CHAPTER 6 FINDINGS AND CONSTRAINTS

6.1 Findings from the Present Condition of the Study Area

6.1.1 Policy and Legislative Constraints

(1) Overlapping Land Classifications and Zoning

Protected Areas/Ancestral Domains/Mining Interests – There are issues raised by the passage of the NIPAS Act (RA 7586, 1992), the Philippine Mining Act (RA 7942, 1995), and the IPRA Law (RA 8371, 1997).

The Casecnan Protected Landscape established by Presidential Proclamation No. 289 covers an area of about 85,219 ha in Nueva Vizcaya, Quirino and Aurora. Covering those areas, CADCs were issued for an area of approximately 232,600 ha. On top of these are mining interests of about 375,045 ha, which also covers the same area. These overlapping issues should be resolved by the agencies involved, namely the PAWB for the Protected Landscape, the NCIP for CADCs, and the MGB for mines, including LGUs that have jurisdiction over these areas.

Settlement Areas – Presidential Proclamation No. 1498[1] was issued to reserve 40,000 ha in Nueva Vizcaya and Quirino, known as the Conwap Valley, which is a resettlement area for occupants of the Ambuklao-Binga Watershed Reservations and landless residents of Nueva Vizcaya and Quirino. Although DENR re-classified only about 6,500 ha as A & D for the resettlement, DAR has issued Certificates of Land Ownership Award (CLOA) for 20,000 ha.

This means that land titles have been awarded within the Forestlands or the lands that DENR has not classified as A & D. Furthermore, the Provincial Agrarian Reform Office (PARO) claims that almost all the 40,000 ha are occupied. These issues certainly require resolution between DAR, DENR and the affected stakeholders.

Strategic Agricultural and Fishery Development Zones – Pursuant to the Agriculture and Fishery Modernization Act (RA 8435, 1997)[2], each municipality of Nueva Vizcaya identifies Strategic Agriculture and Fishery Development Zones (SAFDZ). Their Municipal Councils have adopted these SAFDZ through resolutions. The Provincial Planning and Development Office (PPDO)[3] of Nueva Vizcaya consolidated the SAFDZ identified by the municipalities, and revealed that 211,140 ha of the identified SAFDZ are inside Forestlands and 19,159 ha are inside proclaimed NIPAS areas.

The SAFDZ is an area to be used for production, agro-processing and marketing activities. These production activities include cropping, livestock, fishery and a combination of

[1] Presidential Proclamation No. 1498 Reserving for Settlement Purposes under the Administration and Disposition of the Department of Agrarian Reform Certain Parcels of Land of the Public Domain Situated in the Municipalities of Dupax, Province of Nueva Vizcaya and Madella, Province of Quirino, Island of Luzon, Philippines. 11 September 1975.
[2] RA 8435 An Act Prescribing Urgent Related Measures to Modernize the Agriculture and Fisheries Sectors of the Country in Order to Enhance their Profitability, and Prepare Said Sectors for the Challenges of Globalization Through an Adequate, Focused and Rational Delivery of Necessary Support Services, Appropriating Funds Therefore and for other Purposes. December 22, 1997.
[3] Engr. Ed Sabado, PPDO Officer in Charge of the GIS Unit, Prov. Government of Nueva Vizcaya, personal communication.

crop/livestock or crop/fishery activities. This obvious conflict of land use requires resolution from the municipalities and the DENR. The PPDO of Nueva Vizcaya has informed the PENRO of the situation.

(2) Land Use in the Magat River Forest Reserve

In June 1969 President Marcos declared most of the watershed of the Magat River as "permanent forest reserve (the Magat River Forest Reserve :MRFR)" under Proclamation No. 573 (**Section 4.7.1(3)**). The Proclamation allowed the undertaking of improvements and developments of portions of the watershed only in specific or cooperative projects with then Bureau of Forestry, with the cooperation of the Reforestation Administration, the National Waterworks and Sewerage Authority (MWSA), the National Power Corporation (NAPOCOR) and the Bureau of Soils.

PD No 705[4]defined "critical watershed" as the drainage area of a river system supporting existing and proposed hydroelectric power and irrigation works or existing water facilities needing immediate protection and rehabilitation. It is closed to logging until it is fully rehabilitated. Since the MRFR is supporting the Magat Dam as well as irrigation facilities downstream, it is regarded as a critical watershed ignoring the actual land use and topographic conditions. By virtue of PD 705, as amended, the MRFR is, therefore, not open for development activities.

In reality, however, grass land of 107,554 ha, cultivating land of 68,695 ha, bare land of 11,062 ha and built-up area of 256 ha extend over the watershed of the Magat Dam (417,663 ha) in the MRFR (**Section 3.4.2 of Appendix 1**). Areas within the MRFR can meet the criteria identified for forestland grazing management (FLGMA) under DAO No. 99-36[5]. However, because of the prohibition of development in critical watersheds, no new pasture lease agreements (PLA) in the area have been awarded and existing ones have been allowed to expire, despite the fact that illegal and extensive grazing with uncontrolled burning is prevailing in the grass land.

(3) Unstable Program/Project Policies

A number of CBFM POs were able to obtain permits to harvest trees from natural forests that were felled by typhoons or other causes. However in September, 1998 a Memorandum from the DENR Secretary was issued suspending the processing and issuance of cutting permits in all people oriented forestry projects including CBFMP[6] because of reports that the permit to cut was abused by some POs. This greatly affected economic activities of the POs. The privilege of harvesting fallen trees was later reinstated.[7] Further, the RUPs of four CBFMAs in Quirino were again suspended in September 2001 because of alleged poaching in government plantations[8]. Suspending the

---

[4] Presidential Decree No. 705 (as amended). May 1975. Forestry Code of the Philippines.
[5] DENR DAO No. 99-36. Revised rules and regulations governing the administration, management, development and disposition of forestlands used for grazing purposes. August 10, 1999.
[6] Memorandum from the Secretary: Conduct of Comprehensive Assessment and Evaluation of all People Oriented Forestry Projects Granted Cutting Permits, September 22,1998.
[7] DAO No. 2000-29 Guidelines regulating the harvesting and utilization of forest products within Community-Based Forest Management Areas
[8] PENRO Nicasio Pascua, Quirino Province, personal communication, September 13,2001

RUPs of POs who did not violate their permits stifles the entrepreneurial spirit of the POs, who are being encouraged to build the CBFM program. It also erodes confidence of POs in the government and lessens its credibility as an overall manager and regulator.

(4) Permit to Harvest in ISF/CBFMA Areas and Private Lands

Many CSC-holders of ISF projects have joined the CBFM Programs. Since the ISF projects started in 1980, many of the trees planted by the CSC-holders have matured and become ready for harvest.

To harvest trees from their plantations, however, CSC-holders are required to obtain a cutting permit from the CENRO concerned, a certification from the Barangay Chairman and the CBFM PO President. This procedure entails time and expense from the farmer. The permit to transport also covers trees planted on private lands. Again these regulations stifle the entrepreneurial initiatives of the farmers and are a disincentive to further planting of trees, and worst of all, leads to a loss of faith in government programs in general. The DENR Secretary Elisea Guzon announced during the 52nd anniversary of the Philippine Wood Products Association in August 2003 that trees planted in private lands would be deregulated. This policy should be extended to privately planted trees in government land.

(5) Cost Sharing Policy on Watershed Management

The specific purpose of protecting watersheds is to prevent soil erosion to safeguard their capacity to produce clean water and minimize the accumulation of silt in water bodies. Watersheds particularly those that have been proclaimed as reservations or components of protected areas are withdrawn from utilization or from activities that jeopardize their water-producing capacities such as intensive agriculture, timber harvesting or mining. In the process, forest occupants of such watersheds are restricted, and often deprived, from undertaking economic activities in the watershed. In fact they are required to adopt soil and water conservation measures that entail additional expenses.

These measures, while necessary, often benefit only the stakeholders downstream such as farmers of irrigated fields, users of domestic water or the users of electricity in the case of hydroelectric dams. The users of water downstream do not compensate the watershed occupants for lost economic opportunities.

6.1.2 Institutional Constraints

(1) Organizational Constraints

There are insufficient personnel assigned to the CBFM Unit of the CENROs in the Study Area. To cope with the situation the CBFM Unit Chiefs used to request assistance from other units of the CENRO. This ad-hoc basis of assigning personnel to CBFM on a need basis does not build the technological base for CBFM management at the CENRO level. A constraint in attaining the objectives of the CBFM Program is limited manpower.

The survey conducted by the Study Team revealed that the quality and quantity of human resources at respondents' offices are inadequate[9]. Even though their generic competencies and quality of performance are assessed as more than satisfactory in the self-evaluation during TNA, many respondents stated that the levels of skills and knowledge of their fellow officials are not high enough especially in the latest technologies, computer operation, planning and management and extension work.

Manpower Competencies - The record of work experience and training of the personnel assigned as Project Management Officers (PMOs) of the CBFM projects in the four provinces covered by the Study Area indicated that 50% have had training on the preparation of CRMF, AWP and RUP. None of the staff had any training in extension or community development. Another study conducted by the Study Team found that they do not have adequate educational backgrounds.

The management of CBFM projects requires expertise in forestry, agriculture, animal science, financial management and bookkeeping, organizational management, marketing, enterprise and business development. DENR lack personnel with these expertises.

Devolution of DENR Personnel - Personnel who were devolved along with the devolved functions of DENR at LGUs, ENRO (Nueva Vizcaya and Isabela), PAENRO (Ifugao) or PNREO (Quirino) are still struggling to define their roles and responsibilities. A number of respondents of the TNA at ENRO-LGUs pointed out that LGUs are disinterested in environmental issues, and their assignments are not for "environment and natural resource officers" but rather laborers for the LGU operations. A number of respondents stated that they do not receive adequate managerial and financial support from higher officials at the LGUs. Due to these structural and managerial problems, ENRO-LGUs fail to function effectively and efficiently as a local environment and natural resource office.

(2) Financial Constraints

Travel Funds – The same survey conducted on CBFM Units showed that there are not enough funds to implement the projects in their jurisdictions effectively and efficiently, and that the funds do even not arrive on time. The travel allowance of CENRO Aglipay and Nagtipunan for 2001 was ₱ 3,000 each of the four regular projects they supervise. The travel allowance of ₱ 3,000 a year allocates only ₱ 750 for each of the projects. The travel allowance for Forest Protection personnel for CENRO Dupax del Norte allows only about 34 days of travel, hardly sufficient for full protection of the forestlands within their territory.

PMOs are entitled to ₱ 100 travel allowance per day even within 50 km in the case of inaccessible to CBFM projects. Certainly, this is no incentive for the PMOs to travel to their project sites.

Mobility – Most of the CBFM project sites are located in difficult terrain and pose problems of accessibility. Mobility is therefore a requisite for a better management of the projects. The most suitable vehicle would be a motorcycle because it would allow access to even the remotest sites with only trails leading to them. Because of lack of funds,

[9] However, their self-evaluation of their competencies and performance was very high, which contradicts with their evaluation of fellow officers.

implementing units such as the CBFM Unit and the Forest Protection Units cannot acquire necessary vehicles for their vitals tasks.

(3) Weak Linkage in Technology Transfer

The same survey revealed that necessary technologies are determined through observations by PMOs and from actual requests by farmers. Most of the technologies needed by the POs are not new ones and are not the subject of seminars and workshops. What important is that the establishment of linkages between the people with technologies and the people who need them.

The Ecosystems Research and Development Bureau (ERDB) is the main research arm of DENR. Its main area of research is forest production as opposed to forest products utilization. Its research function is very well defined. However, its function in the transfer of technology is less well defined as ERDB is not organized to conduct field level technology transfer. It has a Technology Development Division but it conducts only technology verification and technology documentation and packaging[10].

The technology needs of POs are not limited to forestry or watershed management, and some of these needs cannot be provided by DENR. Linkage with other government agencies such as nearby state colleges and universities, the Department of Science and Technology (DOST) and the Department of Trade and Industry (DTI), which have provincial offices, need to be established and/or strengthened.

(4) Weak Monitoring and Evaluation System

A database has also been established at the CBFM Unit for all projects being supervised including special and foreign funded projects. However, this needs examination and support to further strengthen acquisition of data, processing, storage and retrieval.

DENR has a system of monitoring and evaluation (M&E)[11] of physical performance of projects. However, there is no regular feedback provided to the implementing units except when there are backlogs in targets. Since this is merely a performance monitoring system it does not monitor the socio-economic and environmental impacts of the project.

6.1.3 Technical Constraints

(1) Inadequate Fire Control

Slush-and-burn agriculture and annual burning of grassland for grazing or hunting wildlife provides subsistence to upland farmers. It is, however, obviously not sustainable. Effective forest protection from fire is essential for success in afforestation and reforestation, and for preserving the existing forest cover. The principal risk of fire is uncontrolled burning that spreads from adjacent slash-and-burn farming or grazing (pasture) areas. It is crucial to prevent invasion of fire from these sources.

[10] Ecosystems Research and Development Bureau (ERDB) Information Brochure. College, Laguna, Philippines.
[11] DAO 99-38 Revision of the Standard Operating Procedure (SOP) for Performance Monitoring Prescribed Under DAO No. 33 Series of 1992

Countermeasures to address the fire problem include fire prevention and fire fighting. Depending on site specific conditions that relate to fire occurrence, preventive measures may include: i) establishing fire breaks; ii) planting of fire resistant trees; iii) introduction of controlled burning; and iv) self-reliant management of the awarded lands by POs.

(2) Insufficient Supply of Quality Seeds

There are three Seed Production Areas (SPAs) in the Study Area and there is another SPA in Diadi, Nueva Vizcaya, nearly on the border of the Study Area. However, the production of seed is very limited at the present time given by the fact that SPA at Salinas, Bambang within the Study area, is not functioning as shown in the table below.

Seed Production Areas (SPA) within the Study Area

Location	Species	No. of Tree	Area (ha)	Remarks
1. Consuelo, Sta Fe, N. V.	Mahogany	108	2.87	Managed by LGU
2. Salinas, Bambang, N. V.	Mahogany	64	1.0	Not functioning
3. Nagtipunan, Quirino	Yemane	54	1.5	CENRO
4. Magat, Diadi, N.Vizcaya	Mahogany Yemane Narra	400 59 88	9.7 2.5 2.0	Outside of the Study area

Source: ERDS, Diadi, Nueva Vizcaya

Seedling production in nurseries generally relies on seeds gathered from areas within or adjacent to government reforestation sites and private plantations. In most of the cases, seed quality is questionable due to in-breeding.

(3) Technical Constraints of DENR and Contractors

Seedlings - DENR standards prescribe pencil-size diameter and 30-45 cm height for seedlings. But these standards have not been strictly followed. In some cases, this relates to the short interval between seed maturity and planting season. Seed storage facilities would help address this problem. In other cases, it is simply because seedlings have not remained in the nursery long enough for growth to the standard sizes.

Insufficient Site Preparation - Usually, strip brushing is applied for site preparation. But often, the strips are less than the recommended width (one meter). Furthermore, grass is not cut as close to the ground as it should be. This activity must be supervised by experienced people in the community and the appropriate advice should be provided by technical staff.

Inappropriate Planting and Seedling Treatment Methods - Apparently, the dibble method is frequently applied in many planting sites for bare-root seedlings. This method is adequate in good sites with deep and fertile soil, and when rainfall is adequate. Often however, this method is followed in planting sites that are degraded and far from the nursery. Under these conditions, mud-puddling and related treatments are necessary to prevent drying out of the seedlings. Proper seedling treatments are always important, regardless of whether the seedlings are bare-root or potted.

Planting Density and Species - Generally, two by three meter (2 x 3 m) spacing is observed in the Study Area. However, many plantations are established at 1 x 1 m spacing.

Although planting density depends on management objectives, dense spacing usually produces very poor results. Well-timed thinning at the proper intervals accelerates growth and improves the quality of trees. Additionally, most projects consist of monoculture stands. An appropriate mixture of species is required, especially in the context of watershed management and the threat of outbreak of pests or disease associated with monoculture.

Insufficient Maintenance - It was found that many plantations are deficient in maintenance activities such as ring weeding, replanting and fertilization. Additionally, many reforestation and agroforestry targets are prescribed without first determining the number of hectares that have already been planted and need maintenance. There are no reliable data on area extent, ages, and tree species. This information is crucial for sustainable management through application of appropriate harvesting cycles and extraction levels (volumes). Moreover, without adequate data, it is not possible to accurately predict future supplies of wood and other forest products that will be available for processing.

6.1.4 Constraints Pertaining to Natural Conditions

(1) Steep Terrain, Difficult Access

Topography is generally rugged in the Study Area. This makes it difficult to prepare the land for crops, haul seedlings to planting sites and conduct other land use activities. Plowing to eliminate Cogon (*Imperata cylindrica*) and other undesirable vegetation is often not feasible because of steep terrain. Additionally, sloping land tends to lose fertility through loss of top soil especially if it has not been properly managed, as in most parts of the Study Area. This topographic characteristic makes many communities within the Study Area difficult to access for public services and market.

(2) High Potential of Soil Degradation

More than 50,000 ha of Forestland and Protected Areas in the Study Area are being used for agriculture. In upland agriculture areas, farming practices that are not ecologically appropriate were observed such as deep tilling across entire plots on steep slopes, no catch drains, etc. All of these are apt to induce soil erosion, entailing loss of surface soils and fertility of the soils. Further expansion of the agricultural lands within Forestlands and Protected Areas should be made strictly in conformity with proper guidelines on land use.

