The ISF accounts for 5 to 16% of the net reserves in the future and each class of farmers will have a capacity to pay ISF as follows:

Item	Owner	Owner Cultivator				Lessee/Share Cropper			
	Non-Cultivator	Small	Medium	Large	Average	Small	Medium	Large	Average
I. Camalig Diversion Area									
Lowland Operating Area (ha)	0.78	0.35	0.48	1.65	0.70	0.25	0.55	1.38	0.70
Net Reserve/With	13,210	15,420	21,980	69,290	32,168	6,050	7,320	22,720	10,815
ISF & AF	1,660	740	1,020	3,510	1,490	530	1,170	2,930	1,490
(% to Net Reserve)	(13%)	(5%)	(5%)	(5%)	(5%)	(9%)	(16%)	(13%)	(14%)
II. Dam No.2 Area									
Lowland Operating Area (ha)	0.48	0.18	0.61	1.38	0.70	0.20	0.55	1.50	0.70
Net Reserve/With	6,190	7,470	24,320	49,490	26,400	3,460	6,650	20,260	9,255
ISF & AF	1,020	380	1,300	2,930	1,490	430	1,170	3,190	1,490
(% to Net Reserve)	(16%)	(5%)	(5%)	(6%)	(6%)	(12%)	(18%)	(16%)	(16%)

Applying amortization fee at 2.5 cavans/year/ha, the required number of years for the completion will be 14 years in Camalig area and 49 years in Dam No.2 area as follows:

Item	Unit	Camalig Area	Dam No.2 Area
Construction Cost/1	P'000	14,884	51,996
Annual AF Collected	P'000	138.1	201.9
Area Irrigated	ha	130	190
Unit Rate/2	P/ha	1,062.5	1,062.5
Amortizing Year	Year	14.0	48.9

1/ Direct cost and physical contingency without the cost of dam reservoir.
2/ 2.5 cavan x 50 kg x P8.5/kg

(3) Management of Production and Marketing Centers and Nucleus Facilities

The cashflow statement for the production and marketing centers in the lowland model project and nucleus facilities in the upland model project was prepared by considering the respective investment and other costs vis-a-vis revenues. The following cashflow analysis shows that the facilities can be operated profitably. Agricultural credit in the form of fixed asset and working capital will have to be worked out with the LBP for the initial year to realize this projection. The farmers' organizations will be able to repay the loans and earn enough cash for future replacement of equipment and new agri-business investments. In this regard, an appropriate loan scheme with reasonable grace period vis-a-vis the gestation period of perennial crops and the facilities will have to be made. Long-term production loans for perennial crops will be indispensable for the successful implementation of the upland model projects (Ref. Table 9.2.2).

(Unit: ₱ '000)

Item / Year		1	2	3	4	5	6	7	8	9	10	11	12	13
(1) Camalig Production and Marketing Center														
I. Inflow		778	1,081	1,249	1,249	1,249	1,249	1,249	1,249	1,249	1,249	1,249	1,249	1,249
II. Outflow		778	1,081	1,047	1,072	1,093	1,093	1,062	1,062	1,062	1,062	1,062	1,002	1,247
III. Balance	Annual Balance	0	0	202	177	155	155	187	187	187	187	187	247	2
	Cumulative	0	0	202	379	535	690	876	1,063	1,249	1,436	1,622	1,870	1,872
(2) Dam No.2 Production and Marketing Center														
I. Inflow		1,499	1,949	2,586	2,586	2,586	2,586	2,586	2,586	2,586	2,586	2,586	2,586	2,586
II. Outflow		1,499	1,949	1,884	1,933	1,960	1,960	1,929	1,929	1,929	1,929	1,929	1,852	2,163
III. Balance	Annual Balance	0	0	702	654	627	627	657	657	657	657	657	734	423
	Cumulative	0	0	702	1,356	1,983	2,609	3,267	3,924	4,582	5,239	5,896	6,631	7,054
(3) Magogon Nucleus Facilities														
I. Inflow		1,385	2,032	3,161	3,263	3,284	3,305	3,326	3,348	3,369	3,390	3,411	3,432	3,454
II. Outflow		1,385	2,032	3,074	3,144	3,176	3,187	3,145	3,156	3,168	3,179	3,190	3,143	3,388
III. Balance	Annual Balance	0	0	87	119	108	118	181	191	201	211	221	289	65
	Cumulative	0	0	87	206	314	432	614	805	1,006	1,218	1,439	1,728	1,793
(4) San Ramon, Production Farm														
I. Inflow		1,440	1,581	2,759	3,046	3,621	4,023	4,196	4,483	4,770	5,057	5,345	5,632	5,919
II. Outflow		1,440	1,581	2,324	2,607	3,091	3,303	3,412	3,624	3,836	4,048	4,260	4,324	5,133
III. Balance	Annual Balance	0	0	435	440	530	721	783	859	934	1,009	1,085	1,308	786
	Cumulative	0	0	435	874	1,405	2,125	2,908	3,767	4,701	5,710	6,795	8,103	8,889
(5) San Ramon, Nucleus Farm														
I. Inflow		566	557	745	773	859	911	917	945	974	1,002	1,031	1,060	1,088
II. Outflow		566	557	688	735	789	810	801	822	842	863	884	839	1,127
III. Balance	Annual Balance	0	0	57	38	71	102	116	124	131	139	147	221	-39
	Cumulative	0	0	57	95	166	267	383	507	638	777	924	1,146	1,107

9.3 Assessment of Potential Environmental Effects

9.3.1 Screening and Scoping

Environmental screening and scoping was undertaken to identify the potential adverse impact of each project on the environment. Of the proposed projects, the Camalig diversion and Dam No.2 lowland model area projects are likely to cause moderate adverse impact on the human population, unless mitigation measures will be pursued. The other projects are not expected to have negative impact on the environment because of their scale, and the nature of activities to be undertaken which will be in the form of improvement / construction of roads, and/or social activities.

9.3.2 Environmental Assessment of Lowland Model Projects

The assessment of the potential environmental impact of the Camalig diversion and Dam No.2 lowland model projects is given in Tables 9.3.1 and 9.3.2. The environmental effects are described below.

(1) Soil Erosion in the Construction Site

Soil erosion from fresh cuts and fill of soil in the construction site will likely occur during the rainy season, because the construction work will disturb the surface soils. The effect will be temporary and moderate. They could be minimized, however, by proper handling of cut and fill materials during the construction stage and the restoration of vegetation in the disturbed land after the completion of construction work.

(2) Effects on Property

There are about 25 houses located near the proposed site of Camalig diversion weir and the flood protection walls. There are also 5 houses on the proposed shortcut course of Ligban river. These households will have to be relocated either temporarily during the construction period, or permanently if the houses are located between the flood protection wall and the river or on the proposed shortcut course. This might cause antagonism among the affected households.

Although the project plan has already been informed to some of the households during the consultation meetings in Phase II study, further consultations and negotiations with all the affected households will be necessary to arrive at mutual arrangement relative to compensation for damaged properties..

The Dam No.2 project will inundate about 40 ha of land due to the construction of reservoir. The owners or tenants of the land will have to give up these lands in the reservoir area. According to the survey, a total of 47 lots in barangay Lacog will be affected by the construction of the proposed dam. The number of houses within the proposed reservoir area is 22. The status of the occupants is as follow:

Owner	Owner (residing outside)	Tenant	Unknown	Total
23 (50%)	10 (22%)	7 (14%)	7 (14%)	47

Based on the consultation meetings held in barangay Lacog during the Phase II study, most of the affected families showed their willingness to give up their lands, provided they will be duly compensated. About 50% of the land owners prefer monetary compensation for the damaged properties and the rest desired to be relocated within barangay Lacog. On the other hand, the tenants wanted either the provision of lands in an other place or be given priority for employment, in order to ensure their livelihood. There are two options for providing lands to the tenants: they could be given a land in a nearby barangay as eligible beneficiaries of the CARP, or be resettled in the area acquired by the provincial government of Albay for Mayon victims. In the latter case, about 22 ha of lands in barangay Anislag will be one of the possible resettlement sites. The relocation of affected families is essential for the successful and peaceful implementation of the projects.

9.3.3 Watershed Management

An external factor that can influence the irrigation project is land utilization in upstream. In particular, soil erosion in the watershed area causes various problems such as increasing the

sediments in the reservoir and canal clogging. This will raise the maintenance cost and shortens the economic life of the irrigation projects. The watershed management of irrigation projects is one of the activities to be undertaken to effect better land use in the future.

CHAPTER 10 RECOMMENDATIONS

The following conclusions and recommendations are put forward based on the findings and evaluation of the feasibility study:

1. The WLIRDP as a package is recommended for consideration by the Philippine Government. The 4 model rural development projects, as a package showed a favorable EIRR of 19.8%. Although the economic evaluation of Dam No.2 lowland model rural development project yielded an EIRR of 10% which is below the opportunity cost of capital, this project should be considered for endorsement. Dam No.2 should be gauged not only from the traditional investment criterion but also from the social and equity standpoint of providing irrigation water to small farm households. In addition, the cost for the improvement of the river course of the irrigation component of the Camalig lowland model project estimated at 65.72 million pesos should be supported by the government. It should be noted that this investment has nothing to do insofar as irrigation efficiency is concerned, but essential to protect flooding of houses and farmlands in the outlying areas.

2. The rural road upgrading and rural water supply rehabilitation components outside of the 4 model project areas, including the integrated support services are equally important and should be supported. The rural road and water supply rehabilitation projects are basic necessities to the population in the project area. The integrated support services project will be the key to improving delivery of agricultural support services.

3. It is also recommended that the Philippine Government should give particular support to the proposed implementing organizational structure for this project. The project will test the absorptive capacity of the LGUs in Albay. This will be the first time that the PGA and MGCD through the PMU will implement a rural development project of this magnitude, with the irrigation facility as the biggest investment item. In this regard, it is suggested that the NIA be made to lend its technical support to the implementing body.

4. The implementing authority should address the more critical implementation issues, namely: displacement of 27 households as a result of the construction of Dam No.2; just compensation for damaged properties; and cost recovery for the irrigation and post-harvest equipment. It is suggested that permanent resettlement areas provided with basic facilities be in place before commencement of construction. Since the project will be the responsibility of the LGUs in Albay, cost recovery for the irrigation facility

should be consistent with the NIA policy on communal irrigation systems. The mechanisms for collection of amortization should be established given the fact that the implementing authority does not have a corporate charter. Although by virtue of the autonomy act, the LGUs have fiscal powers.

5. The success of the project will hinge on the long-term viability of farmers' organizations. New farmers organizations will be established and existing will be strengthened. The integration of lowland and upland farming activities together with the provision of agricultural support services is envisaged to be achieved through these institutions. It is therefore recommended that the institutional budget be made as permanent support during the implementation period.

6. The accelerated means to get the support for this project is for the implementing authority to get the nod of the DAR to declare the 4 model project areas as ARCs. In so doing, existing support for the ARCs can be extended especially to the lowland model project areas. The implementing authority should work this out with the DAR.

THE FEASIBILITY STUDY ON
THE WESTERN LEGAZPI IRRIGATION AND
RURAL DEVELOPMENT PROJECT IN THE PHILIPPINES

TABLES

Table 2.1.1 Basic Economic Indicators in the Philippines

Indicator		Unit		1990	1991	1992	1993	1994	Growth Rate (1990-94, %/year)
Population		Thousand	\(1980\)						
Philippine	Actual		48,098	60,703				(1980-90)	2.35
	Projected			62,049	63,692	65,339	66,982	68,624	2.55
Region V	Actual		3,477	3,910					
	Projected			3,995	4,094	4,193	4,292	4,391	2.39
Albay	Actual		809	903					
	Projected								
Gross Domestic Product		Million Pesos							
At Current Prices									
Philippine				1,077,237	1,248,011	1,351,559	1,474,458	1,687,704	-
Region V				31,927	36,201	39,616	44,479	50,705	-
AT Constant 1985 Prices									
Philippine	Total			720,692	716,522	718,942	734,155	765,692	1.53
	Agriculture			160,734	162,937	163,571	167,053	171,240	1.60
	Industry			255,549	248,719	247,385	251,460	266,687	1.07
	Service			304,409	304,866	307,986	315,642	327,765	1.87
Region V	Total			21,687	21,733	21,902	22,503	23,353	1.87
	Agriculture			8,567	8,797	8,557	8,647	8,853	0.82
	Industry			4,422	4,236	4,568	4,748	5,072	3.49
	Service			8,698	8,700	8,777	9,108	9,428	2.04
Gross National Product/Philippines		Million Pesos							
At Current Prices				1,082,557	1,266,070	1,385,562	1,519,229	1,751,963	-
AT Constant 1985 Prices				724,386	726,819	737,139	756,293	795,017	2.35
Per Capita GDP		Pesos							
At Current Prices				17,361	19,594	20,685	22,013	24,593	9.10
AT Constant 1985 Prices				11,615	11,250	11,003	10,960	11,158	-1.00
Per Capita GNP		Pesos							
At Current Prices				17,447	19,878	21,206	22,681	25,530	9.98
AT Constant 1985 Prices				11,674	11,411	11,282	11,291	11,585	-0.19
									(Average)
Infration Rate		%		14.2	18.7	8.9	7.6	9.0	\(11.7\)
Unemployment Rate		%		8.1	9.0	8.6	8.9	8.4	\(8.6\)
Gross Savings as ratio to GNP		%		18.6	18.3	19.0	18.0	20.0	\(18.8\)

Source : NSCB, NSO, Central Bank

Table 3.2.1 Demographic Estimation in the Study Area, 1995

Municipality / Barangay	Area (ha)	Population Growth (%/year) 1980-90	Population Actual 1990	Population Estimated 1995	Household Actual 1990	Household Estimated 1995	Population Density/1995 (Person/ha)
Camalig							
C-1 Quirangay	651	0.92	1,955	2,047	362	379	3.1
C-2 Salugan	105	4.34	1,281	1,584	223	278	15.1
C-3 Gapo	88	2.43	1,135	1,280	233	261	14.5
C-4 Poblacion	36	0.77	3,590	3,730	640	666	103.6
C-5 Tinago	65	2.04	1,198	1,325	213	237	20.4
C-6 Ilawod	187	1.51	2,488	2,682	470	506	14.3
C-7 Libod	327	2.73	2,272	2,600	376	433	8.0
C-8 Ligban	91	1.73	584	636	114	125	7.0
C-9 Tagaytay	387	1.61	1,946	2,108	367	398	5.4
C-10 Gotob	91	1.41	458	491	89	96	5.4
C-11 Baligang	347	1.82	2,662	2,913	469	511	8.4
C-12 Tagoytoy	127	-0.24	573	566	110	109	4.5
C-13 Taladong	203	-0.58	1,040	1,010	214	206	5.0
C-14 Binitayan	69	0.98	398	418	71	75	6.1
C-15 Comun	157	1.07	1,124	1,185	213	224	7.5
C-16 Bongabong	316	-2.14	763	685	122	109	2.2
C-17 Cotmon	595	1.36	2,136	2,285	410	439	3.8
C-18 Del Rosario	246	-0.91	816	780	165	159	3.2
C-19 Panoypoy	455	-1.45	1,038	965	211	197	2.1
C-20 Magogon	240	-1.81	543	496	97	89	2.1
Study Area/Camalig	4,783	1.10	28,000	29,786 *	5,169	5,497 *	6.2
Camalig Municipalty	13,090	0.65	49,961	51,606	9,216	9,557	3.9
Daraga							
D-1 Inarado	682	1.55	1,392	1,503	278	301	2.2
D-2 Gapo	389	0.37	1,579	1,608	315	322	4.1
D-3 De La Paz	73	0.53	508	522	103	107	7.2
D-4 Dinoronan	61	-1.77	323	295	72	66	4.8
D-5 Peña Francia	194	1.53	1,509	1,628	241	258	8.4
D-6 Alobo	161	-0.33	568	559	101	100	3.5
D-7 Tabon-Tabon	208	1.51	1,227	1,322	241	259	6.4
D-8 Gabawan	93	0.10	1,227	1,233	225	224	13.3
D-9 Mabini	124	-2.00	500	452	105	94	3.6
D-10 Kinawitan	79	0.21	430	435	94	95	5.5
D-11 Burgos	149	0.10	837	841	161	162	5.6
D-12 Bascaran	424	1.12	2,511	2,655	489	521	6.3
D-13 Talahib	432	-2.16	587	526	114	103	1.2
D-14 Namantao	363	0.35	1,149	1,169	212	216	3.2
D-15 San Vicente Pequeño	64	0.00	192	192	39	39	3.0
D-16 Maopi	253	-0.45	836	817	168	163	3.2
D-17 Anislag	659	-0.02	2,807	2,804	521	519	4.3
D-18 Canarom	247	-1.79	490	448	88	80	1.8
D-19 San Ramon	785	-0.13	1,346	1,337	261	257	1.7
D-20 Mayon	357	1.11	1,108	1,171	198	209	3.3
D-21 San Rafael	33	-1.09	275	260	48	46	7.9
Study Area/Daraga	5,830	0.28	21,401	21,777 *	4,074	4,141 *	3.7
Daraga Municipalty	11,860	1.34	83,603	89,357	15,551	16,548	7.5
Study Area/Total	10,613	0.74	49,401	51,563 *	9,243	9,638 *	4.9
Camalig/Daraga	24,950	1.08	133,564	140,963	24,767	26,105	5.6

* ; Total of the respective barangays

Table 3.7.1 Land Suitability Classification in the Study Area

Soil Group	Soil Mapping Unit	Area (ha)	Land Utilization Type		
			Wetland Rice	Diversified annuals Crop	Tree Crops
A	10-A d1	610	S2 x	S3 d x	S3 dkx
	10-A f1	80	S2 fx	N	N
	20-A d1	350	S2 x	S3 dt	S3 dk
	30-A d1	4,130	S2 x	S3 dt	S3 dk
	30-A f1	490	S2 f x	N	N
	50-A d1	110	S2 x	S3 dt	S3 dk
Sub-total A		5,770			
B	20-B	760	N	S2 st	S2 dk
	30-B	560	N	S2 st	S2 dk
	50-B	420	N	S2 st	S2 dk
Sub-total B		1,740			
C	20-C e1	1,090	N	S3 st	S3 sk
	30-C e1	1,140	N	S3 st	S3 sk
	50-C e1	150	N	S3 st	S3 sk
Sub-total C		2,380			
D	20-D e2	90	N	N	N
	30-D e2	190	N	N	N
Sub-total D		280			
N	10-A f3	20	N	N	N
Sub-total Agricultural Land		10,190			
Residential and Others		420			
Total		10,610			
Highly Suitable Land (S1)			0	0	0
Moderately Suitable Land (S2)			5,770 ha	1,740 ha	1,740 ha
Marginally Suitable Land (S3)			0	7,580 ha	7,580 ha
Not Suitable Land (N)			4,420 ha	870 ha	870 ha

Source: Soil Survey and topographic map at scale 1:4,000, JICA Study Team 1995

Limiting factors: d : drainage; s : slope; f : flood; t: texture; k: effective soil depth; x : fertility (CEC)

Criteria for Suitability Classification

Land Use Type and Factor Evaluated	Highly Suitable (S1)	Moderately Suitable (S2)	Marginally Suitable (S3)	Not Suitable (N)
Drainage				
Diversified Crops	Well	Not Used	Imperfect	Poor or Excessive
Tree Crops	Well	Not Used	Imperfect	Poor or Excessive
Lowland Rice	Well to Poor	Not Used	Not used	Excessive
Slope (%)				
Diversified Crops	0 to 8	8 to 18	18 to 25	More than 25
Tree Crops	0 to 8	8 to 18	18 to 25	More than 25
Lowland Rice	0 to 3	3 to 8		More than 8
Soil Texture				
Diversified Crops	Fine to medium	Not Used	Coarse	Very coarse
Tree Crops	Fine to medium	Not Used	Coarse	Very coarse
Lowland Rice	Fine	Medium	Moderately Coarse	Coarse
Fertility (CEC)				
Diversified Crops	More than 24	16 to 24	Less than 16	Not Used
Tree Crops	More than 25	16 to 24	Less than 17	Not Used
Lowland Rice	More than 26	16 to 24	Less than 18	Not Used
Soil Depth (cm)				
Diversified Crops	More than 75	75 to 50	50 to 25	Less than 25
Tree Crops	More than 150	150 to 100	100 to 50	Less than 50
Lowland Rice	More than 60	51 to 60	20 to 50	Less than 20

Table 3.8.1 Present Land Use in the Study Area by Barangay

(Unit : ha)

Municipality / Barangay		Total Area (ha)	Paddy Field	Coconut	Upland Crops (Open areas)	Shrubs and Grass	Agricultural Lands Total	Residential and Others
Camalig								
C-1	Quirangay	651	62	375	5	192	634	17
C-2	Salugan	105	0	76	6	14	96	9
C-3	Gapo	88	21	50	8	7	86	2
C-4	Poblacion	36	1	1	0	25	27	9
C-5	Tinago	65	0	53	0	9	62	3
C-6	Ilawod	187	67	77	2	19	165	22
C-7	Libod	327	194	85	3	18	300	27
C-8	Ligban	91	34	45	1	8	88	3
C-9	Tagaytay	387	56	243	5	60	364	23
C-10	Gotob	91	38	37	4	9	88	3
C-11	Baligang	347	10	226	20	76	332	15
C-12	Tagoytoy	127	0	91	8	21	120	7
C-13	Taladong	203	8	158	4	27	197	6
C-14	Binitayan	69	16	41	2	7	66	3
C-15	Comun	157	37	89	4	16	146	11
C-16	Bongabong	316	21	218	10	55	304	12
C-17	Cotmon	595	74	420	11	78	583	12
C-18	Del Rosario	246	3	212	0	18	233	13
C-19	Panoypoy	455	3	421	3	20	447	8
C-20	Magogon	240	5	190	20	17	232	8
	Total	**4,783**	**650**	**3,108**	**116**	**696**	**4,570**	**213**
Daraga								
D-1	Inarado	682	109	467	7	83	666	16
D-2	Gapo	389	16	285	12	70	383	16
D-3	De La Paz	73	0	62	2	6	70	3
D-4	Dinoronan	61	18	30	2	8	58	3
D-5	Peña Francia	194	7	124	7	45	180	14
D-6	Alobo	161	86	60	2	8	156	5
D-7	Tabon-Tabon	208	61	113	0	24	198	10
D-8	Gabawan	93	24	46	3	12	85	8
D-9	Mabini	124	23	89	0	8	120	4
D-10	Kinawitan	79	0	63	5	8	76	3
D-11	Burgos	149	47	84	2	11	140	9
D-12	Bascaran	424	63	289	8	48	408	16
D-13	Talahib	432	11	370	9	30	420	12
D-14	Namantao	363	36	279	6	27	348	15
D-15	San Vicente Pequeño	64	49	12	0	2	63	1
D-16	Maopi	253	22	199	3	20	242	11
D-17	Anislag	656	46	442	55	91	634	22
D-18	Canarom	247	29	190	11	15	245	2
D-19	San Ramon	785	21	534	130	84	769	16
D-20	Mayon	357	32	216	40	50	338	19
D-21	San Rafael	33	0	28	0	3	31	2
	Total	**5,827**	**700**	**3,982**	**304**	**653**	**5,630**	**207**
Study Area Total		**10,610**	**1,350**	**7,090**	**420**	**1,340**	**10,200**	**420**

Source: MAS; PCA; MPDO; Study Team

Table 3.8.2 Recommended and Actual Farming Practices

Farming Practice Recommended for Rice Production (Bicol Rice Production Technoguide, DA Region V)	Actual Farming Practice in Rice Production in the Study Area
1) The use of duly certified seeds is recommended	1) Only about 18 % of farmers, mostly of irrigated areas, use certified seeds.
2) Rice varieties of short growing period, non-shattering, non-logging, are recommended because of frequent typhoon and high rainfall	2) Many farmers are still using varieties of relative long growing period and easily logging.
3) Check the viability of seeds before planting.	3) This practice is seldom done by farmers in the study area
4) A good seedbed site should be far from rice fields infected with rice disease; Avoid using the same area used as seedbed before.	4) Almost all farmers make the rice seedbed inside the planting area, after harvesting the previous rice crop.
5) Apply 60 to 100 grams of ammonium sulfate or complete fertilizer per square meter of seedbed.	5) Very few farmers apply fertilizer to the seedbed.
6) Land preparation should be done 3 weeks before transplanting; Harrow twice at a week interval.	6) A large number of rice farmers can not make timely land preparation due to lack of control on equipment and water supply.
7) Management of water depth according to plant growing stage is recommended (2 to 3 cm after transp; 10 cm at vegetative stage; 2 to 3 cm at tillering; 5 to 10 cm at reproduction stage; Drain at ripening etc.)	7) The recommended water management practices are not applied by farmers of irrigated rice field in the study area. Rainfed rice farmers can not control water depth.
8) The importance of good weed control is emphasized; Mechanical, chemical, and manual methods are indicated.	8) Weed control is deficient done; Manual weed control is the common method in the area.
9) Several measure are recommended as Integrated Pest Management.	9) Integrated Pest Management is not practiced in the study area
10) Have the soil analyzed for determining right amount of fertilizer.	10) Farmers can no afford to have soil analysis done and adequate fertilization
11) Application of nitrogen fertilizer is recommended twice: before transplanting and 5-7 days before panicle formation.	11) Most farmers do no follow the proper timing of fertilizer application. Also, the amount applied are normally below the necessary level.
12) The use of organic fertilizers is recommended to improve soil condition and reduce cost of fertilization. Planting Sesbania rostata and using Trichoderma to make compost from rice straw are recommended.	12) These practices are seldom applied by farmers of the study area.
13) Neighbors farmers should plant simultaneously to reduce concentration of damages cause by rats and birds.	13) Large difference in planting date between neighbor farmers is very common in the study area.
Farming Practice Recommended for Coconut Production (The Philippine Recommends for Coconut, PCARRD Philippines Recommends)	**Actual Farming Practice for Coconut Production in the Study Area**
1) Shallow land tillage stimulates the production of new coconut roots and increase on yield of nuts.	1) Soil tillage is done only in the coconut areas where inter-cropping is practiced.
2) To obtain maximum productivity, all weeds that may compete with coconut trees for nutrient, water, and sunlight should be suppressed.	2) Weed control is very poorly done in the Study area. Different types of weed and shrubs species are commonly competing with the coconut trees.
3) Thinning of coconut planted closely is recommended because shading causes reduction of coconut yield, even if other factors are adequate.	3) There are not much area of coconut planted too closely, but in some areas others trees species are competing for light with the coconuts.
4) Judicious application of fertilizers increases the number of nuts and coconut yield by as much as 230 %.	4) Very few farmers in the Study area apply fertilizers to the coconut trees.
5) Apply Organic matter, Green manure, farm by-products to replace part of the nutrients used by the coconut plants.	5) This farming practice is seldom done by farmers of the study area.
6) When coconut trees reach the age of 60 years, or due to diseases, and damages by natural calamities the yield decreases significantly, therefore it is best to replant. Replanting is recommended to be done in a gradual stage.	6) It is estimated that about 32 percent of the coconut trees in the Study area need to be replanted. At present only very small areas of unproductive coconuts trees have been replanted.
7) Crop protection against insect and rats should be done to reduce damages.	7) Protection against insect, rats, and plant diseases are done by a small number of coconut farmers in the Study area.

Table 3.10.1 Inventory of Water Supply Facilities Level-I

Code	Barangay	Total Population 1/	Total Household 1/	Level-1 Water Supply Facilities by Category					
				Private 2/			Public 3/		
				No. of Wells		Spring	No. of Wells		Spring
				SW	DW	Dev.	SW	DW	Dev.
Municipality : Camalig									
C-1	Quirangay	2,047	379	0	0	1	0	0	0
C-2	Salugan	1,584	278	3	0	0	0	4	0
C-3	Gapo	1,280	261	0	0	1	1	0	0
C-4	Poblacion	3,730	666	64	0	0	0	0	0
C-5	Tinago	1,325	237	21	0	0	2	1	0
C-6	Ilawod	2,682	506	6	0	0	4	2	0
C-7	Libod	2,600	433	10	0	0	6	4	0
C-8	Ligban	636	125	11	0	0	5	1	0
C-9	Tagaytay	2,108	398	10	0	0	5	2	0
C-10	Gotob	491	96	13	0	0	2	0	0
C-11	Baligang	2,913	511	17	0	0	4	2	0
C-12	Tagoytoy	566	109	1	0	0	2	2	0
C-13	Taladong	1,010	206	7	0	0	5	2	1
C-14	Binitayan	418	75	5	0	0	5	0	0
C-15	Comun	1,185	224	15	0	0	8	0	0
C-16	Bongabong	685	109	9	0	0	4	0	0
C-17	Cotmon	2,285	439	9	0	0	2	3	0
C-18	Del Rosario	780	159	3	0	0	1	2	0
C-19	Panoypoy	965	197	5	0	0	3	1	0
C-20	Magogon	496	89	2	0	0	4	1	0
	(Sub-Total)	29,786	5,497	211	0	2	63	27	1
Municipality : Daraga									
D-1	Inarado	1,503	301	60	0	0	8	1	0
D-2	Gapo	1,608	322	5	0	0	4	1	1
D-3	De La Paz	522	107	0	0	0	2	1	1
D-4	Dinoronan	295	66	6	0	0	3	1	1
D-5	Peña Francia	1,628	258	0	0	0	0	2	0
D-6	Alobo	559	100	28	0	0	3	2	0
D-7	Tabon-Tabon	1,322	259	1	0	0	1	2	0
D-8	Gabawan	1,233	224	10	0	0	4	1	0
D-9	Mabini	452	94	8	0	0	3	0	0
D-10	Kinawitan	435	95	0	0	0	2	2	0
D-11	Burgos	841	162	3	0	0	2	2	0
D-12	Bascaran	2,655	521	18	0	0	1	3	0
D-13	Talahib	526	103	0	0	0	0	1	0
D-14	Namantao	1,169	216	10	0	2	3	2	0
D-15	San Vicente Pequeño	192	39	0	0	0	4	0	0
D-16	Maopi	817	163	5	0	0	2	1	0
D-17	Anislag	2,804	519	0	0	0	4	2	0
D-18	Canarom	448	80	0	0	0	1	2	0
D-19	San Ramon	1,337	257	2	0	0	10	1	0
D-20	Mayon	1,171	209	6	0	0	3	2	0
D-21	San Rafael	260	46	0	0	0	1	2	0
	(Sub-Total)	21,777	4,141	162	0	2	61	31	3
	(Total)	51,563	9,638	373	0	4	124	58	4