(3) Infestation by Fire-prone Grass Species

Cogon (*Imperata cylindrica*), Bagokbok (*Themeda triandra*) and other fire-prone grass species are the dominant vegetation in large portions of the grasslands in the Study Area. These grasses are difficult to eliminate, and are strong competitors against planted trees for moisture and plant nutrients. Effective control is possible with systemic herbicides, but the timing and application are crucial and have not been disseminated or demonstrated to agroforestry farmers.

6.1.5 Socio-Economic Constraints

(1) Prevalent Poverty and Limited Livelihood Alternatives

The barangay profiling shows that 46.7 % of households within the Study Area are below the poverty line, which is higher than the national average, and that 73.0 % of the households are engaged in agriculture, which is known as less lucrative and unstable. Due to their economic difficulties, the people in the uplands within the Study Area are incapable in managing their natural resources in a sustainable manner.

A significant number of people within the Study Area continue less capital intensive stationary or shifting rainfed farming to cope with the lack of funds for agricultural investment. The latter is called *kaingin*[12] and is known as a farming method that is remarkably destructive to the environment.

Due to the severe socio-economic situation, the Project area is prone to suffer illegal timber poaching and wildlife hunting.

(2) Political Instability

Parts of Quirino and Isabela provinces are still occupied by insurgent guerillas and government support and regulations hardly reach into those areas. In such cases, the proper management of natural resources cannot be enforced by the government, and implementation of rehabilitation and development of the Forestland and Protected Area cannot be undertaken.

(3) Lack of Infrastructure

The Study revealed that the necessary infrastructures, like roads, electrification, water systems and communication tools such as two-way radios are insufficient to promote the planned activities.

The soil conservation, flood control structures and dams are insufficient to meet the demand for adequate protection of the Protected Areas, Forestland, residential areas and rivers.

(4) Increasing Population Pressure on Protected Areas and Forestland

Increasing population pressure by constant population growth and in-migration has been a major cause of environmental destruction in the Study Area. The government has been promoting family planning and other population controls measures, but the success is limited and the demand for the conversion of the Forestland into farmland remains exceedingly high.

[12] Generic term for slash and burn farming and swidden cultivation

(5) Disorderly Natural Resource Management Mechanisms at the Community Level

Natural resources have been utilized and maintained arbitrarily by individual villagers without regard to established policy, regulation, ordinance or managing authorities. Even traditional management systems such as *Muyong* are facing a gradual disappearance due to the development and modernization of communities. Communities are yet to become an effective vehicle for natural resource management.

(6) Gaps among Socio-Economic Classes and Gender Groups

Communities are composed of members whose patterns of consumption and management of natural resources vary in wide range. Therefore, a project/program would have different impacts and implications for different classes and groups, which usually amplifies the inequalities among the population. For instance, the CBFM Program would expand the domination of men or the rich over the natural resources unless PO capacity building is appropriately achieved.

(7) Emergence of Local Conflicts

Extremely delicate and controversial issues, such as land conflict exist within communities. Many conflicts are political or ethnic in nature. There were cases where external initiatives including DENR programs, aggravated the conflicts within the communities and triggered violent actions such as setting fire to the reforested areas.

(8) Weak Linkages between External Society and Community

There are communities that are isolated from the external societies. Government services, programs and projects have rarely been introduced into those communities. Market linkages are extremely limited. They are quasi self-reliant with few opportunities for progress or advancement.

6.1.6 Constraints Pertaining to POs and NGOs

(1) Lack of Transparency and Communication among Leaders and Members

There are a number of CBFMA and non-CBFMA POs where the monitoring functions do not run effectively due to deficiencies in: i) organizational structure; ii) giving clear roles and responsibilities to PO leaders and members; and iii) giving proper decision-making power and monitoring authority. As a result, the transparency of some POs is prone to become low, which allows corruption and abuse of power to take place. The resulting mismanagement and misconduct are both the cause and effect of improper communication among leaders and members.

(2) Inadequate Educational Background of PO Members

In general, the leaders and members of POs have low levels of educational background with little management skill. In addition, the amount of both technical and managerial

training for PO leaders and members were inadequate. Even if training and orientations were offered to POs, the learned skills, knowledge and information have not been shared with other leaders and members who were unable to attend the training or orientations. Further, learned skills and knowledge often fad away due to the lack of projects and activities where POs can practice them. As a result, POs are struggling in the enhancing their operational efficiency and effectiveness.

(3) Low Participation among PO Members

The majority of members have little incentive to participate in CBFM PO activities for which the land management rights and tenurial instruments have been awarded for a renewable period of 25 years. DENR has been facing difficulty in motivating members to participate in PO activities because of its inadequate human resources, know-how, previous experiences or financial resources to assist incentive programs for the POs. Lack of incentives results in recruitment, which in turn results in insufficient collection of share capital, membership fees and annual fees. This lack of income precludes financially sound management of the PO.

(4) Lack of Physical and Financial Viability of POs

Most POs do not have adequate offices, office equipment or operational funds. POs do not have regular activities and have a tendency of waiting for an external organization to bring a project. To develop commitment of leaders and members towards PO activities, adequate input to the PO development activities is needed.

(5) Inadequate Qualifications of Community Organizers at DENR and LGUs

Officers assigned to CBFM Programs, including Community Development Officers (CDOs) and Community Development Assistants (CDAs) at local DENR offices and LGUs generally have an educational background in forestry/forest science, which is not always useful for PO development. It is important to provide necessary training to the Officers or recruit staff who have an adequate educational background of community organization.

(6) Possible Discrepancy between Village Ordinances and National Legislation

There are cases of village governments passing local ordinances and policies to control and manage natural resources in their communities without consultation with DENR or relevant line agencies. Such uncoordinated procedures would result in a contradiction between the village ordinances and national legislation.

6.2 Lessons Learned from the Pilot Study

6.2.1 Basic Approach, Components, Overall Process, Time Frame, Institutional Setup and Input for CBFM Implementation

(1) Basic Approach

Adopting CBFM as one of the basic approaches for the Master Plan implementation was found to be appropriate based on the Pilot Study. CBFMA is found to empower upland communities, though the provision of land tenure has often been undertaken in isolation without proper community organizing, PO formation, participatory community appraisal, planning, area development or other forms of program implementation.

Under the CBFM concept, PO is the manager of Forestland including development work in the area. The Pilot Study revealed that the CBFM concept is appropriate and operational for the proper management of natural resources within Forestland, particularly when the communities are supported by the government or by other sources.

The concept of CBFM, whereby the livelihood improvement of upland communities is emphasized, was also found to be apposite since the socio-economic difficulties of local people are the major constraints to sustainable management of natural resources in the Study Area. However, the linkage between livelihood improvement and proper natural resource management is often overlooked by the government and local people.

(2) Capacity Building and Institutional Strengthening

During the Pilot Project, the components of PO capacity building and institutional strengthening were tested in addition to the CBFM scheme which is the main component of the Pilot Project and consisted of: i) preparatory work; ii) community organizing and PO formation; iii) community appraisal and participatory planning; and iv) implementation. The Pilot Study revealed that capacity building and institutional strengthening were indispensable for the successful implementation of the CBFM scheme.

(3) Overall Process and Time Frame

It was found that the four components of capacity building (i.e.: i) preparatory work; ii) diagnosis & PO formation; iii) participatory planning; and iv) implementation) and institutional strengthening should be thoroughly and sequentially completed. In previous examples, however, POs were often formed without proper preparatory work, and the CBFM scheme used to be implemented without the completion of community organizing and planning. The lack of adherence to the process delineated in the CBFM guidelines resulted in the low output quality.

DENR Memorandum Circular 97-01 stipulates that the community organizing and PO formation work needs two years. However, there are no regulations or guidelines delineating the time frame of preparatory work and participatory planning.

The Pilot Study implies the required periods of 1.5 years for preparatory work, at least 2.5 years for community organizing and PO formation, and 2 years for participatory planning.

With a little overlap of each stage, these three components would require at least 5 years. To avoid prolonged inauguration of the implementation of CBFM scheme, the implementation could be started in the 4th year at selective areas where the three components have been completed.

(4) Institutional Setups

During the Pilot Study, the establishment of an organizational structure, in addition to the regular DENR structure, exclusive for the Pilot Project management was examined and found to be effective, efficient, feasible and necessary for the Master Plan implementation.

The expertise of DENR is basically limited to that of forestry. Linkage with the supporting agencies or use of external human resources should be sought for civil engineering, agriculture and agriculture extension service, horticulture, and livestock industry relating to CBFM scheme. It was also confirmed that DENR has limited expertise in respect to the PO capacity building, implementation of which should be entrusted to external assisting organizations, such as NGOs. The Project consultant was also found to be indispensable to assist DENR in guidance and management of the Pilot Project.

(5) Input Requirement

The Pilot Study revealed that a significant proportion of inputs should be allocated to the two supporting components, i.e., PO capacity building and institutional strengthening. As for the input for the area development and management of CBFMA areas selected for the Pilot Project, however, adequate input requirements could not be validated in the Study because existing CRMFs for the CBFMA areas did not have any quantitative indicators.

6.2.2 Institutional Strengthening

(1) Facilities and Equipment

To implement CBFMP, the government needs adequate operational funds, office spaces, equipment and mobility since the CBFMP adopts a decentralized community- based approach. In particular, DENR's mobility to visit the communities concerned for the monitoring of implementation of the CBFMP is crucial. It is an essential condition for successful implementation of the CBFMP to provide the DENR field offices with vehicles, such as motorcycles, and adequate funds for vehicle maintenance and travel expenses.

(2) Human Resources

It was confirmed that the allocation of adequate quality and quantity of human resources is a prerequisite for the effective and efficient implementation of the CBFMP. Since, again, the CBFM is a decentralized approach, and supervising, and assisting monitoring the PO activities is a time consuming work, adequate manpower to execute the above activities should be secured. In terms of quality of human resources, DENR personnel should develop their expertise in key areas that were identified as weak points during the Pilot Project. The monitoring of PO capability building, progress of work, reporting and

computer skills to consolidate numerous reports from the POs were found to be particularly weak in DENR and need to be developed.

(3) Field Inspection and Validation

Since most target CBFMA areas are remote and have little road access by vehicle, field work such as supervision, technical guidance and inspection for validation is a physically demanding and time-consuming work. Additional incentives for those who execute the field inspection for validation are desirable. Conceivable incentives would be in a form of special training opportunities, awards, recognitions, opportunities for promotion, application of special policies for travel allowance/per diem (amendment of "50 km policy" of DENR) and financial compensations such as hardship allowance.

6.2.3 Community Organizing and PO Formation

(1) Preliminary Identification of Potential CBFM Areas

It was found that a set of clear criteria for the identification of potential CBFM areas was not available yet. Necessary information for this purpose consists of scientific information including quantitative and geographical data from a base map, accurate and updated land classification maps, updated land use/vegetation maps, an administrative boundary map and soil map, etc.

(2) Identification of CBFMA Area Occupants/Users and Consensus Building

With the aid of a CBFM map showing boundaries of CBFMA areas, CBFMA area occupants and users should be identified with adequate time allocated for the activities, by means of key informant interviews, house-to-house visits and field validation. The results of the Pilot Project suggest that the existence of the semi-permanent community organizer deployed by the external assisting organization employed for PO capacity building helped in the completion of a master list of the CBFMA area occupants and users. It is necessary for DENR and the assisting organization to be able to disseminate information and build consensus among stakeholders with proper community organizing methods and techniques.

(3) PO Formation

Both the DENR and the communities should adhere to the process of organizing of originators, formulation of PO by-laws and policies, establishment of organizational structure, recruitment of members, collection of fees, election of board of directors and PO officers, official registration and CBFMA application and acquisition. It was found during the Pilot Project that the process of establishment/re-establishment of POs was not so complicated, but a technical assistance from DENR and/or the assisting organizations was indispensable for the effective and efficient completion of the work. DENR in the past executed the formulation of the by-laws and registration of the community, and the result was that the PO remained unfamiliar with its own by-laws. The responsibilities of DENR and the assisting organizations in this work are to guide, assist, teach and lead the community people concerned and not perform the work itself.

6.2.4 Community Appraisal and Participatory Planning

(1) Community Appraisal

It was confirmed through the Pilot Study that prior to the commencement of plan formulation, data/information based on indigenous knowledge has to be well identified and sorted out properly. Necessary data and information required for proper plan formulation include community resource maps, land use maps, slope maps, history of natural resource endowment and management in the community, existing decision-making mechanisms for natural resource management, seasonal calendars, major livelihood activities of each socio-economic class, gender relations, etc.

A participatory method such as PRA or a similar method is useful in the collection and sorting the data/information based on indigenous knowledge.

(2) CRMF, AWP and Implementation Plan

It was found that the assistance of experts/specialists for POs is indispensable in technical aspects including cost estimates for the schemes in the AWP. It is required that resource persons from DENR or assisting organizations and facilitators are familiar with the CBFMP, purposes and contents of the CRMF and the AWP, and the resource persons must be familiar with micro land use planning and zoning, which is the most important part of CRMF. The resource persons must also realize the importance of quantitative and geographical data/information (land use/zoning maps) to be included in the CRMF and have the ability to provide technical assistance in the micro land use and zoning.

In case, therefore, DENR and LGU have insufficient personnel with such expertise, an external assisting organization should be employed to assist in the formulation of the CBFM implementation plan.

It was also learned during the Pilot Study that existing individual land occupancy within the CBFMA area should be clarified. The PO with assistance from DENR should conduct field surveys to identify the boundaries of each occupancy lot on the ground. Based on the surveys, the PO should create a master list of CBFMA area occupants because such information is essential for monitoring of the land use within the CBFMA area.

6.2.5 Community-Based Enterprise Development

It was found that a search for existing or familiar businesses for community people was important for the effective and efficient PO business establishment. This is because, while managing the initial business, PO leaders will acquire the business skills required for business expansion and diversification in future.

It was also confirmed that businesses had to be carried out based on reliable and scientific quantitative information in order to ensure the effective and stable production of goods and delivery of services, but this information was often not available or difficult to obtain. As a result, business plans developed used to be baseless and unfeasible.

With regards to capital build up, government public investment is required to strengthen PO business development along with the reinforcement of capital through share schemes. Other means of government assistance to capital build up are the low interest SME loans, guarantee by endorsement, tax incentives and deregulation.

Many existing POs have experiences of business failure in the past. These failures have caused significant financial damage to members with the result that in some cases, PO members strongly distrust the PO leaders, PO as an organization, and external assisting organizations, including DENR and NGOs. The distrust often contributed to financial arrears or interruption of PO operations. In such cases, it is required that the PO leaders be replaced, and the transparency of PO operations be established through participatory business planning and development.

6.2.6 PO Capacity Building

(1) Organizational Issues of Assisting Organizations

The assisting organizations to be employed for PO capacity building **(Section 5.6.4)** should be stable in respect of human, financial and other physical resources. It is required to have adequate office and necessary office equipment, as well as vehicles for mobility. It must have a stock and network of well-trained, experienced experts in the relevant fields that are able to constitute effective teams and replace team members promptly in the case of unexpected turnover.

(2) Technical Issues of PO Capacity Building

The assisting organization must have the ability to understand the situation of target areas and act in accordance with the characteristics of the areas. It is also important that assisting organizations are able to maximize productive political interventions to a project.

During the Pilot Project, it was found that the NGO (assisting organizations) had weaknesses in assisting the POs in respect to skills, knowledge and technologies on natural science and engineering, such as formulation of feeding plans or land use planning.

It is important to balance the volume of POCB work and time/resources given to POCB to avoid the assisting organizations intervening exceedingly. The work schedule should be designed to suit the capability of POs to handle. The implementation scheduled should not overload the people in the target communities who often have their own economic activities aside from the CBFM activities. The assisting organizations should assist the POs to strategize their activities and determine who should participate in what activities.

6.2.7 Social Development Potential of Community for CBFM

CBFMP, because of its community-based approach, requires a community to be socially prepared to pursue development. A socially prepared community means one that has the necessary social institutions for effective and efficient development, such as community organizations (registered and traditional), associations (permanent and occasional), rules (written and unwritten) and enforcement of rules (by authority and social norms). Social

development potential is synonymous with social readiness, and activities to develop social readiness are called "social preparation activities."

It is required that the outcomes of social preparation activities are clearly recognized, and necessary benchmark information and data for monitoring of outcomes are available. The social preparation is properly designed and monitored by experts.

Experience, knowledge and ability of assisting organization staff in social preparation activities are of utmost importance, and the development worker must possess profound understanding and skills in the art of integrating themselves into the community using appropriate communication and socialization techniques.

Local leaders and key community members recognize the vision for development as a result of information dissemination and education about development. With proper guidance from assisting organizations, local leadership and social systems are developed to a level where they can internalize the external development initiatives through intensive training, coaching, meetings and dialogues. Community members should also understand the CBFM concept, benefits, restrictions, rights and responsibilities of the community appropriately through the CBFM campaign and various means of information dissemination and education.

Appropriate time and resources are allocated to social preparation activities since most outcomes pertain to deeply embedded social, cultural and political practices and customs of the community, and the outcomes require time and continuous effort, both by external development organizations/workers and people in the community.

CHAPTER 7 BASIC CONCEPT FOR THE WATERSHED MANAGEMENT PLAN

7.1 Overview of the Present Conditions in the Study Area

The Study area, covering an area of 8,796 km^2 and extending over the uppermost area of the Cagayan River Basin of 27,281 km^2, plays a significant role in the economy of the Cagayan valley region. It provides agricultural production from both uplands and lowlands, is a major source of detrimental sediment, and is a source of flood discharge and quality water alike. Attainment of sustainable watershed management of the Study Area is a basic need for stable development of the region.