Note : 1/ Estimated in 1995
2/ Sourced by PPDO, Albay & Interviews
3/ Sourced by DPWH, Albay

Table 5.1.1 Technical Soundness on potential Irrigation Development plans

Description	Camalig Diversion Dam	Dam No.1	Dam No.2	Dam No.3	Dam No.4
1 Dam and Reservoir	Headwork & Intake gates				
Catchment area (km2)	8	2.3	1.8	1.1	4.9
Dam height (m)	-				
Dam length (m)	-				
Active capacity (MCM)	-	0.007	0.64	0.23	0.05
Dead capacity (MCM)	-	0.006	0.008	0.005	0.015
Needs of saddle dams (embankment)	control dike of back water	no	1 no. (L=50 m, H=2 m)	2nos. (L=80 m, H=2 m) & (L=90 m, H=4 m)	no
2 Dam Foundation					
Geological Profile	limestone (D=more than 6 m)	conglomerates (D= less than 2 m)	sand stone & shale	tuff breccia (D= more than 3 m)	tuff breccia (D= more than 1 m)
Bearing capacity (N value)	more than 30 (D=more than 6 m)	low reliability	more than 30 (D=more than 6 m)	higher reliability	higher reliability
Seepage Factor (cm/sec)	Kc=less than 2.6 x 10 (-4)	high seepage, more than x 10 (-4)	Kc=less than 8.9 x 10 (-5)	low seepage, lower than x 10 (-5)	low seepage, lower than x 10 (-5)
3 Dam and reservoir area	Headwork site				
Land sliding	no	no	no	no	no
Land use	river	river & grass land	village area & coconut land	paddy field (5 ha) & coconut land	coconut land
Need of resettlement program	no	no	approx. 30 households	approx. 10 households	no
Land acquisition problem	negligible	negligible	yes	yes	negligible
4 Objections of dam and reservoir development plan (technical soundness)	no problem	low reliability of water storage due to low active capacity of reservoir & high seepage	no problem	rather long sub dams & negative benefit at reservoir area	lower water level of reservoir against the elevation of irrigation services areas
5 Canal and Drain					
Objections of canal & drain layout	no	long canal network & scattered paddy fields	no	long head race & canal layout at steep cliff section near dam site	long head race (pipe line) & layout of cliff section at head race
Intake method & facilities	movable weir & intake gates	intake structure	intake structure	intake structure	pump station
Total length of main & secondary canals (km)	5.97	4.67	10.5	7.4	15.2
Irrigation area (ha)	130	33	190	84	110
Irrigation canal density (m/ha)	46	142	55	88	138
Total length of main & secondary drains (km)	3.5	1.74	14.3	5	0
Specified related structures					
Irrigation	Stilling basin, Diversification str., Aqueduct & Culvert	Aqueduct & Culvert	Diversification str., Aqueduct & Culvert	Culvert	Culvert
Drainage	Flood control dike & Flap gates		Bridge		
6 Flood control facilities	Flood way (L=250 m)				
7 Objections of irrigation & drainage development plan (technical soundness)	no problem	higher canal density & small scale irrigation development	no problem	higher canal density & objection of layout at cliff section near dam site	higher canal density, objection of layout at cliff section of head race & pump up irrigation method
8 Technical soundness of overall plan	no problem	lower technical soundness	no problem	low technical soundness	lower technical soundness

Table 5.2.1 Selection of Suitable Crops in the Study Area (1/2)

Master List /First Screening

	Crop	Growing Period (days)	Climate Requirement: Temperature	Climate Requirement: Water requirement (mm per season)	Climate Requirement: Remarks	Level of Damage by Typhoon	Adaptability to the Climate	Adaptability to Partial Shading	Overall Rank
1	Upland rice	130	20 to 35	> 750		Minimized by selecting planting season	A	B	B
2	Corn	105	20 to 32	610	Sensitive to lack of water at silking and grain fill	do	B	B	B
3	Sorghum	85	25 to 35	500	Need a dry season during maturity	do	N	N	N
4	Mungbean	70	20 to 30	410	Do not grows well under heavy rain	do	B	B	B
5	String bean	90	20 to 30	400	Tolerate water logging to some extent	do	B	A	B
6	Soybean	90	22 to 30	530	Grows best in humid area, but no excess moisture	do	B	B	B
7	Cowpea	100	20 to 30	530	Excess moisture may cause poor germination	do	B	B	B
8	Peanut	80	24 to 33	600	Excess moisture may cause poor germination	do	B	B	B
9	Tomato	45	24 to 28	450	Sentive to wet soils and excesive rain	do	C	C	C
10	Cabbage	75	max. 30	frequent supply	Affected by excess water	do	C	C	C
11	Onion (Bulb)	60	18 t0 25	frequent supply	Requires a dry period prior to harvest	do	N	N	N
12	Onion (Leaf)	75	18 t0 25			do	B	N	N
13	Garlic	145	15 to 28		Harvest must coincide with the dry season	do	C	N	N
14	Lecture	45 to 80	15 to 30		Affected by heavy rainfall	do	C	N	N
15	Pechay	140	22 to 30		Mild climate is required	do	B	B	B
16	Asparagus	140	24 to 28		Excess of water cause severe damages	do	B	C	C
17	Mushroom	70		(Volvaria species)	Shaded condition; On bed made of crop straw's		A	A	A
18	Kang kong	90				do	A	C	C
19	Watercrest	80 to 140				do	A	C	C
20	Eggplant	80	25 to 35		Sensitive to excess water; Need big ridges	do	B	B	B
21	Okra	Biennial	20 to 30		Excessive moisture will affect roots	do	B	B	B
22	Sweet pepper	130	16 to 35			do	A	B	B
23	Chili	130	16 to 35			do	A	B	B
24	Bittergourd	50 to 70	24 to 32		So much affected even in rainy condition	do	B	B	B
25	Squash	70 to 90	20 to 30		Low humidity is required	do	B	C	C
26	Pumpkin	85 to 115	20 to 30			do	C	C	C
27	Cucumber	60 to 80	18 to 30		Low humidity is required	do	B	C	C
28	Chayote	Biennial	25 to 33			do	A	B	B
29	Carrot	70 to 90	20 to 30			do	C	N	N
30	Radish	90	20 to 30			do	C	N	N
31	Irish potato	120	16 to 23	100 mm/month	Excesive rainfall affects production	do	N	N	N
32	Sweet potato	150	22 to 35	600 to 1200		do	A	B	B
33	Cassava	300	20 to 35	1000 to 1200	Well distributed rainfall	Medium level of damage	B	B	B
34	Yam	300	22 to 32	> 800		Medium to low damage	B	B	B
35	Taro	300	22 to 32	> 1000		Medium to low damage	B	C	C
36	Ginger	300	25 to 35	> 2000 well distrib.	One dry month prior to harvest is required	Medium to low damage	A	A	A
37	Musk melon	70	18 to 35				C	N	N
38	Water melon	90	18 to 35		Long warm and dry weather are required		C	N	N
39	Papaya	Biennial		> 1200 mm	Well distributed rainfall	Medium to High level of damage	B	B	B
40	Orange	Perennial				Medium to High level of damage	B	C	C
41	Lemon	Perennial				Medium to High level of damage	B	C	C
42	Grape fruit	Perennial				Medium to High level of damage	B	C	C
43	Grape	Perennial				Medium to High level of damage	N	N	N
44	Mango	Perennial				Medium to High level of damage	C	B	C
45	Mangosteen	Perennial				Medium to High level of damage	B	C	C
46	Chico	Perennial				Medium to High level of damage	C	C	C
47	Guava	Perennial				Resistant to streog winds	A	B	B
48	Jack fruit	Perennial				Medium to high level of damage	B	B	C
49	Pineapple	Biennial	24 to 30	1000 to 1200	Well distributed rainfall	Low level of damages	A	A	A
50	Banana	Perennial				High level of damages	C	B	C
51	Abaca	Perennial				High level of damages, but can recover quickly	B	A	B
52	Coffee	Perennial	13 to 26	2000	Well distributed rainfall	Medium, can be protected with wind breaks	B	A	B
53	Cocoa	Perennial		1900 to 2000	Well distributed rainfall	Medium, can be protected with wind breaks	B	A	B
54	Black pepper	Perennial		> 1500	Well distributed rainfall	Medium, can be protected with wind breaks	B	A	B
Agro-forestry and Pasture Species									
	Pili	Perennial				Resistant to streog winds	B	B	B
	Anahaw	Perennial				Resistant, low damages	A	A	A
	Bamboo	Perennial				Medium to High level of damage	A	B	B
	Pasture					Low damage	A	A	A

Sources: Philippines Recommends for Irrigation Water Management, PCARRD, Technical Bulletin series No. 50
Irrigation Engineering Manual for Diversified Crops, NIA-JICA
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Handbook of Tropical Vegetables Cultivation, AICAF, Japan
Handbook of Tropical Legume Cultivation, AICAF, Japan
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Agribusiness Opportunities, World Media Grove, Inc., 1988

Note: A = Highly Suitable; B = Moderately Suitable
C = Marginally Suitable; N = Not Suitable

Table 5.2.1 Selection of Suitable Crops in the Study Area (2/2)

Second Screening

	Crop	Land Requirement: Soil Type	pH	Risk of Soil Erosion	Remarks	Suitability Based on Land Properties
1	Upland rice	Clay loam to clayey; High water retension	5 to 7	Require conservation measures for sloping lands		B
2	Corn	Sandy loam & Clay loam;Well drained	5.3 to 7.3	Require conservation measures for sloping lands	High depletion of soil nutrients	B
3	Mungbean	Sandy clay; clay loam; Well drained;	5.8 to 6.5	Require conservation measures for sloping lands	The crop helps to improve soil fertility	B
4	String bean	Sandy or clay loam; well drained	5.5 to 6	do	The crop helps to improve soil fertility	B
5	Soybean	Sandy loam & Clay loam;Well drained	6 to 6.5	do	The crop helps to improve soil fertility	B
6	Cowpea	Sandy clay; clay loam; Well drained;	5.5 to 6.5	do	The crop helps to improve soil fertility	B
7	Peanut	Sandy loam is best; clay loam is marginal	5.8 to 6.5	do	The crop helps to improve soil fertility	C
8	Eggplant	Loam, well drained best; can be on clay	5.5 to 6.8	Require conservation measures for sloping land		B
9	Okra	Most soil types, but Well drained	6 to 6.5	do		B
10	Sweet pepper	Sandy loam to Clay loam; Well drained	5.5 to 7	do		B
11	Chili	Most soil types, but Well drained	5.5 to 6	do		B
12	Bittergourd	High O. M. Good water retention				B
13	Chayote	Grow well in many type of soils		Do not increase the risk of erosion		B
14	Sweet potato	Sandy loam & silt loam; No heavy clay	5.6 to 6.6	High risk of erosion in sloping lands		C
15	Cassava	Sandy loam to Clay loam	5.8 to 7	Appropriate soil conservation practice in sloping land		C
16	Yam	Loam & Clay loam; Clay is marginal	5.5 to 7.5	do		C
17	Taro	Loam & Clay loam; Clay is marginal	5.5 to 7.5			B
18	Ginger	Sandy loam to Clay loam; depth>30; well drained				B
19	Papaya	Well drained; high organic matter	5.8 to 7	Require conservation measures for sloping land		B
20	Mango			After grown, the crop will protect sloping lands		B
21	Guava			After grown, the crop will protect sloping lands		A
22	Jack fruit			After grown, the crop will protect sloping lands		B
23	Pineapple	Well drained	4.5 to 5.5			C
24	Abaca	Clay loam, Well drained	6.5	After grown, the crop will protect sloping lands		B
25	Coffee	Well drained, deep	4.5 to 5.6	After grown, the crop will protect sloping lands		C
26	Cocoa			After grown, the crop will protect sloping lands		B
27	Black pepper	Any soil if well drained				B
	Agro forestry and Pasture					
	Pili			After grown, the crop will protect sloping lands		B
	Anahaw			After grown, the crop will protect sloping lands		A
	Bamboo			After grown, the crop will protect sloping lands		A
	Pasture			After grown, it will protect sloping lands		A

A = Highly suitable; B = Moderately suitable, C = Marginally suitable; N = No suitable

Third Screening

Crop	Labor Requirement (Man-day/ha)	Material Input (Peso/ha)	Estimated total Cost (Peso/ha)	Estimated Net Income (Peso/ha/year)	Marketability	Contribution to Agro industry	Remark
1 Upland Rice	70	4,000	7,100	5,700	Good		
2 Corn	54	3,000	10,000	2,000	Good	Good	
3 Soybean	69	6,000	15,000	3,000	Moderate	Good	
4 Mungbean	80	7,200	14,500	2,500	Good		
5 Okra	181	8,000	30,000	8,000	Limited	Low	
6 Chili	81	9,000	21,000	10,000	Good	Medium	
7 Eggplant	100	8,000	22,000	50,000	Moderate	None	
8 Chayote					Moderate	None	
9 Sweet potato	60	4,200	11,000	29,000	Limited	Medium	
10 Cassava	55	5,000	11,600	24,000	Limited	Medium	
11 Ginger	201	50,000	75,000	43,000	Moderate	High	Cost of planting material is
12 Papaya	110 first year 170 second year	8,300 first Year 7,300 second Year	17,000 first year 22,600 second year	22,000 for year 2 & 3	Good	Medium	
13 Pineapple	260	65,000	104,000	56,000	Moderate	Medium	Cost of planting material is
14 Abaca	128 first year; 230 from third year	22,000 first year 12,000 from third year	33,000 first year 32,000 from second year	16,000 from year 3	Very good	Very high	Up to 50 years continue production
15 Coffee	57 first year 69 from seventh year	8,000 first year 6,000 from seventh year	13,000 first year; 6,000 second year 11,000 from seventh year	7,000 at the 4th year increasing up to 34,000 at the 7th year	Good	High	
16 Black Pepper	68 first year 45 second year	32,000 first year; 9,000 for year 2	38,000 first year; 8,000 from year 3	2,000 at the year 4; 47,000 at the year 8	Moderate	Low	
17 Stringbean	104	20,000	36,000	6,000	Moderate	None	
18 Cowpea	51	7,355	19,200	28,800	Moderate	None	
Agro forestry and Pasture Species							
Pili	It is recommendable to plant at small scale because the long period required until the beginning of production				Good	High	
Anahaw	40	1,300	1,800	20,000	Good	High	
Bamboo					Good	High	No data on cost and benefit
Pasture	(Several species that can grow well under coconut)						