As discussed in Chapters 3 through 6, however, the Study Area is not necessarily managed in a sustainable manner in respect of land and other natural resources. This is evident from the following facts, among others:

a) Accumulated unfavorable land use for the last several decades has brought about open lands within the Protected Areas and Forestlands (PA&FL). Out of an aggregated PA&FL area of approximately 660,600 ha, there is an aggregated amount of open land of 242,600 ha (36.7 %), made up of 53,800 ha of lands being used for agriculture purpose, 104,900 ha of grassland, and 83,900 ha of reproduction brush (**Section 4.6.2**).

b) There are 347,700 ha categorized as possible Protected Areas out of the 660,600 ha. This area includes 13,100 ha devoted to cultivation, 22,400 ha of grassland, and 36,000 ha of reproduction brush, totaling 71,500 ha or 20.6 % of the 347,700 ha (**Section 4.6.5**).

c) Out of 359,600 people residing in 1990 in the PA&FP areas of the Study Area, 46.7% are categorized as "below poverty level"[1], which is much higher than the regional average of 42.5% in CAR and 32.1% in Region 2 (**Sections 4.4.(3) and 4.4.(5)**)

Such unsustainable watershed management is attributed to:

a) Inconsistent land use management
   - Proclaimed Casecnan Landscape Reservation, 88,846.8 ha, overlap with CADCs and Mining permits.
   - Out of 40,000 ha allocated for a resettlement program, land titles under CLOA have been issued for 20,000 ha by DAR despite the fact that DENR had re-classified 6,000 ha into A&D and retained the remaining 34,000 ha as Forestlands.
   - Strategic Agricultural and Fishery Development Zones were demarcated in PA&FL areas.

b) Inappropriate land use
   - Uncontrolled burning for grazing and agricultural purposes
   - Progressive expansion of agricultural lands onto ecologically fragile lands

c) Policy barriers on forestland management
   - Unstable program/project policies

[1] Source: Barangay Profile Survey by the Study Team. Within the PA&FL areas, there are 408 barangays. The 406,000 people and the 46.7 % refer to the 408 barangays.

- Policy on harvesting and transportation of planted trees
- Lack of policy on compensation of upland dwellers practicing sustainable forestland management

d) Institutional inadequacy and shortcoming in available manpower, funds, and facilities, in particular at PENRO and CENRO levels
e) Insufficient funds for management by upland dwellers
f) POs' low management capacity
g) Lack of commitment to sustainable environmental management
   - Subsistence level of livelihood
   - Lack of opportunity for economic development

7.2 Objectives of Watershed Management

Watershed management is "the process of guiding and organizing land and other resource uses in a watershed to provide desired goods and services without adversely affecting soil and water resources"[2]. It should be a combination of occasional and perpetual activities and involve the planning and implementation of technical, policy, institutional, and economic initiatives for the development of individual watersheds with multiple aims:

a) Mitigating soil erosion in the watershed to retain/improve soil productivity and sustainability and to eventually mitigate sedimentation in both the upper and lower parts of the watershed;
b) Providing improved protection from floods by mitigating flood peaks and providing increased and prolonged base flow from/through both the upper and lower parts of the watershed;
c) Providing quality water for both on and off-site beneficiaries;
d) Improving the living standard of upland dwellers by the utilization of natural resources in the watershed in a sustainable manner;
e) Increasing economic value of natural resources in the watershed (such as forestry, agriculture, water, power generation, tourism, etc.); and
f) Protecting, maintaining, and enhancing the present biodiversity.

7.3 Goal of the Watershed Management

The ultimate goal of the watershed management is to make the current watershed management sustainable so that the objectives stated above could be realized and at the same time to improve the economic conditions and quality of life of the upland dwellers.

To this end, the M/P will provide: i) an effective rehabilitation plan of the degraded forest/protected lands; ii) a plan for increasing economic opportunity to upland stakeholders; and iii) an improved management system for the Study Area.

[2] Guidelines for Watershed Management and Development in the Philippines, 1999

7.4 Scope of the M/P

The M/P will include a rehabilitation plan of the degraded PA&FL area and a management plan for all the PA&FL area within the Study Area with a target year of 2015. It will be composed of technical, organizational, structural, institutional, and financial management plans and policy initiatives.

7.5 Basic Framework for Watershed Management Plan Formulation

7.5.1 Legislative Framework

Among others, the concepts and guiding principles contained in the following policies and legal instruments will be taken into account in the formulation of the M/P:

a) Constitution 1987 (Constitutional provisions on ownership of the land and natural resources);

b) PD 705, Forestry Reform Code, 1975;

c) Republic Act 7160, Local Government Code, 1991;

d) Republic Act 7506, National Integrated Protected Areas System Act, 1992;

e) Executive Order 263, Adopting CBFM as the National Strategy to Ensure the Sustainable Development of the Country's Forestland Resources and Providing Mechanism for its Implementation,1995;

f) DAO 96-24, Rules and Regulations Governing the Socialized Industrial Forest Management Program, 1996;

g) Republic Act 8731, Indigenous People's Right Act, 1997;

h) DAO 99-53, Regulation Governing the Integrated Forest Management Program, 1999;

i) DAO 99-36, Revised Rules and Regulations Governing the Administration, Management, Development and Disposition of Forest Lands Used for Grazing Purposes, 1999; and

j) Relevant DAOs

7.5.2 Basic Concept

(1) Integration of Conservation and Development

There are Protected Areas and Forestland in the Study Area, existence of which requires the integration of conservation and development oriented activities. In the Forestland, a development oriented approach is to be employed to support economically depressed upland dwellers to the extent that such development would not entail environmentally adverse impact to the Forestland on its sustainability, while in the Protected Areas conservation oriented management should be applied to maximize expected multiple functions of the watersheds allowing restricted development of the Protected Areas where interventions by upland dwellers have prevailed.

(2) CBFMP as a Main Strategy for Watershed Management

To achieve the goal, the watershed management plan should be realistic and viable for implementation. For sustainable watershed management of the Study Area, improving the economic conditions of the upland dwellers is as important as pursuing ecological sustainability, since a considerable number of upland dwellers are residing within the PA&FL areas and rely on those areas for their livelihood. In this context, it is inevitable that the current primary forest policy of the Philippines such as CBFMP be applied for the M/P as a main strategy of the participatory watershed management.

Out of the 660,572 ha of PA&FL areas in the Study Area, CADCs have been issued for the total area of 232,600 ha, where DENR no longer has jurisdiction as a rule **(Sections 4.6.2 & 4.7.5 (6))**. However, the CBFM approach can be applied upon an agreement by IPs/ICCs. Therefore, IPs/ICCs have two options to pursue the sustainable watershed management, namely watershed management with CBFM approach and with NCIP's own approach.

Both for the CBFM and the NCIP approaches, participatory monitoring by themselves is essential for their self-help and empowerment.

7.5.3 Approach

Considering the complexity of the causes of the current unsustainable management in the Study Area, the goal of watershed management could be achieved through a holistic approach including:

a) Ecologically compatible land utilization;
b) Ecological restoration of degraded areas through vegetative measures;
c) Sustainable resource use for prevention of further degradation;
d) Enhancement of upland economic development for upland dwellers;
e) Establishment of improved management systems through encouraging participatory forest management; and
f) Policy initiative.

(1) Ecologically Compatible Land Utilization

Formulating and implementing an ecologically compatible land use plan is the fundamental approach to restore and maintain the multiple functions of the watershed in a sustainable manner. To this end, first the current PA&FL in the Study Area should be re-delineated in conformity with guidelines prescribed in the NIPAS Act. Then a land use plan for the newly demarcated Protected Areas will be formulated as a conservation-oriented one and that for the Forestland will be designed as resource use-oriented one.

(2) Ecological Restoration of Degraded Areas

Reproduction brush, grasslands and cultivated lands in the PA&FL are defined as degraded land in the Study and are subject to ecological restoration.

Proposed land use patterns in the degraded land will vary with land classification category, category of slope gradient, current land use, and land tenure. As a rule, however, slope

category is a decisive factor for the proposed land use pattern among the factors stated above.

The ecological restoration will basically be attained by vegetative measures with small-scale structural measures. The vegetative measures will include: i) reforestation, forest stand improvement (FSI), timber stand improvement (TSI) and assisted natural regeneration (ANR); ii) agro-forestry such as orchards, alley cropping and hedge raw planting; iii) ecologically compatible silvo-pastoral plantation and pasture development; iv) introduction of ecologically compatible agriculture such as contour farming, in-row tillage, enhancement of organic farming practices, enhancement of biological land amelioration, hedge rows construction, etc.

(3) Sustainable Resource Use

Substantiating sustainable resource use is indispensable to prevent further degradation of the PA&FL in the Study Area.

Sustainable Resource Use by CBFM POs: A master resource use plan should be formulated for the PA&FL. It is referred to as the Community Resource Management Framework (CRMF) for the area where CBFMA has been issued. Resource Use Plan should be prepared for the area where extraction of timber or non-timber forest products (NTFP) is conceivable. An action plan, referred to as the Annual Work Plan (AWP), should be formulated based on the CRMF and the RUP. The PO concerned will prepare all the resource use plans with assistance from DENR and external assisting organizations.

CRMF is a long-term development plan of the PO. It will clearly illustrate the "blueprint" of the PO in 25 years reflecting "what the members want the PO to be and look like." The formulation process of CRMF will enable the POs to understand their situation as well as the Project in a holistic sense, determine their ideal future condition in 25 years, and decide how they intend to realize this envisioned future. The presence of a CRMF will help determine where the direction of the PO fits in the overall development plan of the local government unit (LGU), what are common and/or unique development needs, and how both the community and LGU could work together.

The PO concerned will pursue the development and management of the CBFMA areas, in conformity with the CRMF, RUP and AWP.

Sustainable Resource Use by ICCs/IPs: the CADC areas should be controlled, managed, developed, protected, conserved and used by the ICCs/IPs in a sustainable manner. To this end, Ancestral Domain Sustainable Development and Protection Plans (ADSDPPs) have to be prepared and submitted to the municipality and provincial government units concerned.[3] The CADC areas should be managed by the ICCs/IPs accordingly, except when the ICCs/IPs agree to manage the area with a CBFM approach.

[3] Part II, Rule III, NCIP Administrative Order No.1 Series of 1998, Rules and Regulations Implementing Republic Act No. 8371, Otherwise Known as "The Indigenous Peoples Right Act of 1997"

(4) Enhancement of Upland Economic Development

Upland dwellers in the Study Area are generally dependent for their livelihoods on practicing extensive upland farming and collecting timber/NTFP in the PA&FL. As their livelihood remains at subsistence level, they used to apply production-oriented farming and collection without paying any consideration to ecological impacts or sustainable resource use. This uncontrolled/unsustainable resource use has obviously brought about considerable degradation in the PA&FL.

If ecologically compatible farming and sustainable collection are introduced to them, there will be some restriction over their activities on livelihood, which would entail degradation of their livelihood level. Rehabilitation of the degraded land and land security are not realistic without securing a source of income for the upland dwellers. This is the reason why enhancement of the economic development is proposed to come into the Project.

The economic development will be enhanced through: i) developing community-based enterprises; ii) introducing intensive agriculture in areas where land use plan allows the cultivation; and iii) developing rural infrastructure.

Shifting cultivation will be discouraged and existing cultivated areas will be incorporated into the agricultural land where applicable. It may be unavoidable that the total area of agriculture and agroforestry land will be expanded to meet population growth in the Study Area. However, intensive agriculture and agroforestry will be encouraged more than extensive development because of the limited land resource.

(5) Establishment of Improved Watershed Management System

Stakeholder analysis for the Study[4] revealed that DENR is a critical and very influential player, while the local communities/POs concerned are the critical players having moderate influence to attain sustainable watershed management. Notwithstanding their important roles, both the DENR and the POs are weak in the managerial, financial, and technical capabilities required for sustainable watershed management (**Sections 6.1.2 and 6.1.6**). To cope with this situation, it is important to establish an improved watershed management system through: i) institutional strengthening; ii) appropriate PO formation and CBFMA acquisition/ IPO formation; iii) capacity building of the POs/IPOs; and iv) policy initiatives.

Institutional Strengthening: Institutional strengthening for the relevant offices of DENR/NCIP is crucial for effective and smooth implementation of the M/P and for effective management of the watershed after the implementation. It will include: i) establishing specialized organizational structure for the implementation in addition to the regular DENR/NCIP organization; ii) provision of necessary equipment to increase managerial capability of the relevant offices; ii) provision of vehicles to improve mobility of the staff; and iii) human resource development through a series of training for project management, supervision of the project implementation, technical guidance and advice to the POs/IPOs, and for managing the watershed after the project implementation.

[4] Attachment-4, Progress Report for the Pilot Study, Master Plan Study for Watershed Management in Upper Magat and Cagayan River Basin, September 2002

PO Formation and CBFMA Acquisition: As indicated previously, CBFM will be the main strategy for the watershed management, properly organizing communities into POs for CBFM and acquiring CBFMA in conformity with guidelines stipulated in the relevant DAOs are prerequisite to implement the M/P successfully and manage the CBFMA areas in a sustainable manner after the implementation.

Capacity Building of POs: Capacity building of POs is a supportive and indispensable part of the M/P to achieve the sustainable watershed management. It will be required to empower the communities/POs to enhance social development potentiality, organize and register the PO for CBFMA acquisition, acquire CBFMA, formulate CRMF, RUP and AWP, implement the AWP, and manage the CBFMA area after the implementation. Necessary input for the capacity building will be in the form of training, facilitating workshops and meetings for various aspects, and providing technical assistance and guidance at grassroots level. These inputs will be closely related to the activities stated above so that the skills provided could be practiced on the ground during the implementation.

Capacity Building of IPs: Similar to the POs for CBFMP, IPs in the CADC areas should be capacitated in various aspects so that they could manage their areas in a sustainable manner.

Policy Initiative in Establishing Watershed Management Council (WMC): As watershed boundaries are demarcated along topographic divides and are generally not coincident with the jurisdiction of administrative boundaries; multiple administrative jurisdictions within a watershed can occur at various levels such as Region, Province, Municipality and *Barangay*. The interests of those administrative units are different from each other in many cases, particularly those in the upstream and downstream areas. Collaborative efforts among regions/provinces/ municipalities/barangays will be required to manage the watershed as a whole. In this context, partnership among stakeholders of the watershed has to be established so that the stakeholders are united in sustainable watershed management. By so doing the expected functions of the watershed could materialize.

Policy Initiative in Cost Sharing Mechanism (CSM): Despite the fact that watershed management is a sort of public work, which needs considerable costs, DENR/NCIP have been facing difficulty in funding it. This unfavorable situation will not improve in a short period. Benefits of watershed management **(Section 7.2)** go to people in the downstream areas at the sacrifice of economic activities of people residing in upstream portions of the watershed. It is too optimistic to expect that upland dwellers will manage their CBFMA/CADC areas after the implementation of the M/P without receiving any subsidy for the management of the watershed. Therefore, the costs of sustainable management activities should be shared between the people living upstream and those downstream or among all the stakeholders concerned. To achieve sustainable management of the watersheds, a cost sharing mechanism should be established before the completion of the implementation of the M/P.

7.6 Target Year and Target of the M/P

7.6.1 Target Year

The M/P will cover a planning period of 2004 – 2015.

7.6.2 Regional Physical Framework Plan

The land use plans proposed in the Regional/Provincial Physical Framework Plan (**Section 2.3**) were reviewed to be used as a framework for setting the targets of the M/P. It was, however, revealed that: i) Provincial Physical Framework Plans (PPFP) do not include a land use plan; ii) the RPFP failed to provide a clear framework because:

a) Region 2 and CAR used different land categories for the land use plan;

b) RPFP for Region2 indicates neither agriculture nor agroforestry land use in the Protected Area despite the fact that currently more than 10,000 ha of these types of land use exist in the Protected Areas within the Study Area;

c) RPFP for Region 2 includes a grassland/brush lands category in the Protected Area, however, it is not indicated whether or not those lands will be turned into other types of land use such as second growth forest, agroforestry, or agriculture, or whether they will be left as grassland;

d) RPFP for CAR has no provincial breakdown for the land use plan;

e) The land use plan of CAR is based on land slope categories and no detailed land use plan based on vegetation is available; and

f) The land use plan of CAR does not show the total picture by land classification such as Protected Areas, Forestlands, A & D Area, and Civil/Military Reservation Area.

The following table shows a summary of the land use plan cited from the RPFPs.

(Unit: ha)

	N. Vizcaya	Quirino	Ifugao[5]	Total
1. Protected Area				
1.1 NIPAS areas	0	0	3,376	3,376
1.2 Non-NIPAS areas	179,942	119,160	58,580	357,682
Sub-total	179,942	119,160	61,956	361,058
2. Forestland Area				
2.1 Production forest	113,218	86,057	167,789	367,064
2.2 Mining areas	36,000	32,000	0	68,000
Sub-total	149,218	118,057	167,789	435,064
Total	329,160	237,217	229,745	796,122

Source: CAR-RPFP & Region 2-RPFP

As shown in the above table, the total size of the Protected Area, 361,058 ha, indicated in the Region-2 RPFP is rather similar to the total size of the Protected Areas, 349,012 ha, proposed in the M/P (Chapter 8). This similarity indicates that the proposed figure by the Study Team is along the line with the Regional Framework Plan.

[5] Land use plan for Ifugao were estimated by Study Team based on the relevant tables in CAR-RPFP, as CAR has no provincial breakdown of the land use plan by 2020.