Sources: Quantity of inputs from Crop Production Guide, BIP; Prices: BAS and Study Team survey, as of October to December, 1995

Table 5.3.1 Proposed Rural Road Network Improvement Plan in the Municipalities of Camalig and Daraga, 1996-2010

Name of Road Section / Location	Length (km)			Implementation Plan 1996 - 2010					
	Total	Provl. Road	Bgy. Road	1996 - 2000 (km)	1996 - 2000 (P '000)	2001 - 2005 (km)	2001 - 2005 (P '000)	2006 - 2010 (km)	2006 - 2010 (P '000)
Municipality Camalig									
I. Priority Roads (Short Term : 1996 - 2000)									
I-1 Comun - Cotnon - Del Rosario - Panoypoy - Magogon	9.7	7.2	2.5	9.7	24,250	-	-	-	-
I-2 Cotnon - Maninila - Taplacon - Taloto	7.0	7.0	0.0	7.0	17,500	-	-	-	-
I-3 Tagaytay - Bariw - Palanog - Ilaluan	7.3	7.3	0.0	7.3	18,250	-	-	-	-
I-4 Baligang - Caguiba - Pariaan	6.9	6.9	0.0	6.9	17,250	-	-	-	-
I-5 Ilawod - Ligban - Goteb - Taladong	5.5	0.0	5.5	5.5	13,750	-	-	-	-
I-6 Quirangay - Sua - Tumpa - (Guinobatan Bdry.)	4.3	4.3	0.0	4.3	10,750	-	-	-	-
(Sub-total)	40.7	32.7	8.0	40.7	101,750				
II. Medium Term : 2001 - 2005									
II-1 Baligang - Bantonan	0.9	0.9	0.0	-	-	0.9	2,250	-	-
II-2 Libod - Bariw	2.2	2.2	0.0	-	-	2.2	5,500	-	-
II-3 Pariaan - Manawan - Quinuartilan	3.5	3.5	0.0	-	-	3.5	8,750	-	-
II-4 Salugan - Anoling	3.1	3.1	0.0	-	-	3.1	7,750	-	-
II-5 Binitayan - Inarado (Daraga)	0.7	0.0	0.7	-	-	0.7	1,750	-	-
II-6 Caguiba - Calabidongan	2.3	0.0	2.3	-	-	2.3	5,750	-	-
II-7 Cotnon - Solong	3.0	0.0	3.0	-	-	3.0	7,500	-	-
II-8 Ilaluan - Manawan	2.8	0.0	2.8	-	-	2.8	7,000	-	-
II-9 Pariaan - Binandirahan	3.3	0.0	3.3	-	-	3.3	8,250	-	-
II-10 Taladong - Bongabong	0.9	0.0	0.9	-	-	0.9	2,250	-	-
II-11 Taladong - Mina	1.5	0.0	1.5	-	-	1.5	3,750	-	-
II-12 Taladong - Tagoytoy	2.8	0.0	2.8	-	-	2.8	7,000	-	-
II-13 Taloto - Mabunga	1.3	0.0	1.3	-	-	1.3	3,250	-	-
(Sub-total)	28.3	9.7	18.6			28.3	70,750		
III. Long Term : 2006 - 2010									
III-1 Sumlang - Internal of the barangay Sumlang	1.0	0.0	1.0	-	-	-	-	1.0	2,500
III-2 Bantonan - Palanong	2.9	0.0	2.9	-	-	-	-	2.9	7,250
III-3 Bongabon - Calabidongan - Solong - Taplacon	5.2	0.0	5.2	-	-	-	-	5.2	13,000
III-4 Caguiba - Quitinday	4.0	0.0	4.0	-	-	-	-	4.0	10,000
III-5 Quitinday - Taloto	3.5	0.0	3.5	-	-	-	-	3.5	8,750
III-6 Talot - Panoypoy	2.8	0.0	2.8	-	-	-	-	2.8	7,000
(Sub-total)	19.4	0.0	19.4					19.4	48,500
(Total of Camalig)	88.4	42.4	46.0		101,750		70,750		48,500
Municipality Daraga									
I. Priority Roads (Short Term : 1996 - 2000)									
I-1 Mayon - San Ramon - Bigao - San Vicente Grande	6.9	2.2	4.7	6.9	17,250	-	-	-	-
I-2 Bascaran - Burgos - Mabini - Kinawitan - Panoypoy (Camalig)	6.0	0.0	6.0	6.0	15,000	-	-	-	-
I-3 Malabog - Lacag - Inarado	5.7	3.0	2.7	5.7	14,250	-	-	-	-
I-4 Anislag - Maopi - Magogon (Camalig)	5.0	2.2	2.8	5.0	12,500	-	-	-	-
(Sub-total)	23.6	7.4	16.2	23.6	59,000				
II. Medium Term : 2001 - 2005									
II-1 Inarado - Alobo - Mabini	5.2	0.0	5.2	-	-	5.2	13,000	-	-
II-2 Peña Francia - Gabawan - Kiwalo - Bagumbayan	4.4	0.0	4.4	-	-	4.4	11,000	-	-
II-3 Anislag - Canarom	5.3	0.0	5.3	-	-	5.3	13,250	-	-
II-4 Bascaran - Talahib - Legaspi City Bdry.	2.4	0.0	2.4	-	-	2.4	6,000	-	-
II-5 Bigao - San Rafael	1.2	0.0	1.2	-	-	1.2	3,000	-	-
II-6 Maopi - San Vicente Pequeño	1.0	0.0	1.0	-	-	1.0	2,500	-	-
II-7 Salvacion - Muisl	4.5	0.0	4.5	-	-	4.5	11,250	-	-
II-8 San Vicente Grande - Ibaugan	2.4	0.0	2.4	-	-	2.4	6,000	-	-
II-9 San Vicente Grande - Nabasan	2.6	0.0	2.6	-	-	2.6	6,500	-	-
(Sub-total)	29.0	0.0	29.0			29.0	72,500		
III. Long Term : 2006 - 2010									
III-1 Alobo - Kinawitan	1.7	0.0	1.7	-	-	-	-	1.7	4,250
III-2 Busay - Pandoe - Lacag	2.4	0.0	2.4	-	-	-	-	2.4	6,000
III-3 Canarom - Magogon (Camalig)	1.2	0.0	1.2	-	-	-	-	1.2	3,000
III-4 Canarom - San Rafael	1.8	0.0	1.8	-	-	-	-	1.8	4,500
III-5 Cullat - Bongalon - Kidaco - Banilad - Peña Francia	5.6	0.7	4.9	-	-	-	-	5.6	14,000
III-6 Nabasan - Ibaugan	4.0	0.0	4.0	-	-	-	-	4.0	10,000
III-7 Salvacion - Budiao - Bañadero	4.3	4.3	0.0	-	-	-	-	4.3	10,750
III-8 San Rafael - San Vicente Grande	2.1	0.0	2.1	-	-	-	-	2.1	5,250
III-9 San Ramon - Canarom	2.4	0.0	2.4	-	-	-	-	2.4	6,000
III-10 Anislag - Internal of the barngay Anislag	1.6	0.0	1.6	-	-	-	-	1.6	4,000
III-11 Gapo - Internal of the barangay Gapo	2.4	0.0	2.4	-	-	-	-	2.4	6,000
III-12 Villahermosa - Internal of the barangay Villahermosa	1.7	0.0	1.7	-	-	-	-	1.7	4,250
(Sub-total)	31.2	5.0	26.2					31.2	78,000
(Total of Daraga)	83.8	12.4	71.4		59,000		72,500		78,000
(Total of Daraga and Camalig)	172.2	54.8	117.4		160,750		143,250		126,500
(Total Cost for 1996 - 2010)	430,500								

Note : Totative unit cost of a 2,500 Pesos / m is applied for the cost estimation, based on PPDO Investment Program and DPWH unit cost.

Table 5.3.2 Projection of Water Supply Development

Code	Barangay	Present (1995)			Projection up to 2010				
		Total Population	Total Population Covered	Population Coverage (%)	Projected Population in 2010	Additional Population Covered	Additional Required No. of Deep Wells	Possible Availability , 1/	Shortfall No.of Deep Wells
Municipality : Camalig									
C-1	Quirangay	2,047	424	21	2,286	1,862	35	15	20
C-2	Salugan	1,584	225	14	1,769	1,545	29	9	20
C-3	Gapo	1,280	498	39	1,430	931	18	5	13
C-4	Poblacion	3,730	2,879	77	4,166	1,287	24	6	18
C-5	Tinago	1,325	248	19	1,480	1,232	23	7	16
C-6	Ilawod	2,682	1,128	42	2,996	1,868	35	16	19
C-7	Libod	2,600	572	22	2,904	2,332	44	24	20
C-8	Ligban	636	365	57	710	346	7	1	6
C-9	Tagaytay	2,108	413	20	2,355	1,941	37	17	20
C-10	Gotob	491	426	87	548	122	2	1	1
C-11	Baligang	2,913	390	13	3,254	2,864	54	34	20
C-12	Tagoytoy	566	216	38	632	416	8	2	6
C-13	Taladong	1,010	713	71	1,128	415	8	2	6
C-14	Binitayan	418	286	68	467	181	3	1	2
C-15	Comun	1,185	488	41	1,324	836	16	6	10
C-16	Bongabong	685	250	33	765	515	10	2	8
C-17	Cotmon	2,285	303	13	2,552	2,249	42	23	19
C-18	Del Rosario	780	172	22	871	699	13	3	10
C-19	Panoypoy	965	233	24	1,078	845	16	6	10
C-20	Magogon	496	273	55	554	281	5	1	4
Municipality : Daraga									
D-1	Inarado	1,503	891	59	1,679	788	15	3	12
D-2	Gapo	1,608	318	20	1,796	1,478	28	9	19
D-3	De La Paz	522	212	41	583	371	7	1	6
D-4	Dinoronan	295	280	95	329	50	1	1	0
D-5	Peña Francia	1,628	85	5	1,818	1,734	33	13	20
D-6	Alobo	559	331	59	624	294	6	1	5
D-7	Tabon-Tabon	1,322	131	10	1,477	1,345	25	7	18
D-8	Gabawan	1,233	636	52	1,377	741	14	3	11
D-9	Mabini	452	161	36	505	344	6	1	5
D-10	Kinawitan	435	170	37	486	316	6	1	5
D-11	Burgos	841	182	22	939	757	14	3	11
D-12	Bascaran	2,655	246	9	2,965	2,720	51	31	20
D-13	Talahib	526	42	8	588	545	10	2	8
D-14	Namantao	1,169	256	22	1,306	1,050	20	6	14
D-15	San Vicente Pequeño	192	170	88	214	45	1	1	0
D-16	Maopi	817	148	16	913	764	14	3	11
D-17	Anislag	2,804	254	9	3,132	2,877	54	34	20
D-18	Canarom	448	127	28	500	373	7	2	5
D-19	San Ramon	1,337	475	36	1,493	1,018	19	7	12
D-20	Mayon	1,171	237	20	1,308	1,070	20	7	13
D-21	San Rafael	260	127	49	290	163	3	1	2
	(Total)	51,563	15,984	31	57,593	41,609	783	318	465

Note : 1/ Possible Availability : Possible available no. of deep wells to be implemented by both the national/local funds and any other special water supply program funds such as FW4SP

- Possible available no. of deep wells to be implemented in a year in the Project area = 21.22 (wells)
- Total of possible available no. of deep wells to be implemented up to Year 2010 = 318 (wells)
- Possible available no. of wells by barangay up to year 2010 is tentativelly allocated based on the additional requirement and cove

Following assumptions are used based on the data collected by the Study team and " Water Supply, Sewerage and Sanitation Develo , 1992 - 2010 in Province of Albay"

- Annual population growth rate in the Project area = 0.74 %
- Target population coverage in 2010 = 100 %
- Deep well construction is applied for future development.

Table 5.3.3 Proposed Rural Water Supply Development Plan 1996 - 2010

Code	Barangay	Present (1995)			Projection up to 2010			Implementation Plan 1996 - 2010					
								Short-Term (1996-2000)		Medium-Term (2001-2010)		Long-Term (2006 -2010)	
		Total Population	Total Population Covered	Population Coverage (%)	Projected Population in 2010	Additional Population Covered	Additional Required No. of Deep Wells	(Required No.of wells)	Coverage (%)	(Required No.of wells)	Coverage (%)	(Required No.of wells)	Coverage (%)
Municipality : Camalig													
C-1	Quirangay	2,047	424	21	2,266	1,862	35	12	46	12	73	11	100
C-2	Salugan	1,584	225	14	1,769	1,545	29	10	42	10	71	9	100
C-3	Gapo	1,280	498	39	1,430	931	18	6	57	6	78	6	100
C-4	Poblacion	3,730	2,879	77	4,166	1,287	24	8	79	8	89	8	100
C-5	Tinago	1,325	248	19	1,480	1,232	23	8	45	8	73	7	100
C-6	Ilawod	2,682	1,128	42	2,996	1,868	35	12	58	12	79	11	100
C-7	Libod	2,600	572	22	2,904	2,332	44	15	47	15	73	14	100
C-8	Lugban	636	365	57	710	346	7	3	73	2	88	2	100
C-9	Tagaytay	2,108	413	20	2,355	1,941	37	13	46	13	75	11	100
C-10	Gotob	491	426	87	548	122	2	1	87	1	97	0	100
C-11	Baligang	2,913	390	13	3,254	2,864	54	18	41	18	70	18	100
C-12	Tagoytoy	566	216	38	632	416	8	3	59	3	84	2	100
C-13	Taladong	1,010	713	71	1,128	415	8	3	77	3	91	2	100
C-14	Binitayan	418	286	68	467	181	3	2	84	1	95	0	100
C-15	Comun	1,185	488	41	1,324	836	16	6	60	6	84	4	100
C-16	Bongabong	685	250	33	765	515	10	4	60	4	87	2	100
C-17	Colmon	2,285	303	13	2,552	2,249	42	15	42	15	73	12	100
C-18	Del Rosario	780	172	22	871	699	13	5	50	5	79	3	100
C-19	Panoypoy	965	233	24	1,078	845	16	6	51	6	80	4	100
C-20	Magogon	496	273	55	554	281	5	2	68	2	87	1	100
	(Sub-total)	29,786	10,504		33,269	22,766	429	152		150		127	
Municipality : Daraga													
D-1	Inarado	1,503	891	59	1,679	788	15	5	69	5	84	5	100
D-2	Gapo	1,608	318	20	1,796	1,478	28	10	47	10	76	8	100
D-3	De La Paz	522	212	41	583	371	7	3	63	3	90	1	100
D-4	Dinoronan	295	280	95	329	50	1	1	101	0	101	0	100
D-5	Peña Francia	1,628	85	5	1,818	1,734	33	11	36	11	68	11	100
D-6	Alobo	559	331	59	624	294	6	3	78	2	95	1	100
D-7	Tabon-Tabon	1,322	131	10	1,477	1,345	25	9	41	9	72	7	100
D-8	Gabawan	1,233	636	52	1,377	741	14	5	65	5	84	4	100
D-9	Mabini	452	161	36	505	344	6	2	53	2	73	2	100
D-10	Kimawitan	435	170	37	486	316	6	2	56	2	78	2	100
D-11	Burgos	841	182	22	939	757	14	5	47	5	75	4	100
D-12	Bascaran	2,655	246	9	2,965	2,720	51	17	38	17	68	17	100
D-13	Talahib	526	42	8	588	545	10	4	43	4	78	2	100
D-14	Namantao	1,169	256	22	1,306	1,050	20	7	47	7	75	6	100
D-15	San Vicente Pequeño	192	170	88	214	45	1	1	103	0	103	0	100
D-16	Maopi	817	148	16	913	764	14	5	45	5	73	4	100
D-17	Anislag	2,804	254	9	3,132	2,877	54	18	38	18	68	18	100
D-18	Canaron	448	127	28	500	373	7	3	57	3	88	1	100
D-19	San Ramon	1,337	475	36	1,493	1,018	19	7	56	7	81	5	100
D-20	Mayon	1,171	237	20	1,308	1,070	20	7	46	7	74	6	100
D-21	San Rafael	260	127	49	290	163	3	2	80	1	98	0	100
	(Sub-total)	21,777	5,480		24,324	18,843	354	127		123		104	
	(Total)	51,563	15,984		57,593	41,609	783	279		273		231	
	(Average No.of Wells per Barangay)						19	7		7		6	
	(Average of Population Coverage)			31 %					58 %		81 %		100 %
	(Total Cost : '000 Pesos)						93,522	33,136		32,700		27,686	

Note : 1/ N/L Fund, National or Local Government Fund

2/ Tentative cost for one deep well is applied = 218,000 Pesos / well

Following assumptions are used based on the data collected by the Study team and "Water Supply, Sewerage and Sanitation Development Plan 1992-2010 in Province of Albay"

- Annual population growth rate in the Project area = 0.74 %
- Target population coverage in 2010 = 100 %
- Deep well construction is applied for future development.