7.6.3 Land Resources and Target Area in the Study Area

As the land use plan in the RPFPs/PPFPs to 2022 or 2023 is not detailed enough, the physical target of the rehabilitation/restoration plan for the Study will be set out based on land resources within the Study Area. The following table shows present vegetation/land use.

Land Resources in the Study Area

(Unit: ha)

Category	PA&FL	Civil Res.	A & D	Total
1. Old Growth Forest	147,957	614	2,060	150,631
2. Mossy Forest	7,220	2	26	7,248
3. Residual Forest	216,929	1,775	14,428	233,132
4. Sub-marginal Forest	23,260	52	4,573	27,885
5. Pine Forest	641	0	56	697
6. Reproduction Brush	83,968	571	21,485	106,024
7. Other Plantation	9,794	19	7,607	17,420
8. Grass Land	104,948	965	64,319	170,232
9. Agricultural Land	53,776	349	75,485	129,610
10. Bare/Rocky Land	11,674	108	18,596	30,378
11. Built-up Area	5	0	253	258
12. Water body	244	0	687	931
13. Unidentified	156	0	0	156
Sub-total				874,602
Magat Reservoir				5,356
Total	660,572	4,455	209,575	879,958

Source: Study Team

Out of 660,572 ha of the PA&FL area, the target area of the rehabilitation/restoration will cover 242,692 ha, accounting for reproduction brush of 83,968 ha, grassland of 104,948 ha, and agricultural land of 53,776 ha.

CHAPTER 8 WATERSHED MANAGEMENT PLAN

8.1 Land Use Plan

8.1.1 Criteria for Land Use Planning

Land use planning plays one of the most critical roles in this M/P. The ultimate goal of the M/P is to develop ecologically compatible land use patterns that attain sustainable use of natural resources in the watershed (the Study Area). Therefore, the criteria that are adopted in the formulation of land use patterns play a vital role in planning. The following criteria have been employed in this Study.

(1) NIPAS policy for designation of Protected Areas

The NIPAS policy has been defined mainly to cover ecologically important areas and fragile environment to be protected with a legal basis. Areas under this policy, consisting of those above 1,000 m elevation or with slope above 50% or covered with virgin forest (old growth and mossy forest), have not yet been clearly identified in most of the Study Area. Therefore, such areas have been delineated, and currently proposed areas for NIPAS have also been considered in this M/P.

(2) Slope Category with Potential Erosion

Important criteria also adopted in this M/P are slope categories with potential for erosion as defined by the Bureau of Soils and Water Management of the Department of Agriculture. Land use patterns should differ with different slope gradient due to changes in the level of erosion potential. The steeper the slope, the more limited is the range of activities that are possible whilst still attaining ecological sustainability in the use of the land. The definition of the slope categories by the Bureau of Soils are as follows.

Slope categories	Below 18%	18 – 30 %	30 - 50 %	Above 50%
Magnitude of soil erosion potential	slight	moderate	severe	very severe

(3) Present Vegetation and Land Use Categories

Existing vegetative composition and land use patterns are also used as criteria in land use planning in the M/P. Virgin forest should be left intact mainly for the purpose of conserving biodiversity, soil and water resources. Degraded areas of reproduction brush, grassland and agricultural land with a high potential for severe erosion should be subject to restoration with vegetative measures.

(4) Agricultural Land and Silvo-pastoral/Improved Pasture Lands

Sufficient area of land for agricultural purposes is secured to accommodate predicted population growth up to 2015, which means a level of approximately 120% of present agricultural land.

A minimum of 50,000 ha of lands for silvo-pasture or improved pasture land is secured in line with the land use plan in the Regional Physical Framework Plan.

Securing those areas is important for supporting the livelihood of the local people and to minimize the uncontrolled expansion of these land use patterns in the Study Area.

8.1.2 Expansion of the Protected Areas

(1) Re-delineation of Protected Area by Applying the NIPAS Policy

Current land classification has been reviewed according to the NIPAS policy in this M/P. Rules and regulations stipulated in the Act on the establishment of Protected Areas have been applied throughout the Study Area to attain a sustainable form of future land use. Therefore, the areas that are categorized under the NIPAS policy have been clearly identified (**Figure 4.6.2**), and the present land classification of Protected Area and Forestland has been largely modified in this M/P.

(2) Delineation of the Future Protected Area

Many small patches of areas were delineated under the NIPAS policies through the above procedure. As it is not realistic from the practical point of view that those areas be classified as Protected Areas, the scattered and isolated small patches of area less than about 400 ha have been excluded from the proposed Protected Area, and the areas have been consolidated and the borders have also been clearly demarcated as boundaries of the proposed Protected Areas, Forestland and Civil Reservation and A & D (**Figure 8.1.1**). The present size of Civil Reservation and A & D remains unchanged from the current condition. The present area of Protected Area will be enlarged by about four times. On the other hand, the size of Forestland is to be reduced by 45%. This proposed land classification over the Study Area is illustrated in **Figure 8.1.2**.

The overall process of developing the proposed patterns of land classification is illustrated in the following chart.

1. Present Land Classification

Civil Res. A & D (214,030 ha)	Protected Areas (89,067 ha)	Forestland (571,505 ha)

2. Application of NIPAS Policy

Civil Res. A & D (214,030 ha)	Possible Protected Area Under NIPAS Policy (347,705 ha)	Forestland (312,867 ha)

3. Proposed Land Classification

Civil Res. A & D (214,030 ha)	Proposed Protected Area (349,010 ha)	Proposed Forestland (311,562 ha)

(3) Proposed Land Use and Vegetation

New land use patterns are proposed with the concept of watershed management (**Section 7.5.2**). The above concept was fully applied and environmentally compatible use of present agricultural land, grass land and reproduction brush was proposed in the M/P. The acquisition of alternative areas for the land that is transferred to another land use category was primarily settled within the Protected Area or the Forestland separately. The following tables show conversions of present land use and proposed land use with slope gradients for each of the Protected Area and Forestland.

Proposed Land Use and Vegetation of the Proposed Protected Area

Present Land Use & Vegetation	Slope (%)	Proposed Land Use & Vegetation	Area Size (ha)	(CADC Area)
Old Growth Forest	All	Old Growth Forest	125,700	(62,800)
Mossy Forest	All	Mossy Forest	7,200	(3,900)
Residual Forest	All	Residual Forest	128,700	(65,500)
Sub-marginal Forest	All	Sub-marginal Forest	8,600	(6,100)
Pine Forest	All	Pine Forest	500	(300)
Reproduction Brush	> 50	Repro. Brush (50%)	8,000	(2,300)
		Man Made Forest (50%)	8,000	(2,300)
	30 – 50	Man Made Forest	13,000	(4,600)
	18 – 30	Agroforestry	6,700	(3,200)
	< 18	Agroforestry	3,800	(2,000)
Other Plantation	All	Other Plantation	1,000	(400)
Grass Land	> 50	Man Made Forest	9,000	(2,400)
	30 – 50	Man Made Forest	6,900	(2,100)
	18 – 30	Agricultural Land	3,700	(1,600)
	< 18	Agricultural Land	2,500	(1,100)
Agricultural Land	> 50	Man Made Forest	5,200	(2,100)
	30 – 50	Man Made Forest	4,300	(1,800)
	18 – 30	Agricultural Land	2,400	(1,200)
	< 18	Agricultural Land	1,700	(1,000)
Total			346,900	(166,700)

*) Size of areas such as bare/rocky area and water body are excluded.
Source: JICA Study Team (size of area is rounded for the third digit number)

As presented in the above table, for the present reproduction brush with less than 18% slope in the Protected Areas, agroforestry is applied instead of agriculture. This is to reduce impacts, because some vegetation is recovering within the reproduction brush. In this case, it is proposed that an alternative area for agriculture be secured within the Protected Areas. As a result, alternative agricultural land could be secured in the grass land with 18-30% slope within the Protected Areas.

Proposed Land Use and Vegetation of the Proposed Forestland

Present Land Use & Vegetation	Slope (%)	Proposed Land Use & Vegetation	Area Size (ha)	(CADC Area)
1. Old Growth Forest	All	Old Growth Forest	22,300	(5,800)
2. Mossy Forest	All	Mossy Forest	100	(0)
3. Residual Forest	All	Residual Forest	88,200	(18,300)
4. Sub-marginal Forest	All	Sub-marginal Forest	14,700	(3,600)
5. Pine Forest	All	Pine Forest	100	(100)
6. Reproduction Brush	> 50	Man Made Forest	4,500	(900)
	30 – 50	Man Made Forest	15,300	(3,000)
	18 – 30	Agroforestry	13,600	(2,600)
	< 18	Silvipasture	11,000	(1,500)
7. Other Plantation	All	Other Plantation	8,800	(700)
8. Grass Land	> 50	Man Made Forest	8,000	(900)
	30 – 50	Silvipasture	23,900	(2,600)
	18 – 30	Silvipasture	22,200	(2,500)
	< 18	Agricultural Land	28,800	(1,600)
9. Agricultural Land	> 50	Man Made Forest	3,400	(500)
	30 – 50	Agroforestry	9,600	(1,100)
	18 – 30	Agricultural Land	10,200	(1,200)
	< 18	Agricultural Land	17,000	(1,200)
Total			301,700	(48,100)

*) Size of areas such as bare/rocky area and water body are excluded.
Source: JICA Study Team (size of area is rounded for the third digit number)

The following table shows a summary of the proposed land use plan for the Study Area, and it is illustrated in **Figure 8.1.3**. The total areas proposed for agricultural and silvopastoral use are 66,300 ha and 57,100 ha, respectively.

Summary of the Proposed Land Use and Vegetation in the Study Area

Proposed Land Use & Vegetation	Size of Area (ha)			
	Proposed Protected Area	Proposed Forestland	TOTAL	(CADC Area)
1. Old Growth Forest	125,700	22,300	148,000	(68,600)
2. Mossy Forest	7,200	100	7,300	(3,900)
3. Residual Forest	128,700	88,200	216,900	(83,800)
4. Sub-marginal Forest	8,600	14,700	23,300	(9,700)
5. Pine Forest	500	100	600	(400)
6. Reproduction Brush	8,000	0	8,000	(2,300)
7. Other Plantation	1,000	8,800	9,800	(1,100)
8. Agricultural Land	10,300	56,000	66,300	(8,900)
9. Man Made Forest	46,400	31,200	77,600	(20,600)
10. Agroforestry	10,500	23,200	33,700	(8,900)
11. Silvopastoral	0	57,100	57,100	(6,600)
TOTAL	346,900	301,700	648,600	(214,800)

*) Size of areas such as bare/rocky area and water body are excluded.
Source: JICA Study Team (size of area rounded to the nearest 100)

8.2 Protected Areas and Forestland Management Plan

8.2.1 Overall Management Plan

(1) Management Activities in the Proposed Protected Areas

1) Old growth, mossy forest and sub-marginal forest

Virgin forests such as old growth and mossy forest should be strictly conserved in the proposed Protected Areas. To this end, no harvesting activities or vegetative measures will be applied, and the main management activity in these forests is patrolling to prevent illegal logging and fires.

Sub-marginal forest is also a natural forest but rather fragile. Therefore, this type of forest shall be left intact and not disturbed.

2) Residual forest

Similar to the above category, residual forest plays ecologically important roles so that it shall be protected. This type of forest may be degraded to some extent, therefore, Forest Stand Improvement (FSI) including enrichment planting and supplementary planting with indigenous tree species will be applied as the management options. This technique is aimed at improving the natural condition of the forest and not for harvesting timber.

3) Reproduction brush

Ecological restoration will be focused on the reproduction brush. Reforestation will be employed in the steeper portion (more than 30%) of this area. Assisted Natural Regeneration (ANR) will also be applied for this type of vegetation with over 50% slope for the purpose of minimizing human intervention. The areas with less than 30% slope will be vegetated with trees for agroforestry mainly to increase sub-surface water storage capacity and reduce erosion.

4) Grass land

The grass land with a slope of 18 to 30% will be used for agricultural purposes to secure necessary agricultural land within the Protected Areas.

5) Agricultural land

The proposed Protected Areas will involve existing Agricultural lands of 13,600 ha. These areas on steep slopes (more than 30%) will be converted to forest plantation areas. However, agricultural lands located on slopes less than 30% will be maintained with ecologically compatible practices. The agricultural lands within the Protected Areas should be classified as multiple-use zones and are not to be enlarged. Application of soil and water conservation measures will be encouraged in these areas.

6) Summary of the management options in the proposed Protected Areas

Management options in the proposed Protected Areas are summarized according to different slope gradients in the following table.

Management Options in the Proposed Protected Areas with Different Slope Gradients

Land Use & Vegetation	Slope < 18%	18% < Slope < 30%	30% < Slope < 50%	Slope > 50%
Old Growth Forest	- Natural Regeneration - No harvesting - Patrolling			
Mossy Forest	- Natural Regeneration - No harvesting - Patrolling			
Residual Forest	- Forest Stand Improvement (FSI) - Controlled NTFP		- FSI - No harvesting	- Nat. Regeneration - No harvesting - Patrolling
Sub-marginal Forest	- Natural Regeneration - No harvesting			
Reproduction Brush	- Agroforestry		- Reforestation - Controlled extraction	- Reforestation - Assisted Natural Regeneration (ANR) - Controlled extraction
Grass Land	- Agriculture		- Reforestation - Controlled extraction	
Agricultural Land	- Maintain present activities		- Reforestation - Controlled extraction	

Source: JICA Study Team

(2) Management Activities in the Proposed Forestland

1) Old growth, mossy forest and sub-marginal forest

Old growth and mossy forests located in the proposed Forestland are rather isolated and scattered. Management options for these forests are basically consistent with those of the Protected Areas. These virgin forests shall be strictly conserved, but harvesting/collection of non-timber forest product (NTFP) shall be permitted except in the areas over 50% slope. Sub-marginal forest would be treated as a natural forest so that this type of forest would also be protected accordingly.

2) Residual forest

Forests in this category will be enriched with the application of Timber Stand Improvement (TSI) to assist the growth of valuable trees for production. Controlled timber extraction would be permitted in this type of forest.

3) Reproduction brush

Reforestation will be applied in areas of reproduction brush with more than 30% slope. Areas of less than 30% slope would be properly utilized by means of agroforestry and silvopastoral practices.

4) Grassland

Grassland will be used for multiple purposes with different slope gradients. The upper portion of the area with more than 50% slope would be reforested, but the area with slope between 18 to 50% will be used for silvopastoral purposes. The area below 18% slope may be used for agricultural purposes.

5) Agricultural land

Present agriculture on areas with a slope less than 30% will be maintained as such and other areas will be reforested with fruit or forest trees. Conservation measures will be introduced into the agricultural activities.

6) Summary of the management options in the proposed Forestland

Management options in the proposed Forestland are summarized with different slope gradients in the following table.

Management Options in the Proposed Forestland with Different Slope Gradients

Land Use & Vegetation	Slope < 18%	18% < Slope < 30%	30% < Slope < 50%	Slope > 50%
Old Growth Forest	- Natural Regeneration - Controlled NTFP - Patrolling			
Mossy Forest	- Natural Regeneration - Controlled NTFP - Patrolling			- Nat. Regeneration - No harvesting - Patrolling
Residual Forest	- Timber Stand Improvement (TSI) - Controlled extraction			- Nat. Regeneration - Controlled extraction - Patrolling
Sub-marginal Forest	- Natural Regeneration - Controlled NTFP			
Reproduction Brush	- Silvipasture	- Agroforestry	- Reforestation - Controlled extraction	
Grass Land	- Agriculture	- Silvipasture		- Reforestation - Controlled extraction
Agricultural Land	- Maintain present activities		- Agroforestry	- Reforestation - Controlled extraction

Source: JICA Study Team

8.2.2 Rehabilitation and Restoration Plan

(1) Applicable Measures

The rehabilitation and restoration plan in the proposed Forestland includes the following vegetative measures:

- Silviculture: reforestation, FSI, TSI and ANR including enrichment planting, gap planting and supplementary planting
- Agroforestry: orchard, alley cropping, contour hedgerow planting
- Silvipasture: ecologically compatible silvopasture, ecologically compatible pasture (live fencing and hedgerow fodder planting)

- Agriculture: ecologically compatible agriculture, contour farming, in-row tillage

(2) Rehabilitation Activities in the Proposed Protected Areas

The rehabilitation and restoration plan is applicable to the residual forest (less than 50% slope), reproduction brush, grass land and agricultural land (more than 30% slope). The following table shows an applicable area for each management action with different slope gradients in the future Protected Areas.

Area for Rehabilitation in the Proposed Protected Areas

Present Land Use & Vegetation	Slope (%)	Management Activity	Area for Rehabilitation (ha)	(CADC Area)
1. Residual Forest	< 50	FSI	2,100	(500)
2. Reproduction Brush	> 50	Reforestation/	8,000	(2,300)
		ANR	8,000	(2,300)
	30 – 50	Reforestation	13,000	(4,600)
	18 – 30	Agroforestry	6,700	(3,200)
	< 18	Agroforestry	3,800	(3,200)
3. Grass Land	> 50	Reforestation	9,000	(2,400)
	30 – 50	Reforestation	6,900	(2,100)
4. Agricultural Land	> 30	Reforestation	9,500	(3,900)
TOTAL			67,000	(24,500)

Source: JICA Study Team

(3) Rehabilitation Activities in the Proposed Forestland

The rehabilitation and restoration plan is applicable to residual forest (less than 50% slope), reproduction brush, grass land and agricultural land (more than 30% slope). The following table shows the applicable area for each management activity with different slope gradients in the future Forestland.