Table 6.1.1 Demography of Model Project Areas in 1995

(1) Camalig Diversion Area

Model Area/Barangay Block No.		No. of Household Total	Non-Farm	Farm	Population Total	Non-Farm	Farm
C-6 Bawod	0.89	506	56	450	2,682	295	2,387
(5 Blocks in total)							
C-6-1	0.89	98	11	87	519	57	462
C-6-2	0.89	96	11	85	509	56	453
C-6-3	0.89	68	7	61	360	40	320
C-6-4	0.89	162	18	144	859	94	765
C-6-5	0.89	82	9	73	435	48	387
Block-total		506	56	450	2,682	295	2,387
C-7 Libod	0.89	433	48	385	2,600	286	2,314
(7 Blocks in total)							
C-7-4	0.89	36	4	32	216	24	192
C-7-5	0.89	42	5	37	252	28	224
Block-total		78	9	69	468	52	416
C-8 Ligban	0.89	125	14	111	636	70	566
(3 Blocks in total)							
C-8-1	0.89	40	4	36	204	22	182
C-8-2	0.89	62	7	55	315	35	280
Block-total		102	11	91	519	57	462
C-9 Tagaytay	0.89	398	44	354	2,308	232	1,876
(7 Blocks in total)							
C-9-1	0.89	47	5	42	249	27	222
C-9-2	0.89	39	4	35	206	23	183
C-9-3	0.89	87	10	77	461	51	410
C-9-4	0.89	78	9	69	413	45	368
Block-total		251	28	223	1,329	146	1,183
C-10 Gotob	0.89	96	11	85	491	54	437
(7 Blocks in total)							
C-10-1	0.89	12	1	11	61	7	54
C-10-2	0.89	19	3	16	97	11	86
C-10-3	0.89	14	2	12	72	8	64
C-10-4	0.89	11	1	10	56	6	50
C-10-5	0.89	13	1	12	66	7	59
C-10-6	0.89	13	1	12	66	7	59
C-10-7	0.89	14	2	12	73	8	65
Block-total		96	11	85	491	54	437
Related Barangay Total		1,558	173	1,385	8,517	937	7,580
Related Block Total		1,033	115	918	5,489	604	4,885

(2) Dam No 2 Area

Model Area/Barangay Block No.		No. of Household Total	Non-Farm	Farm	Population Total	Non-Farm	Farm
C-14 Binitayan	0.951	95	5	90	418	20	398
(5 Blocks in total)							
C-14-1	0.951	30	1	29	132	6	126
C-14-2	0.951	26	1	25	114	6	108
C-14-3	0.951	15	1	14	66	3	63
Block-total		71	3	68	312	15	297
C-15 Comia	0.951	224	11	213	1,185	58	1,127
(4 Blocks in total)							
C-15-1	0.951	67	3	64	354	17	337
C-15-2	0.951	50	2	48	265	13	252
Block-total		117	5	112	619	30	589
C-17 Cotmon	0.951	439	22	417	2,285	112	2,173
(6 Blocks in total)							
C-17-1	0.951	119	6	113	619	30	589
C-17-2	0.951	87	4	83	453	22	431
C-17-3	0.951	73	4	69	380	19	361
Block-total		279	14	265	1,452	71	1,381
D-1 Inarado	0.951	325	16	309	1,503	74	1,429
(7 Blocks in total)							
D-1-1	0.951	52	3	49	240	12	228
D-1-2	0.951	47	2	45	217	11	206
D-1-3	0.951	53	3	50	245	12	233
D-1-4	0.951	47	2	45	217	11	206
D-1-5	0.951	47	2	45	217	11	206
D-1-6	0.951	37	2	35	171	8	163
D-1-7	0.951	42	2	40	196	9	187
Block-total		325	16	309	1,503	74	1,429
D-6 Alobo	0.951	100	5	95	559	27	532
(4 Blocks in total)							
D-6-1	0.951	32	2	30	179	9	170
D-6-2	0.951	17	1	16	95	5	90
D-6-3	0.951	29	1	28	162	8	154
Block-total		78	4	74	436	22	414
D-7 Tabon-Tal	0.951	259	13	246	1,322	65	1,257
(7 Blocks in total)							
D-7-7	0.951	34	2	32	174	9	165
D-11 Burgos	0.951	162	8	154	841	41	800
(7 Blocks in total)							
D-11-1	0.951	28	1	27	145	7	138
D-11-2	0.951	29	1	28	151	7	144
Block-total		57	2	55	296	14	282
Related Barangay Total		1,604	80	1,524	8,113	397	7,716
Related Block Total		961	46	915	4,792	235	4,557

Note : 0.951 : Actual in 1996

(3) Upland Model Areas

Model Area/Barangay Block No.		No. of Household Total	Non-Farm	Farm	Population Total	Non-Farm	Farm
Upland Corn Model							
C-20 Magogon	0.945	127	7	120	496	27	469
(3 Blocks in total)							
C-20-1	0.945	46	3	43	180	10	170
C-20-2	0.945	33	2	31	129	7	122
C-20-3	0.945	48	2	46	187	10	177
Block-total		127	7	120	496	27	469
Upland Coconut Model							
D-19 San Ramo	0.959	257	11	246	1,337	55	1,282
(6 Blocks in total)							
D-19-1	0.959	50	2	48	260	11	249
D-19-2	0.959	43	2	41	224	9	215
D-19-3	0.959	41	2	39	213	9	204
D-19-4	0.959	49	2	47	255	10	245
D-19-5	0.959	44	2	42	229	9	220
D-19-6	0.959	30	1	29	156	7	149
Block-total		257	11	246	1,337	55	1,282

(4) 4 Model Project Areas

	No. of Household Total	Non-Farm	Farm	Population Total	Non-Farm	Farm
Ground Total						
Related Barangay Total	3,546	271	3,275	18,463	1,416	17,047
Related Block Total	2,378	179	2,199	12,114	921	11,193

Table 6.1.2 Present Agriculture Production in Lowland Model Project Areas

Item	Physical Area (ha)	Planted Area (ha)	Harvested Area (ha)	Yield (ton/ha)	Production (ton)
I. Camalig Diversion Model Area					
Rainfed Paddy			201		387
1st Cropping Season	130	130	114	2.1	239
2nd Cropping Season	130	115	87	1.7	148
II. Dam No. 2 Model Area					
Irrigated Paddy	62	62	48		152
1st Cropping Season	31	31	26	3.3	86
2nd Cropping Season	31	31	22	3.0	66
Rainfed Paddy	728	704	550		1,060
1st Cropping Season	364	364	313	2.1	657
2nd Cropping Season	364	340	237	1.7	403
Annual paddy production					1,212
Upland crop (corn)	16	16	16		22
1st Cropping Season	8	8	8	1.5	12
2nd Cropping Season	8	8	8	1.2	10

Table 6.2.1 Present Agriculture Production in the Upland Model Project Areas

Area / Crop	Area Harvested (ha)	Average Yield (ton/ha)	Total Production (ton)
Magogon area			
Coconut	190	1.0	190
Corn			99
1st Season			
In Open land	23	1.5	35
Inter-crop with coconut	19	1.2	23
2nd Season			
In Open land	23	1.0	23
Inter-crop with coconut	19	1.0	19
Paddy			19
1st Season	5	2.1	11
2nd Season	5	1.7	9
San Ramon area			
Coconut	534	1.0	534
Corn			484
1st Season			
In Open land	147	1.5	220
Inter-crop with coconut	53	1.2	64
2nd Season			
In Open land	147	1.0	147
Inter-crop with coconut	53	1.0	53
Paddy			80
1st Season	21	2.1	44
2nd Season	21	1.7	36

Table 6.2.2 Farmers' Concerns on Model Development Projects (1/2)

(1) Membership in Irrigators Association and Irrigators Group

Item	O/NC	O/C	L/SC	CT	Total	%
No. of Respondents	19	84	177	52	332	
Landowners	11	34	54	17	113	32
Owner-cultivators	7	5	17	3	29	8
Owner-cultivators & lessees/sharecropper	7	13	23	11	49	14
Owner and lessees/sharecropper	1	17	62	13	93	26
Actual cultivators	1	7	38	8	54	15
Irrigation operation and maintenance personnel including caretakers	1	8	6	2	17	5
Total	28	84	200	54	355	100

(2) Concept on Lessee/Share-cropper/Caretaker Organization as Irrigation Service Agent

Item	O/NC	O/C	L/SC	CT	Total	%
No. of Respondents	19	84	177	52	332	
Acceptable	0	57	125	51	283	85
Not acceptable	0	6	12	1	27	8
Reason for non-acceptability						
no management capability	0	0	0	0	15	
not responsible	0	0	0	0	5	
no financial capability	0	0	0	0	2	
No response	19	21	40	0	22	7
Total	19	84	177	52	332	100

(3) Utilization and Management of Post-Harvest Facility

Item	O/NC	O/C	L/SC	CT	Total	%
No. of Respondents	19	84	177	52	332	
Necessity of facility						
Utilization for:						
1) ISP collection	19	65	120	52	256	77
2) Multi-Purpose	6	12	53	22	93	36
Operation for:						
1) IA & IG members	19	68	131	52	270	81
2) general public	7	9	38	18	72	22

(4) Requirement of Post-Harvest Facility

Item	O/NC	O/C	L/SC	CT	Total	%
No. of Respondents	19	84	177	52	332	
Solar Dryer	11	53	126	34	224	67
Warehouse	9	25	59	16	109	33
Ricemill	12	44	104	31	191	58

(5) Concept on Operation and Maintenance of Post-Harvest Facility by Landless Farm Household

Item	O/NC	O/C	L/SC	CT	Total	%
No. of Respondents	19	84	177	52	332	
Agree	14	63	142	39	258	78
Disagree	2	18	34	11	65	20
No. answer	3	3	1	2	9	2
Reason for disagreement					(to dusagreed 65)	
no management capability	0	7	17	5	29	45
no financial capability	2	2	3	1	8	12
not responsible	0	2	5	0	7	11
not acceptable	4	7	12	6	29	45
Organization for the Management					(to agreed 258)	
IAs and IGs	4	16	29	9	58	22
Organized coop	2	6	7	2	17	7
Existing permit	0	1	0	0	1	0
Ricemiller	0	2	1	0	3	1
Barangay Captain/Council	0	2	1	0	3	1
No Answer	8	36	103	28	176	68

Note : O/C; Owner/Cultivator O/NC; Owner/Non-cultivator L/SC; Lessee/Sharecropper CT; Caretaker

Table 6.2.2 Farmers' Concerns on Model Development Projects (2/2)

(1) Priority Groups in Receiving Government Support Services

Item	Magogon				San Ramon				
	O/C	L/SC	CT	Total	O/NC	O/C	L/SC	CT	Total
No. of Respondents	9	9	5	23	5	13	24	4	46
Rank	1st	1st	1st	1st	1st	1st	1st	1st	1st
Total									
Landowners	3	4	0	7	1	2	0	3	6
Tenants/caretakers	0	0	0	0	0	4	0	0	4
Local elite/officials	2	0	4	6	5	2	11	0	18

(2) Reasons for the Youth Outmigration

Item	Magogon				San Ramon				
	O/C	L/SC	CT	Total	O/NC	O/C	L/SC	CT	Total
No. of Respondents	9	9	5	23	5	13	24	4	46
Rank	1st	1st	1st	1st	1st	1st	1st	1st	1st
Shortage of income	2	2	3	7	0	0	0	3	3
Less employ oppor	0	0	0	0	5	4	6	0	15
Less recreation	0	0	0	0	0	0	0	0	0
Poverty	5	3	0	8	0	2	2	0	4
Less farming interest	0	0	0	0	0	0	2	0	2

(3) Concept on Nucleus Farming

Item	Magogon				San Ramon				
	O/C	L/SC	CT	Total	O/NC	O/C	L/SC	CT	Total
No. of Respondents	9	8	5	22	5	13	24	4	46
Agree	9	8	5	22	4	11	18	4	37
Disagree	0	0	0	0	1	2	6	0	9

(4) Potential Site of the Nucleus Farm

Item	Magogon				San Ramon				
	O/C	L/SC	CT	Total	O/NC	O/C	L/SC	CT	Total
No. of Respondents	9	8	5	22	5	13	24	4	46
Coconut area under CARP	3	1	2	6	1	2	6	2	11
Donated by landowner	1	3	3	7	0	2	4	0	6
Owned area	5	4	0	9	3	7	8	2	20
No response	0	0	0	0	1	2	6	0	9

(5) Concept on Formation Farmers Trust Association

Item	Magogon				San Ramon				
	O/C	L/SC	CT	Total	O/NC	O/C	L/SC	CT	Total
No. of Respondents	9	8	5	22	5	13	24	4	46
Acceptable	9	8	5	22	4	10	21	4	39
Not acceptable	0	0	0	0	1	3	3	0	7
Reasons					No management capability				