Area for Rehabilitation in the Proposed Forestland

Present Land Use & Vegetation	Slope (%)	Management Activity	Area for Rehabilitation (ha)	(CADC Area)
1. Residual Forest	< 50	TSI	2,500	(500)
2. Reproduction Brush	> 50	Reforestation	4,500	(900)
	30 – 50	Reforestation	15,300	(3,000)
	18 – 30	Agroforestry	13,600	(2,600)
	< 18	Silvopastoral	11,000	(1,500)
3. Grass Land	> 50	Reforestation	8,000	(900)
	30 – 50	Silvipasture	23,900	(2,600)
	18 – 30	Silvipasture	22,200	(2,500)
4. Agricultural Land	> 50	Reforestation	3,400	(500)
	30 – 50	Agroforestry	9,600	(1,100)
TOTAL			114,000	(16,100)

Source: JICA Study Team

(4) Summary of the Area for Rehabilitation Activities in the Study Area

A total of 181,000 ha of the Study Area are subject to rehabilitation in the M/P. Of the rehabilitation area, about 40% of the rehabilitation activity will take place in the proposed Protected Areas and the remaining 60% will be carried out in the proposed Forestland.

Size of Area for Each Rehabilitation Activity in the Study Area

Rehabilitation Activity	Size of Area (ha)			
	Proposed Protected Areas	Proposed Forestland	TOTAL	(CADC Area)
1. ANR	8,000	0	8,000	(2,300)
2. FSI	2,100	0	2,100	(500)
3. TSI	0	2,500	2,500	(500)
2. Reforestation	46,400	31,200	77,600	(20,600)
3. Agroforestry	10,500	23,200	33,700	(10,100)
4. Silvipasture	0	57,100	57,100	(6,600)
Total	67,000	114,000	181,000	(40,600)

Source: JICA Study Team

8.2.3 Agroforestry and Silvopastoral Practice

As discussed in the previous sections, proposed agroforestry and silvopastoral areas total 33,700 ha and 57,100 ha, respectively.

Size of Area for Agroforestry and Silvopastoral in the Study Area

Development Activity	Present Land Use (slope %)	Size of Area (ha)			
		Proposed Protected Areas	Proposed Forestland	TOTAL	(CADC Area)
1. Agroforestry	Repro. Brush (18 – 30)	6,700	13,600	20,300	(5,800)
	Repro. Brush (< 18)	3,800	0	3,800	(3,200)
	Agri. Land (30 – 50)	0	9,600	9,600	(1,100)
	Total	*10,500*	*23,200*	*33,700*	*(10,100)*
2. Silvipasture	Repro. Brush (< 18)	0	11,000	11,000	(1,500)
	Grass Land (30 - 50)	0	23,900	23,900	(2,600)
	Grass Land (18 - 30)	0	22,200	22,200	(2,500)
	Total	*0*	*57,100*	*57,100*	*(6,600)*

Source: JICA Study Team

(1) Sustainable Use of the Land with Agroforestry Practice

One of the objectives of agroforestry is to increase productivity without expanding the size of the farming area. There are numerous options to take in agroforestry, and individual farmers will choose a few options or may combine some of them. Moreover, a farmer may choose to plant erosion control hedgerows that improve production of annual crops and supply fodder for livestock. The following table presents the five primary models for agroforestry practice proposed in the Study Area. These models indicate a combination of farming options that increase production and provide some rehabilitation and restoration.

Sustainable Land Use Plan with Agroforestry Practice

Plan	Species for Planting	Method	Remark
Model 1	Mango Other fruits	10×10 m (100 trees/ha) 200 other fruit trees	Fruit tree inter-planting
Model 2	Mango Fuel wood trees	10×10 m (100 trees/ha) 1,000 fuel woods	Fuel wood inter-planting
Model 3	Fruits other than Mango	5×5 m (400 trees/ha)	Planting between 5 erosion control hedgerows
Model 4	Hedgerows with annual crops	Hedgerows 5 m intervals (20 Hedgerows/ha)	Erosion control hedgerows
Model 5	Perennial legumes	2×2 m (2,500 trees/ha)	Improved fallow

Source: JICA Study Team

(2) Sustainable Use of the Land with Silvopastoral Practice

It is proposed that approximately 55% of the present grassland be converted to silvopastoral area in the Forestland. There seems to be a high demand for grazing area, although the currently existing pasture lease is only 4,467 ha. Given the negative impacts of erosion with the present pasture management with uncontrolled burning, there is an urgent need for introducing silvopastoral and improved pasture development.

Two models of silvopastoral practice as presented in the following table are proposed in this M/P. In order to develop ecologically compatible pasture management, the target pastures will be fenced off. Fencing is necessary to prevent grazing for a few years but is expensive. If these areas are prematurely opened for grazing, the newly planted forage crops will not survive or result in over grazing. With this pasture improvement of providing supplemental nutrition to livestock, the present pasture management practice of burning grass land may be discouraged.

Sustainable Land Use Plan with Silvopastoral Practice

Plan	Species for Planting	Method	Remark
Model 1	Fodder species: pasture grass and legumes	5 erosion control hedgerows	Without fencing
Model 2	Fodder species: pasture grass and legumes	5 erosion control hedgerows (fodder trees), live fence, 100 shade trees	With fencing

Source: JICA Study Team

8.2.4 Ecologically Compatible Agriculture

For the areas where cultivation is allowed for annual crops, ecologically compatible farming practice will be introduced. To these areas, sloping agricultural land technology (SALT) will be encouraged. Further, to minimize expansion of agricultural area by increasing yield of agricultural produces, intensive agriculture would also be introduced in the Forestland.

8.2.5 Responsible Bodies

DENR is a government agency that is responsible for the general supervision over the management of natural resources in the Protected Area and Forestland by providing

technical and administrative assistance. This management framework over the Study Area should be maintained in the long run. The following table summarizes responsible bodies for different management activities.

List of Proposed Responsible Bodies for the Management of Activities in the Protected Area and Forestland

Classification		Government			PAMB	NCIP	Comm. (PO)	Associ./ Firm	Indivi.
		DENR	LGU	Others					
Proposed Protected Area	Non-CBFM Area	○	-	-	◎	-	-	-	-
	CBFM Area	○	-	-	○	-	◎	-	-
	CADC/CALC	○	-	-	○	◎	○	-	-
Proposed Forestland	Area Under NIPAS Policy	○	◎	-	-	-	-	-	-
	CADC/CALC	○	-	-	-	◎	-	-	-
	CBFM Area	○	-	-	-	-	◎	-	-
	CSC	-	○	-	-	-	-	-	◎
	FLGMA	○	-	-	-	-	◎	◎	◎
	IFMA	○	-	-	-	-	-	◎	-
	SIFMA	○	-	-	-	-	-	◎	◎
	TFL	○	-	-	-	-	-	-	◎
	Agri. Land	○	-	◎[1)]	-	-	-	-	-
	Mining Land	◎	-	-	-	-	-	-	-
	Resettle. Area	◎	-	◎[2)]	-	-	-	-	-

Source: JICA Study Team

◎: Acting/main body for management/implementation

○: Supporting body for technical and/or administrative assistance

1): DAR and DA

2): DAR

Development and management of CBFMA areas will be implemented by the POs officially registered for CBFMA acquisition. DENR is responsible for providing technical and administrative support to the POs.

Some parts of the Protected Areas overlap CADC areas, and NCIP prevails over DENR's jurisdiction in such areas.

Virgin forests such as old growth and mossy forest shall be protected as part of the Protected Areas, but some of the patches of such forest also exist in the proposed Forestland. These forests are often numerous in number, small in size and scattered so that a locally based management system is more relevant as opposed to the broader management of PAMB. Therefore, it is proposed that responsibility for the management of the virgin forests located in the Forestland be devolved to LGUs.

CSC and TFL are implemented on an individual basis with appropriate permits from DENR so that responsible people make their own decisions to utilize tenured land. FLGMA and SIFMA can be implemented by individual and/or associations (firms/companies), possibly by POs as well in the case of FLGMA. Therefore, responsible bodies for those activities vary with the type of project.

DENR has the responsibility to manage mining areas. There are some overlaps between areas of mineral interests such as FTAA, MPSA, ExP, and ExPA with other administrative areas such as NIPAS and CADC so that DENR has to coordinate with PAMB and NCIP.

Land in the resettlement area (e.g. Conwap Valley) still needs to be reclassified by DENR, but a form of land title known as CLOA has already been granted to some local people by DAR. Both agencies are, therefore, responsible for the management of the area, but administrative arrangements should be made between the two agencies.

There are other types of projects that are implemented by different agencies. NIA and NAPOCOR have been running reforestation projects with the agreement of DENR.

8.3 Soil and Water Conservation Plan

8.3.1 Contribution of the Master Plan to Soil Erosion Control

The proposed land-use plan will contribute considerably to soil erosion control in the Study Area.

The present forest areas of approximately 420,000 ha will be conserved/maintained and the area of approximately 110,000 ha will be additionally reforested as man-made forest or agroforestry. With these proposed vegetative measures, the total area covered with forest in the future would increase from 60% to 77% of the PA & FL areas, or 58% of the Study Area. These land-use changes are considered to be the main contribution to soil loss reduction.

On the other hand, agricultural land would increase from current 54,000 ha to 66,000 ha along with population growth. However, according to the concept of the M/P, agricultural activity on the steeper slope will be strictly restricted and will be transferred to the lands with gentle slopes. This concept would countervail the increment of potential soil erosion resulting by expansion of agricultural land.

In addition, ANR, alley cropping and inter-cropping of agroforestry, and contour farming would contribute to soil loss reduction.

8.3.2 Indicative Future Potential Soil Erosion

Figure 8.3.1 and the table below show the future potential soil erosion on the sub-watershed basis, which was preliminarily estimated with the same methodology used for estimating present potential soil erosion (**Section 4.9.2**). This figure implies the future potential soil erosion after realizing the goal of the M/P. It shows how excessive erosion in the basin could be controlled by vegetative measures.

The comparison between the present and future potential erosion show a marked reduction in soil loss, especially in the Magat River basin. This indicates that the proposed rehabilitation plan to develop man-made forest and agroforestry in the Magat River basin would contribute considerably to the soil loss control, although it would take more than a decade to obtain the expected effect by the rehabilitation.

Indicative Future Potential Soil Erosion and Total Areas of Excessive Erosion in Each Basin

Basin	Area (ha)	Potential Erosion		Area of Excessive Erosion (ha) (Classes 4, 5 and 6)	Percentage Area of Excessive Erosion (%)
		Volume (m^3/year)	Thickness (mm/year)		
Addalam R. B.	114,776	796,000	0.7	-	-
Cagayan R. B.	342,166	4,545,000	1.3	38,299	11.2
Magat R. B.	417,660	4,498,000	1.1	76,000	1.8

Source: JICA Study Team

8.3.3 Recommendable Plan

(1) Soil Erosion Control Measures

In addition to the vegetative measures, structural measures would also be effective from the view-points of both soil erosion control and of sediment disaster prevention. In the Study, mechanical/structural measures are not formulated nor integrated into the M/P because of little data available and limited field reconnaissance. However, it is recommended that the following measures be introduced or formulated from further data collection and analysis, intensive field investigation and detailed study.

- Construction of waterways especially in the agricultural land on the slope more than 18%
- Contour bunds in the agricultural land on slopes less than 18%
- Protection works such as revetments and spur dikes against riverbank erosion from the viewpoint of farmland conservation.
- Planning of rehabilitation of the collapsed areas concentrated in the uppermost areas of the Magat River basin
- Planning of sabo works within the Magat Dam catchment area as recommended by the Feasibility Study on the Flood Control Project for the Lower Cagayan River (JICA)

(2) Accessibility Improvement for Rural Area

Accessibility to rural/mountainous areas is very poor. Easy transportation of the product from man-made forests or agroforestry to the lowlands is a prerequisite for making a contribution to stabilize the livelihood of upland people mentioned as a principle of the M/P. Therefore, accessibility improvement such as a barangay road construction should be planned and implemented for rural/mountainous areas.

8.4 Strategy for Community-Based Enterprise Development

(1) DENR-LGU-PO as Partner

There should be a close collaborative partnership between the various POs in the establishment of the community-based enterprises. DENR should assist in sourcing support for the POs from various sectors such as the LGUs, local industry

organizations, local offices of national agencies such as the DTI, DOST, the financial institutions and other sources of credit.

(2) The PO as an Enterprise

While the PO is organized to carry out the management functions needed in the sustainable management of the forest resources within the CBFM area the PO should view itself as an enterprise. The PO should therefore be imbued with a business culture.

(3) Allow households or groups to establish enterprises within the umbrella of the PO

Individual households or groups of households with entrepreneurial leanings should be encouraged to establish enterprises or undertake business ventures within the umbrella of the PO to stimulate the entrepreneurial spirit of the members.

(4) Enter into joint-venture with private sector

While there may be a considerable desire within the community to establish business enterprises, this could probably not be fulfilled because of the lack of capital or facilities necessary for undertaking it. There may be a necessity to enter into an agreement with the private sector for joint-venture activities or joint-management of certain portions of the CBFM area for the use of the private sector.

(5) Production complementation with the private sector

As discussed above, the community can enter into an agreement with private firms in a given industry sector such as the furniture or handicraft sectors for the manufacture of furniture or handicraft parts.

(6) Implementation of the Community-based Enterprise Development through Existing Units

The implementation of the enterprise development within the CBFM should be through existing units of DENR and the LGU and new organizations should not be created to implement it. In this instance it should be through the CBFM Unit at the CENRO in partnership with the Provincial ENRO.

8.5 Cost Sharing Mechanism

8.5.1 Current Cost Sharing System in Watershed Management

The importance of the multiple functions of watersheds is becoming increasingly well understood. It is obvious that securing the funds required for management of the Study Area is one of the most crucial issues to make the present management sustainable. To secure necessary funds, this section proposes the establishment of a mechanism for equitable sharing of the cost of watershed management.

It should, however, be noted that the following discussions are still at a preliminary level and subject to further discussion with the counterpart agencies and other relevant stakeholders.

(1) Use of Incentives in Improved Watershed Management

Incentives are powerful tools for achieving objectives. In the case of watershed management, the stakeholders, particularly the forest-dwellers, are likely to be influenced to change the way they use watershed areas or natural resources by the application of appropriate incentives [1]. The incentives seem to be classified into direct and indirect ones. The former means compensation given for a particular activity such as payment for specific activities, while the latter means intangibles such as skill, knowledge, technology, etc. vested to individuals who would be benefited in the long term by applying those.

Some of the incentives have already been adopted in the CBFM program such as the awarding of tenure and secure land rights and granting of tax privileges for privately grown timber (no forest charges for plantation species).

Some other incentives conceivable are improved technical assistance and support services, extension, training, and technology transfer; improved access to markets, and infrastructure support; credit access; and improved access to social services such as health, education, water, electricity and communication; and pricing policies that discourage excessive use of water.

(2) Sharing of Watershed Management Cost by Stakeholders

a) Domestic, Irrigation and Industrial Water Users

When the watershed supplies domestic, irrigation and/or industrial water to downstream users, the amount of sediment that is lodged in water bodies and reservoirs depends upon the practices adopted by the farmers or other watershed occupants. The adoption of soil and water conservation measures entails expenses on the part of the upland dwellers. There are also opportunity costs of the areas that are planted to hedgerows or where impounding dams are built. Cost of watershed management should be equally shared with all beneficiaries.

Approaches should be developed so that the downstream beneficiaries will share in the cost of watershed management. In the case of domestic and industrial water users a small fee could be added to the current price of water from the tap, which should go back to the dwellers for watershed management purposes. In the case of local water supply, Local Water Districts (LWD) could play a key role to share the costs.

Beneficiaries of irrigation systems have difficulties in paying even for the water that they use. A dialogue among the irrigators, NIA, LGUs, the upland dwellers or their organizations and DENR should be conducted to attain a consensus on how the upland dwellers could be compensated for their expenses.

[1] The Philippines Strategy for Improved Watershed Resources Management, by DANIDA, FMB and DENR, 1998.

b) Operators of Hydroelectric and Power Dams

Republic Act No. 7638 created the Department of Energy (DOE) in 1994. It also provided that DOE shall "devise ways and means of giving direct benefits to the province, city, or municipality, especially the community and people affected, and equitable preferential benefit to the region that hosts the energy resource and/or the energy generating facility."

Pursuant to DOE Energy Regulations 1-94, the National Power Corporation (NAPOCOR) collects a levy of ₱ 0.01 per kWh and these funds are held in trust at the DOE. The levy covers power generation from all the power plants in the Philippines.

The same DOE Energy Regulations allow use of the current trust funds for the following multiple purposes:

i) Twenty-five (25%) percent of one centavo (₱ 0.0025) per kWh total sales for: official resettlement or relocation sites of the community and people affected; and establishing relevant training and skills development programs for reforestation.

ii) Power producers shall set aside 25% of one centavo (₱ 0.0025) per kWh of total sales *to establish and maintain a development livelihood fund*.

iii) One-half of one centavo (₱ 0.0050) per kWh of total electricity sales for: reforestation, watershed management, health, and/or environment enhancement.

There are two hydro-power-generating plants that obtain their water resources from the Study Area, the Magat Hydro-electric Power Plant at Magat dam and the Casecnan Multi-purpose Irrigation and Power Project having water resources in the Casecnan River Watershed. The trust fund being collected under the DOE Energy Regulations presents an opportunity for the power producers to share in the cost of watershed management in the Upper Magat and the Cagayan River basins.

The most feasible mechanism to tap this source would be a Memorandum of Agreement (MOA) between the power producer and LGUs on a sharing mechanism. A dialogue among DENR, LGUs, the power producers and the stakeholders will be held to achieve a consensus on how the trust funds can be accessed and used.

The Provincial Government of Nueva Vizcaya has prepared a position paper for submission to the Steering Committee of the DOE and to the Joint Congressional Power Commission. The position paper presents a case for Nueva Vizcaya to be a Host LGU of energy-resources in order to become entitled to a higher share in the proceeds derived from the utilization and development of its resources[2].

[2] An Appeal: Nueva Vizcaya Must be a Host LGU. The Provincial Legal Officer and Staff, Nueva Vizcaya. November 8, 2001.

c) Sharing of Watershed Management Cost Mining Operations

Mining operations are a cause of watershed degradation. It is logical that mining operations should share in the cost of managing the watersheds, particularly in the restoration of the watershed. It is presently practiced that mining operators make environmental guarantee fund deposits to: i) take care of any environmental impacts that the operations might cause; and ii) guarantee the restoration efforts of the mined areas. The upland occupants whose livelihoods have been affected should be compensated in an appropriate manner.

8.5.2 Establishing Cost Sharing Mechanism

There are instruments available for collecting domestic water charges, irrigation service fees, levies for power supply, and compensation for mining. However, they have different objectives and have had no coordination with each other. Therefore, except for part of the levy collected by NAPOCOR, they are not necessarily being utilized for watershed management purposes, and funds available are far below the required amount.

It is of utmost importance to establish a total cost sharing mechanism to recover the required costs for implementing sustainable management of the Study Area as a whole.

Starting with using the existing instruments of cost sharing in the Study Area, a total cost sharing mechanism should be established in the future to secure the necessary funds for the sustainable watershed management. To this end, a task force team should be formed by and among DENR, LGUs, and relevant OGAs. Thorough discussions on the following mechanisms for cost sharing should be conducted:

- Scope of stakeholders;
- Role and responsibility of stakeholders;
- Fund management;
- Sharing ratio/amount of each stakeholder;
- Modality of cost sharing;
- Necessary organizational structure;
- Others

8.6 Establishment of Watershed Management Council

Watersheds covering areas beyond the jurisdiction of one administrative region or even one province need collaborative efforts between regions or between provinces. There are two large watersheds in the Study Area, the Upper Magat River Watershed and the Upper Cagayan River Watershed. In the case of Magat River Watershed, two regions are involved, CAR and Region 2, and three provinces. For the Cagayan River Watershed there are three provinces involved. There is also the fact that several agencies and organizations such as DENR, LGUs, NAPOCOR, NIA, PAWB, NCIP, etc., are involved in the management of portions of the watershed. A coordinating body is necessary to bring all related entities into a single stream to share the same goal.

The idea of Watershed Management Councils (WMC) goes back to Memorandum Order No. 421 on March 2, 1992, creating the Lake Lanao Watershed Protection and Development Council and for Other Purposes[3]. This was brought about by a power crisis in Mindanao apparently due to decreasing volume of water in Lake Lanao.

The number, type, and structure of organizations to manage the Upper Magat and Cagayan River Basin Watershed are left to the stakeholders to decide. However, the possible functions of the organizations are as follows:

a) Formulate policies and guidelines in the management of the watershed;

b) Coordinate the planning and implementation of projects within the watershed;

c) Monitor the implementation of various projects within the watershed area of jurisdiction of the WMC; and

d) Provide assistance on the socio-economic activities of upland communities.

The probable members of the Council include the DENR REDs, Governors of provinces within the watershed, municipal mayors or even barangay chairpersons, PENROs and CENROs, government corporations operating infrastructures in the area such as the NIA and/or NAPOCOR, other government agencies such as NCIP, DA, and DAR, representatives of communities, NGOs, religious groups, etc. The RED or the Governor of the province, which has the largest area within the watershed, could be the Chair of the WMC, or it could be rotated between DENR and the Governors.

The financial requirements of the WMC could be the responsibility, in this instance, of NAPOCOR and/or NIA, which are operating the hydroelectric power plants. A portion of the trust funds from the sale of electricity, as provided for in DOE EM No. 94-1, could be used to finance the activities of the WMC.

8.7 Institutional Strengthening Plan

8.7.1 Overall Strengthening Plan

The plan for the strengthening of watershed management in the Study Area encompasses the following:

a) Manpower complement where it is very necessary to do so;

b) Provision of needed vehicles to improve ability to respond to the requirements of watershed management;

c) Provision of needed equipment for implementation of field projects;

d) Provision of needed equipment for database and information management necessary for planning, monitoring and evaluation and technology acquisition and transfer;

e) Provision of supplemental budget for field units so that they can respond effectively to the needs of clients; and

[3] As cited in: Audit on Institutional Framework. Formulation of a Watershed Management Strategy and Investment Programme. Ministry of Foreign Affairs, DANIDA, DENR and FMB.

f) Establishment of a protocol for technology acquisition and transfer;

g) Establishment of Watershed Management Council(s) within the Study Area.

While the plans of a)-e) stated above are straightforward, the plans of f) and g) need further explanation. The following two sections describe details of the proposed plan.

8.7.2 Increase in Manpower, Mobility, Equipment and Operation Funds

Institutional strengthening includes an increase in manpower, mobility, equipment and operation funds. The implementation plan of these is explained in Chapter 9.

8.7.3 Establishment of Protocol for Technology Acquisition and Transfer

1) Target Groups: The process of technology acquisition and transfer (TAT) involves three groups, namely the technology users, technology generators and the technology brokers. For the Study Area the following are the identified technology users, generators and brokers.

   - Technology Users (e.g. CBFM POs; DENR field officers; individual /household participants in watershed management activities but not a member of a PO; etc.)
   - Technology Generators/Sources (e.g. Ecosystems Research and Development Bureau (ERDB), State Colleges and Universities (SCUs), Ecosystems Research and Development Service (ERDS), Non-Government Organizations (NGOs), Department of Trade and Industry (DTI), Department of Science and Technology (DOST), Technology and Livelihood Resources Center (TLRC), etc.)
   - Technology Brokers (PMOs, CENRO/PENRO and Regional Units, Prov. ENROs, NGOs, Industry Associations, etc.)

   The target groups of the capability building within the framework of institutional strengthening will consist of the following:

   - The program/project planners and managers;
   - The program/project implementers composed generally of field personnel who work directly with the beneficiaries or targets of the program/projects; and

   Program/Project Planners and Managers – As far as DENR is concerned, these include the CENRO, PENRO and Regional Staff, who provide guidance in planning and direction for program implementation and also conduct monitoring and evaluation of the programs/projects. Where the program/project is implemented by organizations other than DENR such as Provincial ENRO or other government agencies, the Planning Staff and Supervisors belong to this group.

   Program Implementers – At the DENR these are the field units at the CENRO. They work directly with the program/project beneficiaries. In the case of the CBFM program it is the CBFM Unit at the CENRO, which is responsible for

implementing the CBFM program. The Provincial ENRO also belongs to this group.

2) Procedure for Technology Acquisition and Transfer: The following is the suggested procedure for technology acquisition and transfer. For illustrative purposes, the CBFMA POs are taken as examples. However, the procedure can be applied to the acquisition and transfer of biodiversity conservation technology or similar technologies.

   a) **Technology Needs Assessment -** A technology needs assessment is conducted in the CBFMA PO with the assistance of the PMO and/or the CENRO CBFM Unit Chief. The help of NGOs or other organizations such as local State Colleges or Universities may be sought.

   b) **Search for Sources of Technology –** The PMO/CENRO CBFM Unit Chief will search for the specific technology from among potential sources such as the state colleges and universities, local offices of national government agencies such as the DTI, DOST, TLRC, etc.

   c) **Acquisition of the Technology –** When the appropriate technology has been found, arrangements should be made for its acquisition.

   d) **Transfer of the Technology –** Transfer of technology would be conducted by means of: training the users on the technology; demonstrations; visits to technology installations nearby; or visits to other farmers' fields in nearby barangays, municipalities or provinces. The arrangements for the technology transfer could be made by the Technical Transfer Unit (TTU) and/or the PENRO/CENRO CBFM Unit.

   e) **The Technology Acquisition and Transfer Chain at DENR –** The procedure of setting up a technology acquisition and transfer (TAT) and TAT chain have to be established.

8.7.4 Training of Field Personnel

As stated earlier, the training contemplated in this Section is for the DENR field personnel of Region 2, the PENRO, CENRO and Provincial ENRO staff, project implementers and project managers.

A tentative training program is prepared as a basis for estimating the investment requirements for training. However, the tentative program will be validated with the intended participants prior to planning the actual arrangements and delivery of the training. The training program will consist of a) technical areas identified by each of the sectors, b) general orientation courses, and c) training courses for PM/PMOs and project implementers. The general topics under these categories are given below.

1) Watershed Management

   a) Watershed management and soil conservation
   b) Plantation technology
   c) Basic watershed management
   d) Structural and basic soil stabilization technology

2) Community-based forest management

a) Upland farming systems
b) Livelihood and enterprise development
c) Community organizing
d) Techniques on participation
e) Organization building framework for the uplands
f) Applicable agro-forestry technologies
g) Community mapping and micro land use planning
h) Financial management and bookkeeping
i) Capability enhancement on reforestation
j) Livestock production
k) Linking and networking

3) Forest Protection

a) Paralegal training
b) Forest fire prevention and control
c) Paramilitary training
d) Forest surveying
e) Training on preparation of complaint and documents relative to filing of cases in court
f) Community organizing
g) Training on investigation of forest violations
h) Orientation seminar on forestry laws, rules and regulations

4) Protected Areas and Wildlife Management

a) Protected Areas and Wildlife System profiling and ecological development training
b) Cave assessment
c) Wildlife management
d) Community organizing
e) Biodiversity monitoring system
f) Information on biological and genetic resources
g) Park management system
h) Orientation on protected areas laws and regulations
i) Maintenance and protection of Protected Areas
j) Advance learning on wildlife identification and management
k) Flora and fauna identification
l) Ornithology
m) Spelunking and orni-tourism management
n) Aerial wildlife management

5) Community Organizing and PO Capability Building

a) Rural appraisal, possibly using sociological and anthropological survey/analysis methods and Participatory Rural Appraisal (PRA)
b) Identification and delineation of potential CBFMA area, master listing of forest occupants, consensus building and PO formation
c) Community-level participatory planning skills

The capability building plan will consist of formal and informal training. Formal training will involve DENR and Provincial ENRO personnel, particularly those in program/project management and implementation. This will entail study for a Master or Ph.D. qualification either locally or abroad. Where the expertise could not be sourced locally, then the formal training can be done abroad.

Informal training will consist of short-term training courses, either in the confines of classrooms or on-site. More likely it will be a combination of the two. Often technical skills can also be acquired through visits to projects in neighboring countries particularly the ASEAN countries and in Japan. This would also be a strategy that will be adopted in capacitating program implementers.

8.8 Capability Building Plan for POs/IPOs

8.8.1 Target Communities and Duration

Within the Study Area, there are 408 barangays within the Forestland and Protected Areas that cover more than 20% of the total barangay size. Assuming that one CBFM PO/IPO be formed in each barangay, 408 POs/IPOs have to be organized during the M/P period from year 2004 to 2015. To date 40 POs with CBFMA were already established, and hence the remaining 368 CBFM POs/IPOs will be formed during the M/P period.

While total target rehabilitation area (181,000 ha) is approximately 27.4% of total Forestland and Protected Areas (660,572 ha), thus, 112 POs/IPOs or 27.5% of the 408 are estimated to be formulated for the rehabilitation work.

8.8.2 Purposes and Strategies

Since POs/IPOs are the main implementers of the rehabilitation and management of the degraded Forestland and Protected Areas, the POs/IPOs should have capability to execute the rehabilitation and management. In this sense, support to the implementation of the rehabilitation and management is the process of capacitating the POs/IPOs. However, conventional assistance to reforestation and natural resource protection does not necessarily enhance the capabilities of POs/IPOs. There should be particular effort to derive the proper management of natural resources to PO/IPO capability building. The effort includes the technical assistance in the designing, planning, coaching, guiding, monitoring and evaluating of the main component of Master Plan implementation, such as social preparation, community organizing, community appraisal, PO/IPO formation, participatory planning, organizational development and rehabilitation work.

Since there are experienced organizations, such as NGOs, which have been engaged in the PO capability building, DENR/NCIP should outsource those to maximize the efficiency and effectiveness of its assistance. Therefore, major work of PO/IPO capability building work for the Master Plan implementation will be contracted out to assisting organizations.

DENR/NCIP should focus on the monitoring and evaluation of assisting organizations as well as the technical assistance to POs/IPOs pertaining to rehabilitation work. For this, the levels of achievement and benefit of the M/P should earn special attention, and DENR/NCIP should make significant efforts to disseminate the importance and benefit of this plan during the implementation.

The following sections discuss the main points of PO/IPO formation plan.

8.8.3 Accountability and Transparency of POs/IPOs

The Capability Building Plan would focus on the technical assistance in the establishment of a standard organizational structure for the PO/IPO and promote it to all the POs/IPOs. The standard structure would give the appropriate authority and responsibility of the General Assembly and clearly delineate the functions and accountability of the executive body. The structure would also clearly illustrate the responsibility and rights of the Board of Directors (BOD). Necessary by-laws and organizational regulations should be formulated in conjunction with the organizational structure and enforced properly. Assisting organizations will be used to provide proper technical assistance to POs/IPOs in this regards, and DENR/NCIP would closely monitor the enforcement of by-laws and take any necessary actions to prevent the mismanagement of funds and abuse of power.

8.8.4 Human Resource Development

The capability building plan for the POs/IPOs would include training on the intensification of farming to replace the extensive slash and burn farming. In addition, the human resource development would be executed in the area of local policy and legislation, such as the creation of a village ordinance to regulate natural resource extraction.

The training and education of PO/IPO members and leaders will focus, not only on techniques of reforestation, agroforestry or farming but also on organizational management and leadership. The training will be provided in the form of on-the-job training with the implementation of rehabilitation of the degraded Forestland/ Protected Area, community-based enterprise development, etc. Participation of women will be encouraged in order to enhance opportunities for women to participate in social activities.

8.8.5 Incentive Program and Membership Recruitment

The capability building plan will emphasize the technical assistance in the development of micro credit services, purchase and sale of discounted farm supplies and commodity goods, provision of dividends, patronage refunds, market information, training and education, promotion of livelihood activities and rental service of farm equipment/facilities. Establishing the above services would provide incentives for PO/IPO members, and the services would generate revenue needed for the sustainability of organization.

8.8.6 Financial Management of POs

In addition to launching revenue-generating services, PO leaders and members will have training on financial management so that they could pursue proper financial management. As the training has its limitations, initial inputs should be provided for the establishment of services.

8.8.7 Linkages with External Societies

The PO/IPOs development initiatives will focus on strengthening external linkages of POs/IPOs with government agencies, donors, NGOs and the market. The POs/IPOs are expected to develop their ability to proactively establish connections with external societies and enhance the inflow and outflow of resources and information to and from the community. Assisting organizations are expected to provide proper technical assistance in the PO's/IPO's activities stated above.

However, the assisting organizations and the public agencies should try to prevent communities from developing a physical and mental dependency on external interventions. They should, rather, enhance the sustainability of development efforts and self-help of communities through income generating projects such as animal husbandry, cottage industry and business development that would enhance community independence.

CHAPTER 9 IMPLEMENTATION PLAN

9.1 Priority and Grouping the Sub-Watersheds (SWS) for Implementation

9.1.1 Priority of SWSs for Watershed Management Needs

In accordance with DAO 99-01[1], the Study Area was divided into 133 sub-watersheds (SWSs) as units for watershed management. In order to determine priority ranking of the 133 SWSs regarding management needs, the SWSs were first examined according to the two principal conditions, viz., natural conditions and social conditions. All SWSs were classified into 7 categories, separately, under different parameters of social and natural environmental conditions.

In the examination of the natural conditions, three indexes were used to assess relative effectiveness of soil loss reduction. Those are: i) mass reduction; ii) erodible layer reduction; and iii) the ratio of rehabilitation area against entire SWS area. The first index means total soil loss reduction derived from the rehabilitation of degraded land and represents the impact to the downstream area. The second one indicates the difference in the thickness of possible sheet erosion before and after project conditions and represents on-site impact. The third one indicates the seriousness of deterioration in SWS (**Appendix 5**).

Management needs in respect of social conditions were examined based on the dependency ratio of upland dwellers on agriculture and poverty level as the main indicators (**Appendix 6**). The results of the examination are shown in **Figure 9.1.1** for the natural conditions and **Figure 9.1.2** for the social conditions.

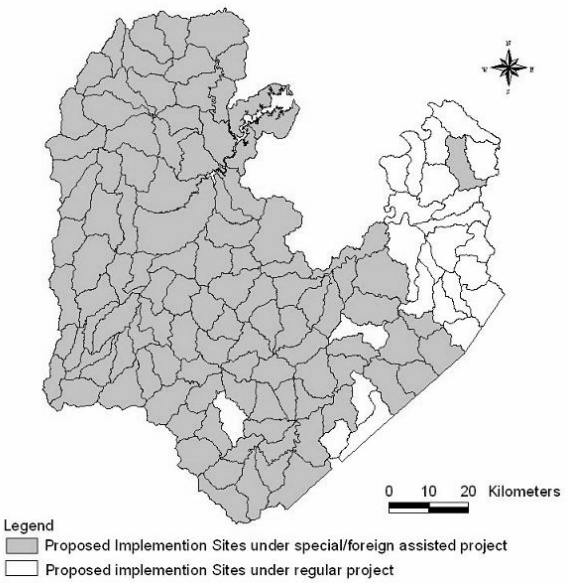
In order to determine the overall score of each SWS reflecting natural and social aspects, natural environment was weighted for 75% because there were three parameters involved in the natural environment while there was only one parameter in the social aspect that involves some uncertainty at *barangay* level. Each of the grouped SWS was given a score of 1 to 7, and the overall score was calculated as having the average score of the four parameters. The result is shown in **Table 9.1.1** and **Figure 9.1.3**.