(6) Management of Nucleus Farm

Item	Magogon				San Ramon				
	O/C	L/SC	CT	Total	O/NC	O/C	L/SC	CT	Total
No. of Respondents	9	8	5	22	5	13	24	4	46
Land trust contract	3	4	3	10	0	3	6	3	12
Fixed rent	6	4	2	12	4	7	15	1	27

(7) Concept on Collective Ownership of Nucleus Farm

Item	Magogon				San Ramon				
	O/C	L/SC	CT	Total	O/NC	O/C	L/SC	CT	Total
No. of Respondents	9	8	5	22	5	13	24	4	46
Agree	9	8	4	21	3	7	15	3	28
Disagree	0	0	1	1	1	3	6	1	11
Reasons					Restriction in personal intensions Difficulty in organization				
No response	0	0	0	0	1	3	3	0	7

Note : O/C; Owner/Cultivator O/NC; Owner/Non-cultivator L/SC; Lessee/Sharecropper CT; Caretaker

Table 6.2.3 Summary of Issues and Concerns Raised in Farmers Meetings (1/3)

Model Area/ Barangay	Number of Paricipants	Project Implementation Requirements/ Issues Raised			Farmers Priority Requirements		Proposed Concepts/Issues Raised				
		Formation of IA	Payment of ISF	Amortization of the Irrigation System	Farm Machinery	Post-harvest Facilities	Organization of Landless Farmers as Service Agency	Crop Rotation	Rotation of Water Distribution	Infrastructure	Other Issues and Concerns
a) Canalig Diversion											
a.1) Ilawod	16	-generally acceptable - policies will have to be formulated regarding membership and operations	-generally acceptable	-generally acceptable - need for further study by IA	hand tractor	solar dryer, mechanical dryer and rice mill - sites will not be a problem	-generally acceptable - organization would need technical support	will primarily plant rice should the irrigation system will be operationalized	subject for further discussion once the IA has been organized	- inclusion of Ilawod in the Level II water supply development and barangay road improvement	- target date of implementation - settlement of ROW claims
a.2) Libod	11	-generally acceptable	-generally acceptable	-generally acceptable	hand tractor	solar dryer mechanical dryer - site will be the responsibility of the barangay officials	-generally acceptable	rice will be their main crop	for further Study	none	- settlement of ROW claims
a.3) Ligban and Gotob	26	-generally acceptable - a government agency or an NGO should assist IA	-generally acceptable - farmers who will not use the facilities are not required to pay the ISF	-generally acceptable - terms must be study - by the IA	not applicable	rice mill and solar dryer (Gotob)	-generally acceptable - institutional develop. program is requirement	rice remains the priority crop	subject to further dicussion by the IA	- inclusion of Ligban in the spring develop project component - flood control system for the exisung inundated land in Baligan, Gotob, Ligban and Tagaytay	- a number of families living in government land will be displaced in Ligban
a.4) Tagaytay	21	-generally acceptable - formulation of policies is needed to avoid internal conflicts	-generally acceptable	-generally acceptable - terms should depend on the financial capability of IA - ownership of the system will be with the	hand tractor	mechanical dryer and rice mill	-generally acceptable - responsive to the need for additional employment opportunities in barangay	generally acceptable	for further study	- possible solution regarding extreme water suppy situation (i.e. Flood)	- target date og project implementat. - payment of ROW claims
b) Dam No. 2											
b.1) Binitayan	24	-generally acceptable	-generally acceptable	-generally acceptable - depend in the capability of the IA	hand tractor	solar dryer, rice mill - Josefina Torres could donate an 11x 20 m of land in Purok 2 for these facilities	-generally acceptable	- generally acceptable - source of planting materials	for further discussion by IA	inclusion of Binitayan in spring development project component	- settlement of ROW claims
b.2) Comun	57	-generally acceptable - actual cultivators should be members	-generally acceptable	-generally acceptable - depend on the finanancial capability of the IA	hand tractor	solar dryer, mechanical dryer - barangay officials will be resposible for the site	-generally acceptable	rice will remain as the main crop	for further study	inclusion of Comun in the spring development component of the project	- settlement of ROW claims - immediate implementation of the project - will be volunteering their services (bayanihan style) in the transfer of Lacag families to the resettlement site

Table 6.2.3 Summary of Issues and Concerns Raised in Farmers Meetings (2/3)

		Project Implementation Requirements/ Issues Raised			Farmers Priority Requirements		Proposed Concepts/Issues Raised				
Model Area Barangay	Number of Participants	Formation of IA	Payment of ISF	Amortization of the Irrigation System	Farm Machinery	Post-harvest Facility	Organization of Landless Farmers as a Service Agency	Crop Rotation	Rotation of Water Distribution	Infrastructure	Other Issues and Concerns
b.3) Cosmun	15	-generally acceptable	-generally acceptable	-generally acceptable - would depend on feasibility study	hand tractor	mechanical/solar dryer barangay officials will be responsible for site	-generally acceptable	rice will be the main crop	for further study	none	- settlement of ROW claims - target date of implementation
b.4) Inarado	36	-generally acceptable - measures to be undertaken so that internal conflicts will be avoided -members should be all farmer cultivators	-generally acceptable	-generally acceptable project study to be made - liability of the association if dam collapses	hand tractor, sprayers and threshers	solar/mechanical dryers and rice mills	-generally acceptable	generally acceptable	subject fo further discussion	none	- payment of the usage of the Level II water supply - target date of implementation - settlement of ROW claims - assistance to Barangay Lacag families
b.5) Alobo	50	-generally acceptable - need to formulate rules and regulations - tenants and landowners should be member of IA	-generally acceptable - payment must be settled between the landowne and the tenant	-generally acceptable - study to determine capability of IA	hand tractors, threshers	rice mill - Mr. Felimon Luces of Purok 1 could donate the site	-generally acceptable	rice to be their main crop	for further study	- inclusion of Alobo in barangay road improvement project	- settlement of ROW claims -posible solution to eradicate Golden Snails
b.6) Tabon-Tabon	30	-generally acceptable - members should be all farm cultivators	-generally acceptable	-generally acceptable - affordability of IA to be study	hand tractor, tresher	solar/mechani. dryers - the facilities could be accommodadeted at the present site of the barangay hall	-generally acceptable - need for institutional strengthening program	rice to be the main crop	scheme could be further studied by IA	none	settlement of ROW claims
b.7) Burgos	43	-generally acceptable - all farm cultivators should be members	-generally acceptable - who will be responsible for the payment of ISF	-generally acceptable - means for IA to rise the payments	hand tractors, treshers and sprayers	solar dryer mechanical dryer and rice mills - Mr. Reymerio Loterte of Purok 3 is willing to donate a portion of his land as a possible site for these facilities	-generally acceptable	rice to be the main crop	for further study	none	- settlement of ROW claims - target date of implementation - eradicaion of Golden Snails - willingness to assist Bgy. Lacag families in the transfer to resettlement site
b.8) Taladong and Songabong	24	-generally acceptable - possibility for the barangay residents to maintain the irrigation system in their area	-generally acceptable	-generally acceptable - subject to further study of the IA	hand tractor	mechanical dryer and rice mills - site for these facilities will be the responsibility of the barangay officials	-generally acceptable	palay will be their main crop	subject to further discussion	- if the utilization of potable water supply will also be paid by the residents of Taladong	- settlement of ROW claims

Table 6.2.3 Summary of Issues and Concerns Raised in Farmers Meetings (3/3)

		Project Implementation Requirements/ Issues Raised			Proposed Concepts/Issues Raised			
Model Area Barangay	Number of Participants	Formation / Strengthening of Farming Marketing Service Cost	Intensification of Inter-cropping	Improved Practices in Upland Managem.	Barangay Cluster Formation	Developement of Nucleus Farm	Organization of Landless Farmers	Other Issues and Concerns
a) Magogon	49	generally acceptable - institutional strengthening program for the cooperative officers and members	generally acceptable - availability of high quality seeds	generally acceptable - availability of technical assustance	generally acceptable - availability of the center - housing scheme and other amenities	generally acceptable - identification of possible site	generally acceptable	none
b) San Ramon	52	generally acceptable - institutional development to be an important aspect of the program	generally acceptable	generally acceptable	not applicable	generally acceptable - possibility to include other sites as nucleus farms - availability of planning materials - individual farm titling would still be observed - allotment of 1,000 sq m of land by each member for the Nucleus Farm will not be a problem		formation of association and venturing into collective farming are acceptable

Table 7.1.1 Anticipated Crop Production in Lowland Model Project Areas

Item	Physical Area (ha)	Planted Area (ha)	Harvested Area (ha)	Yield (ton/ha)	Production (ton)
I. Camalig Diversion Model Area					
Irrigated Paddy					1,365
1st Cropping Season	130	130	130	5.5	715
2nd Cropping Season	130	130	130	5.0	650
Mungbean	-	45	45	1.2	54
II. Dam No. 2 Model Area					
Irrigated Paddy	380	380	380		1,995
1st Cropping Season	190	190	190	5.5	1,045
2nd Cropping Season	190	190	190	5.0	950
Rainfed Paddy	410	390	390		1,096
1st Cropping Season	205	205	205	3.0	615
2nd Cropping Season	205	185	185	2.6	481
Total Paddy Production					3,091
Mungbean	-	135	135	1.2	162

Table 7.1.2 Salient Features of Irrigation and Drainage System

I. Camalig Diversion Lowland Model Project		
1. Irrigation Service Area	:	130 ha
2. Major Structure		
(1) Diversion Weir		
- Type of Weir	:	Ogee Type with One Sluice Gate
- Intake Water Level	:	EL. 112.0
- No. of Intake Gate	:	1 no.
- Length of Weir	:	22 m
- Design Flood Discharge	:	81 m3/s
- Design Flood Water Level	:	EL. 113.9
(2) Settling Basin	:	1 no.
- Type	:	2-Lane Type
- Length	:	11 m
- Width	:	2 m
3. Irrigation Canal		
(1) Main Canal		
- Design Discharge	:	0.16 m3/s (130 ha)
- No. of Main Canal	:	1 no.
- Total Length of Main Canal	:	2.3 km
(2) Lateral Canals		
- No. of Lateral Canals	:	2 nos.
- Total Length of Lateral Canals	:	3.3 km
(3) Farm Road along Irrigation Canal	:	4.9 km
(4) Link Road	:	0.4 km
3. Drainage Canal		
(1) Main Drain		
- No. of Main Drains	:	3 nos.
- Total Length of Main Drains	:	2.3 km
4. Major Canal Structures	:	68 nos.
5. Protection Dike at Swamp Area		
- Length	:	3.3 km
- Flap Gates	:	3 nos.
6. River Improvement (Ligban River)	:	2.0 km
II. Dam No.2 Lowland Model Project		
1. Irrigation Service Area	:	395 ha with rotation
2. Major Structure		
(1) Small Impounding Pond		
- Active Storage Capacity	:	0.68 MCM
- Dam Height	:	16.8 m
- Dam Length	:	278 m
- No. of Intake Gates	:	3 nos.
- Design Flood Discharge	:	48 m3/s
- Floodway from Emergency Spillway	:	1.6 km
- Access Road to Dam	:	0.9 km
3. Irrigation Canal		
(1) Main Canal		
- Design Discharge	:	0.20 m3/s (190 ha)
- No. of Main Canal	:	1 no.
- Total Length of Main Canal	:	10.7 km
(2) Lateral Canals		
- No. of Lateral Canals	:	11 nos.
- Total Length of Lateral Canals	:	10.7 km
(3) Farm Road along Irrigation Canal	:	18.4 km
(4) Link Road	:	1.8 km
4. Drainage Canal		
(1) Main Drain		
- No. of Main Drain	:	2 nos.
- Total Length of Main Drains	:	8.2 km
(2) Secondary Drain		
- No. of Secondary Drains	:	9 nos.
- Total Length of Secondary Drains	:	9.2 km
5. Major Canal Structures	:	192 nos.

Table 7.1.3 Project Cost
(Camalig Diversion Lowland Model Project)

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	19,772	12,420	32,192
1.1 Irrigation and Drainage Facilities	9,172	4,359	13,531
(1) Diversion Weir	3,157	1,699	4,856
(2) Irrigation and Drainage Canals	6,015	2,660	8,675
1.2 Rural Infrastructure Facilities	9,880	7,752	17,632
(1) Rural Road Upgrading	8,833	6,335	15,168
(2) Farm Roads	767	1,309	2,076
(3) Rural Water Supply Rehabilitation	280	108	388
1.3 Production and Marketing Center	720	309	1,029
2. O & M Equipment	96	24	120
3. Engineering Cost	2,414	805	3,219
4. Administration Cost	0	644	644
5. Land Acquisition and Compensation Cost	0	2,494	2,494
Total (Item No.1 to 5)	22,282	16,387	38,669
6. Physical contingency (10%)	2,228	1,639	3,867
Total (Item No.1 to 6)	24,510	18,026	42,536
7. Price Escalation (F/C : 2.0%) (L/C : 6.0%)	1,650	3,631	5,281
Total (Item No.6 to 7)	3,878	5,270	9,148
GRAND TOTAL (P 1,000)	26,160	21,657	47,817
Price Escalation Rate (%)			
GRAND TOTAL (US$ 1,000)	1,006	833	1,839

Exchange Rate : US$1 = P26 = ¥108

Table 7.2.1 Project Cost
(Dam No.2 Lowland Model Project)

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	74,446	41,585	116,031
1.1 Irrigation and Drainage Facilities	64,088	32,442	96,530
(1) Dam	32,591	16,670	49,261
(2) Irrigation and Drainage Canals	31,497	15,772	47,269
1.2 Rural Infrastructure Facilities	9,006	8,563	17,569
(1) Rural Road Upgrading	5,514	4,031	9,545
(2) Barangay Road and Farm Roads	2,599	4,220	6,819
(3) Rural Water Supply Rehabilitation	893	312	1,205
1.3 Production and Marketing Center	1,352	580	1,932
2. O & M Equipment	144	36	180
3. Engineering Cost	8,702	2,901	11,603
4. Administration Cost	0	2,321	2,321
5. Land Acquisition and Compensation Cost	0	4,663	4,663
Total (Item No.1 to 5)	83,292	51,506	134,798
6. Physical contingency (10%)	8,329	5,151	13,480
Total (Item No.1 to 6)	91,621	56,657	148,278
7. Price Escalation (F/C : 2.0%) (L/C : 6.0%)	6,488	12,232	18,720
Total (Item No.6 to 7)	14,817	17,383	32,200
GRAND TOTAL (P 1,000)	98,109	68,889	166,998
Price Escalation Rate (%)			
GRAND TOTAL (US$ 1,000)	3,773	2,650	6,423

Exchange Rate : US$1 = P26 = ¥108

Table 7.3.1 Plan for Annual Planting Area in Magogon Model Project

Year	Coconut planting and Production			Coffee planting and production	
	Planting Area (ha)	Fertilizing Areas (ha)	Production (tons)	Planting Area (ha)	Production (tons)
1	0	0	186	0	0
2	0	0	186	0	0
3	9	27	184	1	0
4	9.5	27	211	9	0.25
5	9.5	28	236	9	2.75
6	9.5	28	285	9	7.5
7	9.5	28	340	9	14
8	47	138	445	37	23
9			490		27
10			535		35
11			580		42
12			630		47
13			651		55

Year	Coffee planting and production		Number of Seedlings Required		
	Planting Area (ha)	Production (tons)	Coconut	Coffee	Pili
1	0	0	0	0	0
2	0	0	0	0	0
3	1	0	1,125	130	30
4	9	0	1,188	1,170	270
5	9	0	1,188	1,170	270
6	9	0	1,188	1,170	270
7	9	0	1,188	1,170	270
8	37	1	5,877	4,810	1,110
9		3			
10		6			
11		17			
12		35			
13		55			
14		62			
15		74			

Table 7.3.2 Anticipated Crop Production in Upland Model Project Areas

I. Magogon Model Area

Crop	Harvested Area (ha/year)	Average Yield (tons/ha)	Total Production (tons)
Coconut	185	3.5	648
Corn	108	2.8	308
Coffee	37	1.5	55
Pili	37	2	74
Mungbean	54	1.2	65
Paddy rice	10	2.8	28

II San Ramon Model Area

Crop	Harvested Area (ha)	Average Yield (tons/ha)	Total Production (tons)
Coconut	529	3.5	1,850
Abaca			
In open land (with shade trees)	190	2.6	494
Inter-cropping with coconut	317	2.6	824
Total	507		1,318
Pili (as shade tree)	190	2	380
Eggplant	15	7	105
Paddy			
1st season	21	3.5	74
2nd season	21	3	63

Table 7.3.3 Project Cost
(Magogon Upland Development Model Project)

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	15,397	11,474	26,871
1.1 Rural Infrastructure Facilities	14,101	10,919	25,020
(1) Rural Road Upgrading	13,019	9,586	22,605
(2) Barangay Road and Farm Roads	853	1,270	2,123
(3) Deep Well for Rural Water Supply	229	63	292
1.2 Nucleus Facilities	1,296	555	1,851
2. Engineering Cost	2,015	672	2,687
3. Administration Cost	0	537	537
4. Land Acquisition and Compensation Cost	0	38	38
Total (Item No.1 to 4)	17,412	12,721	30,133
5. Physical contingency (10%)	1,741	1,272	3,013
Total (Item No.1 to 5)	19,153	13,993	33,146
6. Price Escalation (F/C : 2.0%) (L/C : 6.0%)	1,122	2,595	3,717
Total (Item No.5 to 6)	2,863	3,867	6,730
GRAND TOTAL (P 1,000)	20,275	16,588	36,863
GRAND TOTAL (US$ 1,000)	780	638	1,418

Exchange Rate : US$1 = P26 = ¥108

Table 7.4.1 Plan for Annual Planting Area in San Ramon Model Project

Coconut planting and Production

Year	Planting Area (ha)	Fertilizing Areas (ha)	Production (tons)
1	0	0	534
2	0	0	534
3	12	34	529
4	29.5	91	565
5	29.5	91	605
6	29.5	91	790
7	29.5	91	960
8	130	398	1,210
9			1,630
10			1,780
11			1,450
12			1,625
13			1,850

Abaca Planting and Production

Planting Area (ha)	Production (tons)
0	0
0	0
5	0
27	4
28	8
89	22
89	67
89	146
90	292
90	534
507	822
	1,126
	1,318

Pili planting and production

Year	Planting Area (ha)	Production (tons)
1	0	0
2	0	0
3	5	0
4	5	0
5	4	0
6	35	0
7	35	0
8	35	0
9	35	0.8
10	36	1.6
11	190	2.8
12		8
13		21
14		43
15		79
16		128
17		243
18		298
19		341
20		380

Number of Seedlings Required

Abaca	Coconut	Pili
0	0	0
0	0	0
12,500	1,500	150
67,500	3,688	150
70,000	3,688	120
222,500	3,688	1,050
222,500	3,688	1,050
222,500	16,252	1,050
222,500		1,050
222,500		1,080
1,262,500		5,700

Table 7.4.2 Project Cost
(San Ramon Upland Development Model Project)

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	15,145	11,092	26,237
1.1 Rural Infrastructure Facilities	13,135	10,231	23,366
(1) Rural Road Upgrading	9,821	7,927	17,748
(2) Barangay Road and Farm Roads	2,136	1,998	4,134
(3) Deep Well for Rural Water Supply	1,178	306	1,484
1.2 Nucleus Facilities	2,010	861	2,871
2. Engineering Cost	1,968	656	2,624
3. Administration Cost	0	525	525
4. Land Acquisition and Compensation Cost	0	37	37
Total (Item No.1 to 4)	17,113	12,310	29,423
5. Physical contingency (10%)	1,711	1,231	2,942
Total (Item No.1 to 5)	18,824	13,541	32,365
6. Price Escalation (F/C : 2.0%) (L/C : 6.0%)	1,103	2,511	3,614
Total (Item No.5 to 6)	2,814	3,742	6,556
GRAND TOTAL (P 1,000)	19,927	16,052	35,979
GRAND TOTAL (US$ 1,000)	766	617	1,384

Exchange Rate : US$1 = P26 = ¥108

Table 7.5.1 Project Cost
(Rural Road Upgrading Project)

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	49,872	39,914	89,786
1.1 Rural Infrastructure Facilities	49,872	39,914	89,786
(1) Rural Road Upgrading	49,872	39,914	89,786
2. Engineering Cost	6,734	2,245	8,979
3. Administration Cost	0	1,796	1,796
4. Land Acquisition and Compensation Cost	0	111	111
Total (Item No.1 to 4)	56,606	44,066	100,672
5. Physical contingency (10%)	5,661	4,407	10,068
Total (Item No.1 to 5)	62,267	48,473	110,740
6. Price Escalation (F/C : 2.0%) (L/C : 6.0%)	4,206	10,507	14,713
Total (Item No.5 to 6)	9,867	14,914	24,781
GRAND TOTAL (P 1,000)	66,473	58,980	125,453
GRAND TOTAL (US$ 1,000)	2,557	2,268	4,825

Exchange Rate : US$1 = P26 = ¥108

Table 7.6.1 Rural Water Supply Rehabilitation Project

Level-II Water system		Gotob	Taladong	Inarado	Gabawan
Present Condition	**unit**				
(1) Discharge of water source	l/s	0.32	0.00	1.10	0.24
(2) Existing facilities					
- No.of spring intake box	nos.	4	1	4	2
- No.of ground level reservoir	nos.	1	2	1	1
- Total length of GI pipe	m	394	969	1,141	106
- Total length of PVC pipe	m	781	1,735	1,380	600
- No.of communal faucet	nos.	4	2	8	2
- No.of individual connection	nos.	19	48	20	1
(3) Benificiaries					
- No.of beneficial household	nos.	27	52	67	17
- No.of beneficial population	person	149	286	369	94
Proposed Rehabilitation	**unit**				
(1) Design discharge	l/s	0.40	1.04	0.90	0.20
(2) Rehabilitation Works					
(2.1) Construction of additional facilities					
- spring intake box	nos.	1	1	0	0
- ground level reservoir	nos.	1	1	2	1
- perimeter fence	nos.	1	1	1	1
- pipelines expansion	m	700	1,050	2,070	1,950
- communal faucets at source site	nos.	0	3	1	0
- communal faucets at distribution line	nos.	7	10	19	5
(2.2) Rehabilitation & minor repair of facilities					
- spring intake box minor repair	nos.	4	0	4	2
- pipe line replacement	m	0	850	2,600	0
- communal faucet rehabilitation	nos.	4	2	8	0
- minor repair of pipes & joints, replacement of valves and provision of pipe supports	sum	1	1	1	1
(3) Benificiaries					
(3.1) Additional Beneficiaries					
- No.of beneficial household	nos.	0	0	95	25
- No.of beneficial population	person	0	0	532	140
(3.2) Additional Beneficiaries (adjoining brgy.)		Ligban	Mina & Comun */	None	None
- No.of beneficial household	nos.	35	65	0	0
- No.of beneficial population	person	196	364	0	0
(3.3) Total Beneficiaries					
- No.of beneficial household	nos.	62	117	162	42
- No.of beneficial population	person	345	650	901	234

*/ Brgy. Mina = 3 Communal Faucets & Brgy. Comun =10 Communal Faucets

Table 7.6.2 Project Cost
(Water Supply Rehabilitation Project)

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	736	343	1,079
1.1 Rural Infrastructure Facilities	736	343	1,079
(1) Rural Water Supply Rehabilitation	736	343	1,079
2. Engineering Cost	81	27	108
3. Administration Cost	0	22	22
4. Land Acquisition and Compensation Cost	0	0	0
Total (Item No.1 to 4)	817	392	1,209
5. Physical contingency (10%)	82	39	121
Total (Item No.1 to 5)	899	431	1,330
6. Price Escalation (F/C : 2.0%) (L/C : 6.0%)	67	101	168
Total (Item No.5 to 6)	149	140	289
GRAND TOTAL (P 1,000)	966	532	1,498
GRAND TOTAL (US$ 1,000)	37	20	57

Exchange Rate : US$1 = P26 = ¥108

Table 7.7.1 Project Cost
(Integrated Support Service Project)

(Unit : P 1,000)

Description	Foreign Currency	Local Currency	Total
1. Construction Cost	372	160	532
1.1 Municipal Agricultural services	372	160	532
(1) Municipal Training Center	372	160	532
2. Procurement of Equipment	5,739	1,435	7,174
3. Engineering Cost	40	13	53
4. Administration Cost	0	11	11
5. Land Acquisition and Compensation Cost	0	1	1
Total (Item No.1 to 5)	6,151	1,620	7,771
6. Physical contingency (10%)	615	162	777
Total (Item No.1 to 6)	6,766	1,782	8,548
7. Price Escalation (F/C : 2.0%) (L/C : 6.0%)	271	221	492
Total (Item No.6 to 7)	886	383	1,269
GRAND TOTAL (P 1,000)	7,037	2,003	9,040
GRAND TOTAL (US$ 1,000)	271	77	348

Exchange Rate : US$1 = P26 = ¥108

Table 9.2.1 Project Effect on Future Farm Economy in the Model Project Areas

(Unit : Pesos)

Item	Owner	Owner Cultivator				Lessee/Share Cropper				Care-
	Non-Cultivator	Small	Medium	Large	Average	Small	Medium	Large	Average	Taker
I. Camalig Diversion Area										
Average Operating Size (ha)	0.78	0.85	1.96	5.07	2.50 1/	0.75	1.37	1.88	1.30 1/	1.47
Lowland	0.78	0.35	0.48	1.65	0.70	0.25	0.55	1.38	0.70	0.84
Upland	0	0.50	1.48	3.42	1.70	0.50	0.82	0.50	0.70	0.63
Without Project										
I. Income	31,470	31,990	38,190	59,420	41,918	33,580	37,830	43,740	38,241	39,930
II. Expenditure	27,980	29,060	35,420	53,870	38,443	32,340	34,330	39,510	35,119	38,970
III Net Reserve (I - II)	3,490	2,930	2,770	5,550	3,505	1,240	3,500	4,230	3,122	960
With Project										
I. Income	61,120	66,350	88,860	223,670	116,935	46,810	54,050	97,060	62,896	57,210
II. Expenditure	47,910	50,930	66,880	154,380	84,768	40,760	46,730	74,340	52,082	51,840
III Net Reserve (I - II)	13,210	15,420	21,980	69,290	32,168	6,050	7,320	22,720	10,815	5,370
Difference (With - Without)										
I. Income	29,650	34,360	50,670	164,250	74,988	13,230	16,220	53,320	24,656	17,280
II. Expenditure	19,930	21,870	31,460	100,510	46,325	8,420	12,400	34,830	16,963	12,870
III Net Reserve (I - II)	9,720	12,490	19,210	63,740	28,663	4,810	3,820	18,490	7,693	4,410
Change in Percent (%)										
I. Income	94	107	133	276	179	39	43	122	64	43
II. Expenditure	71	75	89	187	121	26	36	88	48	33
III Net Reserve (I - II)	279	426	694	1,148	818	388	109	437	246	459
II. Dam No.2 Area										
Average Operating Size (ha)	0.61	1.16	2.23	3.51	2.30 1/	0.55	1.61	4.19	2.00 1/	1.40
Lowland	0.48	0.18	0.61	1.38	0.70	0.20	0.55	1.50	0.70	0.68
Upland	0.13	0.98	1.62	2.13	1.60	0.35	1.06	2.69	1.30	0.72
Without Project										
I. Income	23,790	26,020	34,240	42,690	31,298	30,910	39,430	51,740	40,378	41,760
II. Expenditure	21,760	24,180	32,690	37,500	31,765	29,790	36,500	48,890	37,920	40,850
III Net Reserve (I - II)	2,030	1,840	1,550	5,190	2,533	1,120	2,930	2,850	2,458	910
With Project										
I. Income	37,950	42,730	92,210	159,830	96,745	36,710	54,550	102,260	62,018	55,330
II. Expenditure	31,760	35,260	67,890	110,340	70,345	33,250	47,900	83,000	52,763	50,900
III Net Reserve (I - II)	6,190	7,470	24,320	49,490	26,400	3,460	6,650	20,260	9,255	4,430
Difference (With - Without)										
I. Income	14,160	16,710	57,970	117,140	62,448	5,800	15,120	50,520	21,640	13,570
II. Expenditure	10,000	11,080	35,200	72,840	38,580	3,460	11,400	34,110	14,843	10,050
III Net Reserve (I - II)	4,160	5,630	22,770	44,300	23,868	2,340	3,720	17,410	6,798	3,520
Change in Percent (%)										
I. Income	60	64	169	274	182	19	38	98	54	32
II. Expenditure	46	46	108	194	121	12	31	68	39	25
III Net Reserve (I - II)	205	306	1,469	854	942	209	127	611	277	387
III. Magogon Area										
Average Operating Size (ha)	0	0.45	1.25	4.00	1.70 1/	0.58	1.59	4.88	2.20 1/	3.75
Lowland	0	0.25	0.25	0.50	0.30	0.00	0.25	0.13	0.20	0.63
Upland	0	0.20	1.00	3.50	1.40	0.58	1.34	4.75	2.00	3.13
Without Project										
I. Income	0	34,240	75,590	77,270	66,780	40,730	36,670	43,240	39,330	40,110
II. Expenditure	0	30,060	70,590	69,030	61,230	37,500	32,050	36,720	34,580	37,320
III Net Reserve (I - II)	0	4,180	5,000	8,240	5,550	3,230	4,620	6,520	4,750	2,790
With Project										
I. Income	0	46,540	111,010	190,160	114,280	56,480	57,000	111,660	70,540	63,910
II. Expenditure	0	39,690	94,630	141,830	92,910	47,880	45,990	81,640	55,380	55,220
III Net Reserve (I - II)	0	6,850	16,380	48,330	21,370	8,600	11,010	30,020	15,160	8,690
Difference (With - Without)										
I. Income	0	12,300	35,420	112,890	47,500	15,750	20,330	68,420	31,210	23,800
II. Expenditure	0	9,630	24,040	72,800	31,680	10,380	13,940	44,920	20,800	17,900
III Net Reserve (I - II)	0	2,670	11,380	40,090	15,820	5,370	6,390	23,500	10,410	5,900
Change in Percent (%)										
I. Income	-	36	47	146	71	39	55	158	79	59
II. Expenditure	-	32	34	105	52	28	43	122	60	48
III Net Reserve (I - II)	-	64	228	487	285	166	138	360	219	211
IV. San Ramon Area										
Average Operating Size (ha)	3.31	1.08	1.48	2.17	1.55 1/	0.58	1.98	4.00	2.20 1/	1.56
Lowland	0.50	0.50	0.25	0	0.25	0.25	1.00	0.38	0.66	0
Upland	2.81	0.58	1.23	2.17	1.30	0.58	0.98	3.63	1.54	1.56
Without Project										
I. Income	38,450	38,650	47,640	45,070	44,980	59,130	60,240	57,790	59,370	40,930
II. Expenditure	31,640	34,800	43,440	37,250	40,030	56,350	54,500	50,900	54,070	37,940
III Net Reserve (I - II)	6,810	3,850	4,200	7,820	4,950	2,780	5,740	6,890	5,300	2,990
With Project										
I. Income	127,760	83,640	113,290	143,050	113,320	78,510	99,040	127,130	100,940	68,110
II. Expenditure	91,330	65,260	85,920	103,410	85,190	70,060	75,960	99,410	80,360	55,420
III Net Reserve (I - II)	36,430	18,380	27,370	39,640	28,130	8,450	23,080	27,720	20,580	12,690
Difference (With - Without)										
I. Income	89,310	44,990	65,650	97,980	68,340	19,380	38,800	69,340	41,570	27,180
II. Expenditure	59,690	30,460	42,480	66,160	45,160	13,710	21,460	48,510	26,290	17,480
III Net Reserve (I - II)	29,620	14,530	23,170	31,820	23,180	5,670	17,340	20,830	15,280	9,700
Change in Percent (%)										
I. Income	232	116	138	217	152	33	64	120	70	66
II. Expenditure	189	88	98	178	113	24	39	95	49	45
III Net Reserve (I - II)	435	377	552	407	468	204	302	302	288	324

Note : 1/ Weighted average.