9.1.2 Grouping SWSs by Implementation Mode

Aside from the priority ranking for management needs, raking the SWSs was made with the size of possible reforestation and agroforestry areas (**Table 9.1.2**). Then the ranked SWSs were grouped into two categories, i.e., the SWSs with the possible reforestation and agroforestry area of more than 100 ha and the ones with the areas less than 100 ha. It is assumed that the 109 SWSs belonging to the former category would be implemented as special/foreign assisted projects under the management of FASPO, while the remaining 24 SWSs included in the latter one would be implemented under regular projects through PENROs/CENROs. For the implementation of the special/foreign assisted project, it is proposed to establish an organization that will be exclusively responsible for executing the project (**Section 9.2**).

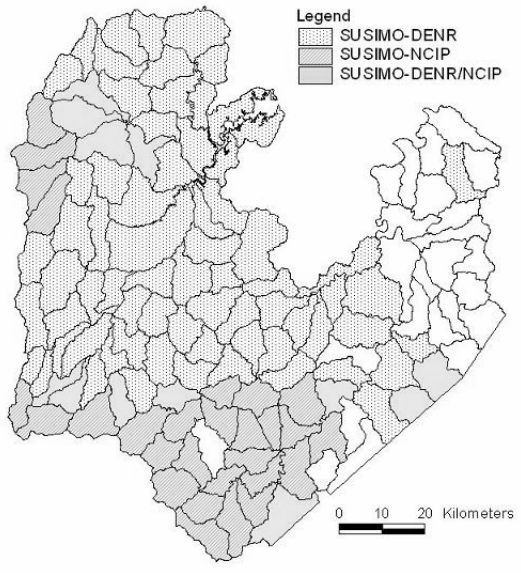
[1] DAO No.1 issued in 1999: Governing the watershed as planning framework.

Further, the SWSs were grouped into the ones with CADC areas and without CADC areas (**Table 9.1.3**). It is also assumed that management of the SWS with CADC area more than 80% of the basin area would be implemented mainly by NCIP, that of the SWS with CADC area between 79-21% of the basin area would be implemented by both the NCIP and the DENR, and that the rest would be implemented by DENR.



9.2 Institutional Framework for Implementation of Watershed Management Projects

A variety of responsible bodies have been identified for the management of watersheds by different land classifications and tenures (**Section 8.2.5**). Institutional framework for watershed management projects could broadly be divided into two types. Those are the ones for the implementation of watershed management under special/foreign assisted projects and those under regular projects with regular budgets. Institutional framework for implementation discussed here is for the special/foreign assisted project. In the following sections, two proposed institutional frameworks are presented for implementation of the two major watershed management projects, i.e., the implementation frameworks for watershed management projects under CBFMP on non-CADC areas and that for projects on CADC areas.



9.2.1 Institutional Framework for the Implementation of Watershed Management Projects under CBFMP on Non-CADC Areas

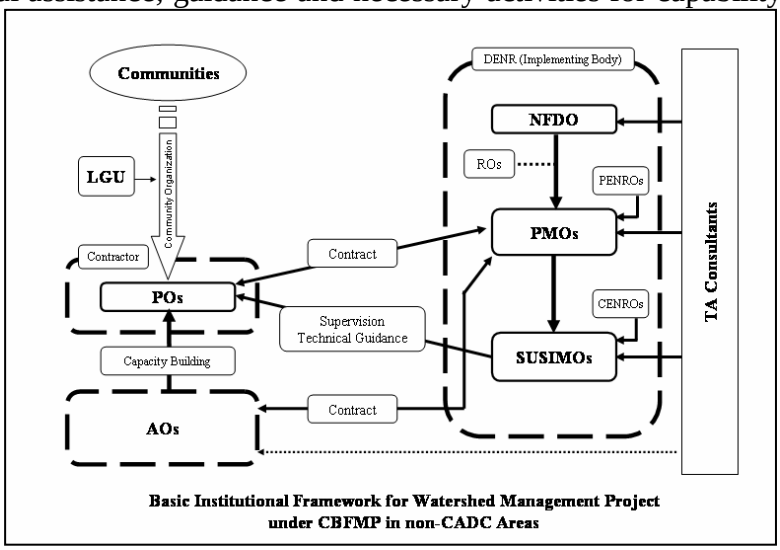
The DENR through the National Forestation Development Office (NFDO) will be responsible for the implementation of the watershed management project as the sole

executing agency. At the provincial level, Project Manger Offices (PMOs) would be established based at the DENR Provincial Environmental and Natural Resources Office (PENRO). At the sub-watershed level, Sub-project Site Management Offices (SUSIMOs) would be established. Each PMO will enter into contract with CBFM POs for the implementation of the watershed management project in each CBFMA area concerned. The SUSIMO will be responsible for supervising and monitoring of the implementation by the POs and provide them with technical assistance on the matters relevant to the implementation.

The PO will be the sole implementing body for the watershed management project.

Assisting organizations (AOs) will be employed by NFDO or PMO to provide the POs with the services of technical assistance, guidance and necessary activities for capability building. A technical assistance consultant team (TA consultant) will provide consulting services to NFDO, PMOs and SUSIMOs to improve the implementation of the projects.

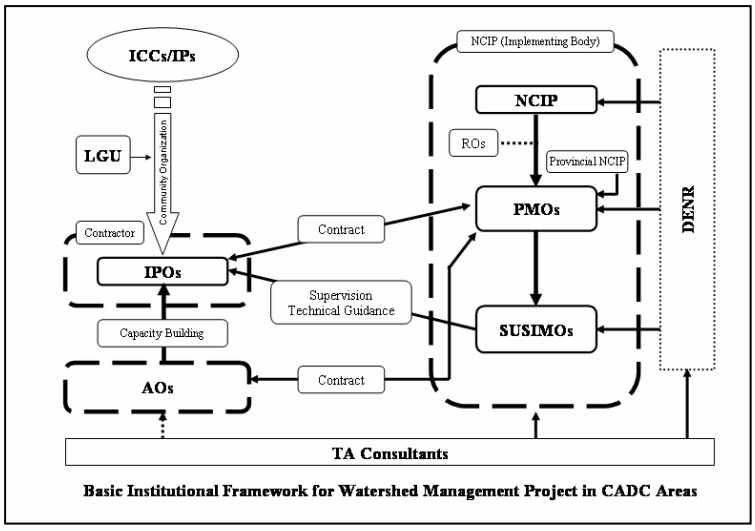
This framework will be applied not only for the non-CADC areas but also for part of the CADC areas where CBFM approach is applicable.



Basic Institutional Framework for Watershed Management Project under CBFMP in non-CADC Areas

9.2.2 Institutional Framework for Implementation of Watershed Management Projects on CADC Areas

A National Ancestral Domain Sustainable Development and Protection Plans (ADSDPP) project office would be established, as the sole executing agency, in the NCIP for the implementation of the watershed management projects in CADC areas. At the provincial level, PMOs will be established based at the Provincial NCIP Office. At the sub-watershed level, SUSIMOs would be established. Each PMO will enter into a contract with Indigenous People's Organizations (IPOs) for the implementation of watershed management projects in each IPO area concerned. The SUSIMO will be responsible for supervising and



Basic Institutional Framework for Watershed Management Project in CADC Areas

monitoring of the implementation by the IPOs and provide them with technical assistance on the matters relevant to the implementation.

The IPO will be the sole implementing body for the ADSDPP projects.

AOs will be employed by the National ADSDPP project office or PMO to provide the IPOs with the services of technical assistance, guidance and necessary activities for capability building. A technical assistance consultant team (TA consultant) will provide consulting services to the National ADSDPP project office, PMOs and SUSIMOs to improve the implementation of the projects.

9.3 Proposed Work

9.3.1 General Perspective

Proposed project work included in this M/P are: i) preparatory work, ii) community organizing and PO/IPO formation, iii) participatory planning, iv) rehabilitation of degraded Protected Areas and Forestland, v) community-based enterprise development, vi) establishment of watershed management council for watershed management in the Study Area; vii) establishment of cost sharing mechanism for watershed management in the Study Area; and viii) institutional strengthening, and ix) PO/IPO capability building,.

9.3.2 Preparatory Work

Preparatory works will include: i) survey and mapping; and ii) establishment of institutional organizations.

(1) Survey and Mapping

The following survey and mapping will be conducted prior to PO/IPO formation.

a) Mapping with accuracy of 1:10,000
b) Watershed-wise socio-economic baseline survey including data needed for the classification of target communities (**Section 9.3.3**).
c) PO/IPO-wise socio-economic baseline survey
d) Silvo-pasture development study
e) Preliminary study on community based enterprise development

(2) Establishment of Institutional Organization

The following number of PMOs and SUSIMOs would be established for watershed management projects possibly implemented under special/foreign assisted project. It is assumed that the special/foreign assisted projects would encompass the SWSs having proposed man-made forest/agroforestry plantation area of more than 100 ha in a SWS. Those SWSs are 109 in number and 727,953 ha in aggregated SWSs area.

The following table shows the number of the PMOs and SUSIMOs to be established under DENR and NCIP. Tentative location of the SUSIMOs is shown in **Table 9.1.2**.

Number of Implementation Offices

Executing Agency	PMOs	SUSIMOs
DENR	4	81
NCIP	4	40
Total	8	121

9.3.3 Community Organizing and PO/IPO Formation

Community organizing and PO/IPO formation will be executed for 408 *barangays*/ICCs, including 112 *barangays*/ICCs that are target for the rehabilitation work and 296 *barangay*s/ICCs that are not subject to rehabilitation but have Forestland and Protected Areas that are larger than 20% of the size of the *barangay*. Community organizing and PO/IPO formation include the activities described below, and all the activities would be assisted by AOs.

Community organization & PO formation	**Community organization & IPO formation**
(1) Preliminary identification of potential CBFMA areas: DENR will identify potential CBFMA area using maps and other data available.	(1) Re-confirmation of CADC area: NCIP, possibly with the technical assistance of DENR, will re-confirm the CADCs area of some 241,600 ha on the map. In addition, the NCPI should preliminary identify the target areas of possible IPOs.
(2) CBFM campaign to communities, LGUs and other stakeholders: DENR will contact communities and LGUs concerned and organize a series of consultation meetings with those stakeholders to explain CBFMP and the M/P and induce them to participate to the CBFMP.	(2) Information dissemination to customary elders and ICC members pertaining to the project implementation.
(3) Enhancement of Social Development Potentiality: DENR will conduct information dissemination and discussion of the M/P and CBFMP with the community leasers and potential PO members. DENR and AOs will identify potential local leaders and support the leadership development and visioning. The community will raise awareness about their environment and prepare for the internalization of external development interventions.	(3) The discernment of free and prior informed consent: The acceptance of the project should be confirmed through appropriate assemblies in accordance with customs and traditions of IP and affirmation of the decision of recognized council of elders ICC/IP
(4) PO registration: The local leaders organize themselves as PO originators, prepare PO by-laws and other documents required for registration and apply for Cooperative Development Authority (CDA), SEC, Department of Labor and Employment (DOLE) or other registration agencies.	(4) The assistance for customary elder: NCPI should provide assistance to ICC leaders when and if necessary and appropriate.
(5) Recruitment of PO members: After the registration, the PO will elect its directors and officers. The PO administration will prepare master list of forest occupants and users, and recruit the PO members based on the master list.	(5) IPO formation: The leaders will organize Indigenous People Organizations (IPOs), and register it to the NCIP Provincial Office concerned with necessary documents.
(6) Identification of CBFM areas and consensus building: DENR and the PO will jointly decide the CBFMA area.	(6) Census of ICC members: NCPI should conduct the census of all ICC members within the target area for the project and complete the listing with proper information of ICC members.

(7) Perimeter survey of the selected CBFM areas: The survey will be conducted by DENR in collaboration with the PO.	(7) The elders should disseminate the information on the project to all ICC members to be affected by the project and complete the petition of the members.
(8) CBFM acquisition: CBFMA application with necessary documents will be prepared by the PO and submitted to DENR.	(8) Perimeter survey of project sites: Regional Survey Division of NCPI should conduct the perimeter survey of project area. DENR and other government agencies should be consulted during the delineation and all land conflicts should be resolved.

Community organizing described above as well as activities that follow the community organizing will be more effectively and efficiently conducted, if the situations of communities are analyzed and classified beforehand based on the 3 basic aspects, namely resource, institution and social norm. The entry point, sequence and intensiveness of assistance from DENR and AOs can be determined using the classification. For each aspect, the following criteria can be adopted for the classification of situations of communities.

Aspects	Criteria
Resource	- Access to both internal and external resources and services needed for development activities
	- Availability of technologies for the generation of benefits
	- Availability of public facilities that enable the participation of community people to the utilization and management of resources
Institution	- Existence of mechanisms for substantial participation and mutual help
	- Experience of democratic management of community organizations
	- Achievement of leadership development
	- Existence of various community organizations with different functions and appropriateness of their coordination
	- Existence of a network with external organizations (such as POs, government agencies and NGOs)
Social Norm	- Level of consciousness for social change
	- Maturity of consciousness and willingness to contribute to public activities
	- Level of cohesiveness of the community as a social unit for development

Source: Ohama, Yutaka "Participatory Local Social Development and Rural Social Institutions", JICA, 1997 (original text is in Japanese and translated by JICA Study Team)

9.3.4 Participatory Planning

(1) Participatory Planning under CBFMP

A Community Resource Management framework (CRMF) and action plan (AWP) will be formulated for each of the CBFMA areas by the PO concerned with assistance from DENR and assisting organizations.

1) Social Survey on CBFM Area Users/Occupants/Claimants

The social survey will cover all POs with CBFMA and will adopt the participatory survey approach and Participatory Rural Appraisal (PRA) method.

The social survey aims to collect data and information usable for the POs to formulate and implement the CRMF and AWP as well as policies and institutions that enable the POs to properly manage the CBFM areas. The social survey will include the following activities:

a) Institutional survey;
b) Survey on current practices of Forestland management (including burning and timber poaching);
c) Economic/agricultural activities directly and indirectly related to Forestland management including burning and timber poaching; and
d) Identification of Problems and conceivable solutions.

2) Planning

The conceivable solutions worked out by the PO will be elaborated into plans. The plan for the proper CBFMA area management will be incorporated into larger plans to be formulated under the Project, including CRMF, AWP and detailed implementation plan.

The CRMF will cover the land use plan, rehabilitation plan for the degraded land, CBFMA area management plan including harvesting plan of the forest timber products and NTFP. Consistent with the CRMF, an AWP will further be formulated by the PO concerned.

3) Evaluation on the PO Formation and Planning

Before enter into the implementation stage, the accomplishment and outcomes of PO formation and planning will be assessed by DENR through the following activities:

a) Evaluation of by-laws, organizational structure and member list;
b) Validation of master list of forest occupants and users;
c) Evaluation of-CBFM perimeter map; and
d) Evaluation of social survey, CRMF and AWP.

To the POs for rehabilitation work, the following items should be added:

e) Evaluation of established working groups/committees for the Project (with organizational policies describing the roles and responsibilities of working groups/committees and their members); and
f) Evaluation of approved organizational policies on benefit sharing between the CBFM occupants and PO.

(2) Participatory Planning for Ancestral Domain Development and Protection

In order for ICCs/POs to freely pursue their economic, social, political and cultural development of the CADC areas where CBFMP is not applicable in the Study Area, the IPOs, with the assistance of the NCIP, will formulate ADSDPP in the following procedure:

a) Information dissemination: The Council of Elders/Leaders will conduct intensive information dissemination on the IPRA among the community members.
b) Baseline survey: The Council of Elders/Leaders will conduct a participatory baseline survey of the CADC areas focusing on the existing population, natural resources, development projects, land use, sources of livelihood, income and

employment, education and other concerns.

c) Development needs assessment: The Council of Elders/Leaders will conduct development needs assessment through workshops at every *barangay* in the CADC areas.

d) Formulation of ADSDPP: Based on the above, the IPOs concerned will prepare ADSDPP.

e) Validation of ADSDPP: The IPO will conduct assemblies among IPO members for the validation and approval of the ADSDPP.

f) Submission of ADSDPP to NCIP: Upon validation and approval, the IPO will submit the ADSDPP to the NCIP for their information and concurrence.

9.3.5 Rehabilitation of Degraded Protected Areas and Forestland

Total area for the rehabilitation of degraded Protected Area and Forestland within the Study Area was proposed to be 181,100 ha. The area for each activity in the project is summarized in the following table.

Proposed Rehabilitation Activity on the Degraded Protected Areas and Forestland

(Unit: ha)

Rehabilitation Activity	Total Area for Rehabilitation
1. Assisted Natural Regeneration (ANR)	8,000
2. Forest Stand Improvement (FSI)	2,100
3. Timber Stand Improvement (TSI)	2,500
2. Reforestation	77,600
3. Agroforestry	33,700
4. Silvipasture	57,100
Total	181,000

Source: JICA Study Team

(1) Seed Production

It is essential that a sufficient amount of good quality seeds be secured to supply the required number of seedlings for reforestation of 77,600 ha by the year 2015. However, capability of the seed production at Seed Production Areas (SPA) in and around the Study Area is currently insufficient to meet the requirement. Therefore, the required seeds will be secured through the following measures:

- Identify existing plantations including those that contain good mother trees as sources of seed supply
- Monitor and provide information on the above plantations
- Strengthen seed supply capacity of SPA
- Storage of seeds for which storage technique has been established

(2) Nursery Establishment

For effective planting with a sufficient supply of planting stocks, flying nurseries will be established in each SWS. This type of nursery will be temporarily established near planting sites for use for usually less than five years.