Table 9.2.2 Summary on Financial Cashflow Statement for Production and Marketing Centers and Nucleus Facilities

(1) Camalig Production and Marketing Center

Item / Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I. Inflow																	
1. Irrigation O&M Activities			165.8	276.3	276.3	276.3	276.3	276.3	276.3	276.3	276.3	276.3	276.3	276.3	276.3	276.3	276.3
2. Service Activities			567.3	845.5	845.5	845.5	845.5	845.5	845.5	845.5	845.5	845.5	845.5	845.5	845.5	845.5	845.5
3. Corn Milling and Sales of			75.1	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9
4. Loan		778.4	332.0														
	Total	778.4	1,081.2	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7	1,248.7
II. Outflow																	
1. Investment		778.4	245.0											245.0			
2. Irrigat AS Payment			82.9	138.2	138.2	138.2	138.2	138.2	138.2	138.2	138.2	138.2	138.2	138.2	138.2	138.2	138.2
3. Operation Cost			628.8	713.5	713.5	713.5	713.5	713.5	713.5	713.5	713.5	713.5	713.5	713.5	713.5	713.5	713.5
4. Repayment of Loan			124.5	184.8	220.1	241.6	241.6	210.5	210.5	210.5	210.5	210.5	149.8	149.8	149.8	149.8	
	Total	778.4	1,081.2	1,036.5	1,071.8	1,093.3	1,093.3	1,062.2	1,062.2	1,062.2	1,062.2	1,062.2	1,001.5	1,246.5	1,001.5	1,001.5	851.7
III. Balance	Annual Balance (I - II)	0	0	212.2	176.9	155.4	155.4	186.5	186.5	186.5	186.5	186.5	247.2	2.2	247.2	247.2	397.0
	Cumulative	0	0	212.2	389.1	544.5	699.9	886.4	1,072.9	1,259.4	1,445.9	1,632.4	1,879.6	1,881.8	2,129.0	2,376.2	2,773.2

(2) Dam No.2 Production and Marketing Center

Item / Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I. Inflow																	
1. Irrigation O&M Activities			242.2	403.8	403.8	403.8	403.8	403.8	403.8	403.8	403.8	403.8	403.8	403.8	403.8	403.8	403.8
2. Service Activities			1,197.6	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0	1,996.0
3. Commercial Activities			132.0	186.6	186.6	186.6	186.6	186.6	186.6	186.6	186.6	186.6	186.6	186.6	186.6	186.6	186.6
4. Loan		1,499.0	397.0														
	Total	1,499.0	1,968.9	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4	2,586.4
II. Outflow																	
1. Investment		1,499.0	311.0											311.0			
2. Irrigation Amortization			121.1	201.9	201.9	201.9	201.9	201.9	201.9	201.9	201.9	201.9	201.9	201.9	201.9	201.9	201.9
3. Operation Cost			1,273.0	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7	1,361.7
4. Repayment			239.8	320.3	368.9	395.1	396.1	365.4	365.4	365.4	365.4	365.4	298.4	288.4	288.4	288.4	
	Total	1,499.0	1,948.9	1,883.9	1,932.5	1,959.7	1,959.7	1,929.0	1,929.0	1,929.0	1,929.0	1,929.0	1,852.0	2,163.0	1,852.0	1,852.0	1,563.6
III. Balance	Annual Balance (I - II)	0	0	702.4	653.8	626.6	626.6	657.4	657.4	657.4	657.4	657.4	734.4	423.4	734.4	734.4	1,022.8
	Cumulative	0	0	702.4	1,356.2	1,982.8	2,609.4	3,266.8	3,924.2	4,581.6	5,239.0	5,896.4	6,630.8	7,054.2	7,788.6	8,523.0	9,545.8

(3) Magogon Nucleus Facilities

Item / Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
I. Inflow																			
1. Service Activities			214.9	316.6	401.5	419.4	437.3	455.2	473.1	491.0	508.9	526.8	544.7	562.6	580.5	598.4	616.3	634.2	653.6
2. Commercial Activities			1,434.1	2,844.5	2,851.3	2,864.6	2,867.9	2,871.2	2,874.5	2,877.8	2,881.1	2,884.4	2,887.7	2,891.0	2,894.3	2,897.6	2,900.9	2,904.2	2,907.7
3. Loan		1,385.4	382.6																
	Total	1,385.4	2,031.6	3,161.1	3,262.8	3,284.0	3,305.2	3,326.4	3,347.6	3,368.8	3,390.0	3,411.2	3,432.4	3,453.6	3,474.8	3,496.0	3,517.2	3,538.4	3,561.3
II. Outflow																			
1. Investment		1,385.4	234.0											234.0					
3. Operation Cost		0	1,575.9	2,761.6	2,787.0	2,798.2	2,809.4	2,820.6	2,831.8	2,843.0	2,854.2	2,865.4	2,876.6	2,887.8	2,899.0	2,910.2	2,921.4	2,932.6	2,944.2
4. Repayment			221.7	312.3	357.2	377.7	377.7	324.5	324.5	324.5	324.5	324.5	266.6	266.6	266.6	266.6			
	Total	1,385.4	2,031.6	3,073.9	3,144.2	3,175.9	3,187.1	3,145.1	3,156.3	3,167.5	3,178.7	3,189.9	3,143.2	3,388.4	3,165.6	3,176.8	2,921.4	2,932.6	2,944.2
III. Balance	Annual Balance (I - II)	0	0	87.3	118.7	108.2	118.2	181.3	191.3	201.3	211.3	221.3	289.2	65.2	309.2	319.2	595.8	605.8	617.1
	Cumulative	0	0	87.3	206.0	314.2	432.4	613.7	805.0	1,006.3	1,217.6	1,438.9	1,728.1	1,793.3	2,102.5	2,421.7	3,017.5	3,623.3	4,240.4

(4) San Ramon, Production Farm

Item / Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
I. Inflow																						
1. Service Activities				400.2	655.8	1,198.8	1,569.4	1,719.0	1,965.6	2,221.2	2,476.8	2,732.4	2,988.0	3,243.6	3,499.2	3,754.8	4,010.4	4,266.0	4,521.6	4,777.2	5,032.8	5,287.4
2. Commercial Activities			698.1	2,358.7	2,399.4	2,422.1	2,453.8	2,485.5	2,517.2	2,548.9	2,580.6	2,612.3	2,644.0	2,675.7	2,707.4	2,739.1	2,770.8	2,802.5	2,834.2	2,865.9	2,897.6	2,929.0
3. Loan		1,440.0	883.1																			
	Total	1,440.0	1,580.9	2,758.9	3,045.2	3,620.9	4,023.2	4,195.5	4,482.8	4,770.1	5,057.4	5,344.7	5,632.0	5,919.3	6,206.6	6,493.9	6,781.2	7,068.5	7,355.8	7,643.1	7,930.4	8,216.4
II. Outflow																						
1. Investment		1,440.0	597.1											597.1								
2. Operation Cost			753.4	1,896.3	2,131.8	2,563.7	2,735.6	2,987.5	3,139.4	3,411.3	3,623.2	3,835.1	4,047.0	4,258.9	4,470.8	4,682.7	4,894.6	5,106.5	5,318.4	5,530.3	5,742.2	5,953.0
3. Repayment			230.4	428.1	474.8	527.1	527.1	424.9	424.9	424.9	424.9	424.9	424.9	277.1	277.1	277.1	277.1					
	Total	1,440.0	1,580.9	2,324.4	2,606.6	3,090.8	3,262.7	3,412.4	3,564.3	3,836.2	4,048.1	4,260.0	4,324.1	5,133.1	4,747.9	4,959.8	4,894.6	5,106.5	5,318.4	5,530.3	5,742.2	5,953.0
III. Balance	Annual Balance (I - II)	0	0	434.6	439.7	530.2	720.6	783.1	858.5	933.9	1,009.3	1,084.7	1,307.9	786.2	1,458.7	1,534.1	1,886.6	1,962.0	2,037.4	2,112.8	2,188.2	2,263.4
	Cumulative	0	0	434.6	874.3	1,404.5	2,125.1	2,908.2	3,766.7	4,700.6	5,709.9	6,794.6	8,102.5	8,888.7	10,347.4	11,881.5	13,768.1	15,730.1	17,767.5	19,880.3	22,068.5	24,331.9

(5) San Ramon, Nucleus Farm

Item / Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
I. Inflow																						
1. Service Activities				57.5	86.1	172.2	229.8	229.4	258.0	286.6	315.2	343.8	372.4	401.0	429.6	458.2	486.8	515.4	544.0	572.6	601.2	629.0
2. Commercial Activities			206.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2	687.2
3. Loan		566.0	350.3																			
	Total	566.0	556.5	744.7	773.3	859.6	911.0	916.6	945.2	973.8	1,002.4	1,031.0	1,059.6	1,088.2	1,116.8	1,145.4	1,174.0	1,202.6	1,231.2	1,259.8	1,288.4	1,316.2
II. Outflow																						
1. Investment		566.0	267.8											267.8								
2. Operation Cost			198.1	525.0	553.7	584.0	604.0	625.6	646.4	667.2	688.0	708.8	729.6	750.4	771.2	792.0	812.8	833.6	854.4	875.2	896.0	913.0
3. Repayment			90.6	162.9	181.2	204.3	204.7	175.2	175.2	175.2	175.2	175.2	108.9	108.9	108.9	108.9						
	Total	566.0	556.5	687.9	734.9	788.7	809.5	800.8	821.6	842.4	863.2	884.0	838.5	1,127.1	880.1	900.9	812.8	833.6	854.4	875.2	896.0	913.0
III. Balance	Annual Balance (I - II)	0	0	56.8	38.4	70.9	101.5	115.8	123.6	131.4	139.2	147.0	221.1	-38.9	236.7	244.5	361.2	369.0	376.8	384.6	392.4	339.2
	Cumulative	0	0	56.8	95.2	166.9	268.4	384.2	508.8	640.2	779.4	926.4	1,147.5	1,108.6	1,345.3	1,589.8	1,951.0	2,320.0	2,696.8	3,081.4	3,473.8	3,813.0

Table 9.3.1 Assessment of Possible Environmental Impacts

Camalig Diversion Lowland Model Development Project

Probable / Potential Impacts	During construction stage	During operation stage	Comments / recomended mitigation measures
1. Soil erosion in and around the construction site	**2** **a-c-e**	-	• Soil erosion from fresh cuts and fill of soil will be likely. • Proper handling of cut and fill materials shall be enforced thoroughly. • Restoration of disturbed land shall be done as a part of the construction activities.
2. Alteration or destruction of the habitat of flora and fauna	**3**	-	• The destruction is minimal and temporal. • No endangered species exist in and around the Project area.
3. Damage to historic, cultural or aesthetic assets	-	-	• No such site exists nearby.
4. Effects on farm lands, houses / building and infrastructure due to creation of reservoir	**2** **a-d-f**	-	• Temporal dislocation of houses located around the proposed weir site will be necessary during construction. • Further consultation with the affected population is necessary.
5. Alteration or loss of farm land	**3**	-	• Some hectare of farm land will be lost due to the construction of canals and service & link roads. • Proposed short cut of Ligban river course will lead to the loss of farm land, while it will relieve the food-prone farm land from suffering. • Consultation with the affected population is necessary during the D/D stage.
6. Deterioration of water quality	**3**	**3**	• IPM or proper use of pesticide will be included in the improved farming practices to be introduced through the project implementation. Thus the deterioration of water quality is unlikely or minimal.
7. Reduction of downstream flows that affect downstream ecology and users of water	-	**3**	• Unlikely
8. Increase of downstream flows (drainage water from farms) affecting communities	-	**3**	• Unlikely
9. Conflicts over inequalities in water distribution throughout service area	-	**3**	• Proper water management by irrigation service association could minimize such conflict.
10. Increased incidence of water-related diseases	-	**3**	• None or minimal.
11. Increase of construction-related employment opportunity	**5** **a-c**	-	• The construction works will provide temporary job opportunity to the villagers nearby.
12. Increase of crop production (which results in the increase of farm income)	-	**4** **a-d**	• The biggest positive effect of the project. • This will lead to higher living standard of the population.
13. Increase of agricultural-related employment opportunity	-	**4** **b-d**	• Employment opportunity in marketing of inputs and outputs, processing, etc. will be increased substantially.

Remarks

Significance of impact
1. Significant (negative)
2. Moderate (negative)
3. Insignificant (negative)
4. Significant (positive)
5. Moderate (positive)
6. Insignificant (positive)

Characteristics of impact
a. Direct
b. Indirect
c. Short term
d. Long term
e. Reversible
f. Irreversible

The feature of impacts is indicated as follow:

1 **a-c-e** meaning that the impact would be significant (negative), direct, short term, and reversible.

4 **a-d-e** meaning that the impact would be significant (positive), direct, long term, and reversible.

The characteristics of insignificant impacts are not indicated.