It is estimated that 500 flying nurseries should be established assuming that forest tree plantation be established in seven years. A typical small-sized nursery of 500 to 600 m^2, producing 100,000 seedlings per annul has been used as a basis for this estimate.

(3) Plantation Establishment

a) Forest and Agroforest Trees Plantation

Yemane is generally accepted and the most extensively planted tree species for plantation throughout the Study Area. However, selection of the tree species will be made taking into account: i) land classification; ii) proposed land use plan; iii) soil conditions; iv) willingness of the local people concerned; and v) socio-economic conditions such as access roads to plantation sites and marketability of the trees. Tree species conceivable for the forest and agroforest tree plantation in the Study Area are listed below: i) forest trees species; Japanese acacia (*Acacia auriculiformis*), mangium (*Acacia mangium* Willd), alder (*Alnus spp.*), yemane (*Gmelina arborea*), Benguet pine (*Pinus kesiya* Royle ex Gordon), Carribean pine (*Pinus carivaea* Morelet), narra (*Pterocarpus indicus*), ipil (*Instia bijuga*), molave (*Vitex parviflora* Juss), mahogany (*Swietenia machrophylla*), teak (*Tectona grandis*), white lauan (*Shorea contorta* Vidal), baktican (*Parashorea malaanonan*), palosapis (*Anisoptera thurifera* Blume spp), bamboo; and ii) agroforest tree species; mango (*Mangifera indica* Linn.), rambutan (*Nephelium lappaceum*), lanzones (*Lansium domesticum* Correa), citrus (*Citrus* Linn.), cashew (*Anacardium occidentale* Linn.), jackfruit (*Artocarpus heterophyllus* Lam.), guyabano (*Annona muricata* Linn.), coffee (*Caffea arabica* Linn), cacao (*Theobroma cacao* Linn.).

For the planting of trees, mixed planting will be encouraged. Mono-cultural forests are susceptible to diseases and other natural disasters so that mixed planting with fast-growing and slow growing species will be selected. Furthermore, under-planting with wild seedlings of endemic species such as shade-tolerant trees, i.e. Dipterocarp spp., will also be encouraged.

b) Silvopastoral Plantation

Two types of silvopastural plantation are proposed. One is improved pasture development consisting of a combination of pasture grass and leguminous fodder species, while the other one is a spatial arrangement of pasture grasses and hedgerows. Conceivable species are: i) Napier grass (*Pennisetum purpureum*), Kennedy grass, and Guinea grass (*Panicum maximum*) for pasture grass; ii) Centro (*Centrosema pubescens*), Stylo (*Stylosanthes guyanensis*), and Arachis (*Arachis pintoi*) for leguminous fodder crops; and iii) kakauate (*Gliricidea sepium*), ipil-ipil (*Leucaena leucocephala*), and Desmondium (*Desmondium cinerea*) for hedgerows. Contour hedgerow planting with those species will be applied particularly on steep slopes.

c) Agricultural Land Conservation

Sloping agricultural land technology (SALT) developed in the Philippines will be introduced to agricultural lands. Major activities of SALT will consist of: i) marking contour lines; ii) contour line preparation; and iii) hedgerow establishment.

(4) Tending

Silvicultural treatment is well documented in the Philippine Forestry Standards, which are also applied in this M/P. Intensive treatment of newly planted seedlings by fertilizing, weeding and mulching are important, particularly for the first three years after planting.

Pruning and thinning will be the main treatment activities after the above intensive treatment. Pruning is to remove nuisance branches, both dead and alive. The main objective of the thinning is to eliminate inferior trees to encourage proper growth of the economically viable trees. Thinning is usually conducted at an appropriate age of the stand: usually 5 to 10 years for fast growing species, 20 years for medium and slow growing species.

(5) Fire Protection

The prevalence of uncontrolled burning with grazing and agricultural purposes such as *kaingin* seems to be a difficult issue in the Study Area because the fires from agricultural areas or grazing areas often extend to forests. The following management options are conceivable at the present time.

- **Controlled burning:** Fires should be kept to a small scale and strictly controlled. For example, fire lines eliminating ground vegetation are to be established to enclose areas intended for burning.
- **Firebreak:** Vegetative barriers should be formed by planting fire tolerant tree species e.g. *Leucaena leucocephala, and* Talisai (*Terminalia catappa* L.) along the mountain ridges. The width of the firebreak is generally about 10 m.
- **Fire line:** Removing all vegetation for a width of 10-15 m to prevent the fire from extending to the area to be protected.

Further to the above technical approach, awareness on the importance of fire control by the local people is critical. Therefore, extension services promoting the benefits of fire prevention will be provided to local farmers. On the other hand, the consequences of the use of fire in current farming practice on the future status of the natural environment will also be demonstrated so that communities will have a better understanding on sustainable use of the land.

- **Lookout towers:** One lookout tower will be constructed in every 200 ha of plantation/agroforestry area. The presence of fire will be watched for at the tower, particularly in the dry season.
- **Improved pasture land management without burning:** Improved pasture land development could eliminate burning for grazing.
- **No-fire Bonus Scheme:** This scheme currently exists with DENR, granting an annual rate of about ₱ 150/ha to a PO that has not had a fire within a plantation throughout the whole year. This is a durable scheme and should be maintained.

9.3.6 Community-Based Enterprise Development

This component is to provide technical assistance to all POs/IPOs in the area of enterprise project development. Contents of this component are: i) searching for projects with a high potential for implementation, ii) pre-feasibility study and feasibility study for a project including market research, iii) inquiries about finance to the banks that are possibly used in relation to the enterprise development, iv) requesting local governments for assistance in the improvement of infrastructures (road construction, water supply and power supply) and v) acquisition of technical skills and knowledge.

Below is a list of several business enterprises that have been successful in other places.

a) Farm input/hardware wholesaling
   - Purchase and sale of farm/products (market outlet and brokerage)
   - Transportation (*Jeepny* and *tricycle*)
   - Water supply services
   - Post harvest services (rice mill, primary processing, dryer and packaging)
   - Saving and credit
   - Public work contracts

b) Agriculture/Forestry
   - Livestock breeding and fattening
   - Fish culture
   - Seedlings and garden plants production
   - Mushroom culture
   - Beekeeping
   - Harvesting timber and timber products
   - Harvesting non-timber forest products (NFTP)

c) Manufacturing
   - Food processing using resource based products
   - Fiber extraction and processing
   - Furniture making
   - Broom making
   - Handcraft production using resource based products
   - Compost production
   - Production of organic fertilizer from chicken manure

9.3.7 Establishment of Cost Sharing Mechanism and Watershed Management Council

(1) Watershed Management Council

A series of activities for creation of a watershed management council for the Study Area will be undertaken during the implementation of the M/P. The activities will include: i) creation of a task force consisting of staff from FMB, and Regional offices; ii) dissemination to and consensus building among stakeholders within the Study Area; iii) formulation of tasks, rules and regulations of the council; iv) authorization of the establishment of the council; and v) conducting general assemble meetings to discuss and ratify the organizational setup for the council, implementing rules and regulations.

Regular members of the Councils and principles are to be discussed and decided within this four-year term, and the meeting of the Councils should be held with the same frequency from the fifth year of the M/P project.

Furthermore, it is proposed that a technical committee under the Councils be formulated to discuss technical and local issues on watershed management. Outcome of this technical committee is to be discussed at the Councils for further discussions and making decisions within the context of watershed management as a whole. Technical meetings are to be commenced a year after the establishment of the Councils and be held about 10 times annually to implement watershed management effectively.

(2) Cost Sharing Mechanism

In order to establish a cost sharing mechanism for the implementation of the sustainable watershed management after the M/P implementation, the following activities are planed to: i) create a task force; ii) conduct dissemination and consensus building; iii) formulate/ develop concept, rules and regulations; iv) legitimate the mechanism.

The establishment of the comprehensive cost sharing mechanism is a topical issue for discussions and hence time consuming because it is difficult to identify the beneficiaries of the Project and to value various benefits of the same, none of which has been accomplished yet. To this end, a methodology to value the benefits has been preliminarily studied by the Study Team (**Appendix 6**). It is proposed that this methodology be discussed by the task force or an ad-hoc team consisting of relevant experts and be finalized so that the project benefits value based on it could be used as the basis for discussion of the cost sharing.

The task force for creating the watershed management council could combine the tasks for the cost sharing mechanism.

9.3.8 Institutional Strengthening

The institutional strengthening program will include: i) creation of M/P implementation offices; ii) improvement in mobility of field personnel with acquisition of appropriate vehicles; iii) provision of the equipment required for improving the capability of PMOs and SUSIMOs to respond to PO needs, better project management, provision of required technology, development of database and information systems; and iv) training and technology transfer.

(1) Creation of M/P Implementation Offices and Increase in the Stuff Members

It is proposed for the implementation of M/P to create four PMOs each for DENR and NCIP, and 81 and 40 SUSIMOs for DENR and NCIP, respectively (**Section 9.3.1**).

After the completion of the implementation of M/P, it is also proposed to increase staff members of PENROs and CENROs of DENR and ENROs of provincial governments. To this end, it may be realistic and practical that the staff of PMOs and SUSIMOs be transferred to those regular offices.

Proposed Additional Manpower

(Unit: person)

	PENROs	CENROs	ENROs	Total
1. CBFM Unit	0	0	2	2
2. Forest Protection U.	18	55	0	73
3. WSM Unit	6	16	8	30
4. Wildlife Unit	0	6	0	6
Total	24	77	8	111

(2) Proposed Mobility Improvement

For mobility improvement, vehicles will be provided for different sections at NFDO /NCIP, PMOs and SUSIMOs as follows.

Proposed Numbers of Vehicle Input

(Unit: Number)

	NFDO/NCIP	PMOs	SUSIMOs	Total
1. Pick-up trucks	4	8	121	133
2. Motorcycles	0	0	324	324

(3) Proposed Equipment

Equipment in different sections at NFDO/NCIP, PMOs and SUSIMOs will be provided as shown in the following table.

Proposed Numbers of Major Equipment

(Unit: Number)

	NFDO/NCIP	PMOs	SUSIMOs	ENROs	Total
1. Computer sets	7	32	121	0	160
2.Laser Printers	7	24	121	0	152
3. Photo copiers	2	8	0	0	10
4. Fire fighting equip.	0	0	121	0	121
5. Survey equipment	0	0	121	0	121
6. Multi-media LCD	0	8	0	0	8
7. GPS	0	8	121	0	129
8. Others	ls	ls	ls	ls	

ls: lump sum

(4) Training and Technology Transfer Plan

Relevant training will be given to the staff working in the related sections of PMOs and SUSIMOs. Transfer of technology will be performed systematically, particularly with the staff of POs/IPOs. The plan will include: i) use of computer applications, ii) data collection and analysis, data storage and search, establishment of data bases, iii) general training.

(5) Capability Building of the Staff of DENR/NCIP and ENRO

Capability building of the staff of DENR/NCIP and ENRO will include plans such as: i) capability building by sending staff to academic courses like Master's at the University (domestic), ii) attending short-term seminars, iii) training abroad in ASEAN countries.

Training Plan

Type of Training	Times/Course	Participant
Academic Course (MS)	9 times	50 staff
Short-term Seminar	72 courses	10-2-/course
Overseas Training	4 times	64 staff

9.3.9 Capability Building for POs/IPOs

Various activities and actions for capability building will be provided to all target POs/IPOs during the implementation of the Master Plan. The effectiveness and efficiency of activities below will be enhanced if the sequence, contents and intensiveness of assistance will be determined depending on the classification of target communities (**Section 9.3.3**).

The following are a set of the proposed activities and actions, which will be the key components of the proposed work to be undertaken for the implementation of the Master Plan with CBFMP/ADSDPP.

(1) Assistance in Community Organizing

Activities will include: i) social preparation (such as community entry activities of assisting organizations, community appraisal, social investigation and assistance in leader identification through meetings, key informant interviews and informal dialogues, information dissemination on development options, environmental education and community visioning) for both the CBFM communities and the ICCs/IPs; ii) assistance in identification of potential target areas; iii) assistance in preparation and collection of various maps needed; iv) organizing target area development and management orientation for LGU and local leaders; v) master listing of the target area occupants and users; and vi) delineation of potential target areas, etc.

(2) Assistance in Diagnosis and PO/IPO formation

Activities will include assistance in: i) campaign and consensus building for target area development and management at the community level (finalization of the target area); ii) identification and development of potential leaders; iii) execution of detailed community appraisal; iv) PO/IPO formation; v) CBFMA/CALT acquisition, etc.

(3) Assistance in Participatory Planning

Activities will include assistance in: i) formation of CRMF, AWP for CBFM POs and of ADSDPP for IPOs; and ii) business planning for POs/IPOs.

(4) Assistance in Implementation

Activities will include provision of training by means of on-the-job coaching for POs/IPOs pertaining to: i) PO/IPO management and organizational development; ii) assistance in internalization of skills/knowledge acquired from managing projects; iii) PO/IPO business development; iv) policy advocacy and networking, etc.

9.4 Indicative Cost Estimate

9.4.1 General Conditions of the Estimate

Based on the proposed work for watershed management, indicative cost for implementation of the M/P has been estimated with the following conditions.

Unit prices employed in this M/P were those used for the projects implemented in 2000. Also, personnel costs were referred to the ones being used by DENR in the same year. The project cost consists of: i) direct cost; ii) TA Consultant (8% of the direct cost); iii) physical contingency (10% of i & ii), and iv) administration cost (6 % of i & ii). This cost estimate does not include supplementary cost for the price escalation.

Direct cost includes i) cost of preparatory work (5 % of the total cost for direct work other than preparatory work); ii) cost of PO/IPO formation & CBFMA acquisition / IPO formation, iii) cost of participatory planning, iv) cost of rehabilitation of the degraded Protected Area and Forestland, v) cost of community-based enterprise development, vi) cost of capability building for POs/IPOs, vii) cost of institutional strengthening, and viii) cost for initiatives of watershed management council and cost sharing mechanism establishment.

Administration cost consists of: i) personnel and operation expenses for NFDO/ADSDPP Office, PMOs and SUSIMOs; and ii) cost for field survey and establishing monuments for setting out boundaries of the proposed Protected Area.

9.4.2 Establishment of the Unit Prices and Unit Costs for the Cost Estimate

Unit prices and costs for community organizing, PO formation and participatory planning used for this M/P were those derived from the Pilot Study conducted in the M/P Study.

Unit prices and costs for rehabilitation of the degraded Protected Areas and Forestland in the M/P are based on the MC2000-19[2] that is currently used for the Forestry Sector Project. Breakdown of the unit costs for the major proposed works are shown in **Appendix 8**, summary of which are listed in **Table 9.4.1**.

The cost for community-based enterprise development must be estimated based on the scales and kinds of enterprises to be established. To determine the scales and kinds, elaborate production/market research of all target communities are required. Since there is no such a study available, the indicative cost of community-based enterprise development was estimated at ₱ 100,000 for direct initial investment per PO/IPO and 8% of direct investment (₱ 8,000) per PO/IPO for administrative cost of contractors (POs/IPOs).

Cost estimates of PO/IPO Capability Building and Institutional Strengthening were completed based on the unit costs and work quantity derived from the Pilot Study.

For the PO/IPO capability building, the cost was estimated assuming that one assisting organization (AO) would cover 7 communities subject to rehabilitation in view of the fact

[2] Guidelines Governing the Updating of Cost Estimates and Intensification of Plantation Maintenance and Protection Activities for DENR-FSP Watershed Subprojects Under JBIC Funding (04 September 2000).

that a NGO (assisting organization) was able to manage seven targeted communities[3] during the Pilot Project. The total number of AOs will be 16 (112 divided by 7). For the non-rehabilitation communities, a specialist will be assigned to each of the 133 SWSs.

9.4.3 Project Cost

Based on the proposed work and unit costs described in **Sections 9.3, 9.4.1 and 9.4.2**, overall project cost was estimated at **₱ 9,256.7 million** (**US$ 169.5 million**[4]), breakdown of which is given in **Table 9.4.2**.

Cost Estimate for Overall Project

(Unit: Million Pesos)

Work Items	Cost
1. Project Direct Cost	7,388.8
1) Preparatory Work	215.1
2) PO formation & CBFMA Acquisition/ IPO formation	73.4
3) Participatory Planning	0.5
4) Rehabilitation (Degraded PA & FL)	5,791.9
5) Community-based Enterprise Development	40.8
6) Institutional Strengthening	690.7
7) PO Capability Building	573.3
8) Initiative for Watershed Management Council Establishment	1.8
9) Initiative for Cost Sharing Mechanism Establishment	1.3
2. TA Consultant	591.1
3. Contingencies	798.0
4. Administrative cost	478.8
Total	9,256.7

9.5 Action Plan for the Projects

9.5.1 Implementation Schedule

The implementation schedule of the proposed work for overall watershed management in the Study Area was prepared as shown in **Table 9.5.1** based on the assumption that all the proposed work would be implemented during the target M/P period from 2004 to 2015. The action plan for the proposed work was prepared as shown in **Table 9.5.2** based on the preliminary implementation schedule stated above.

9.5.2 Implementation Schedule of the Forestry Sector Project Phase -2 (FSP-2)

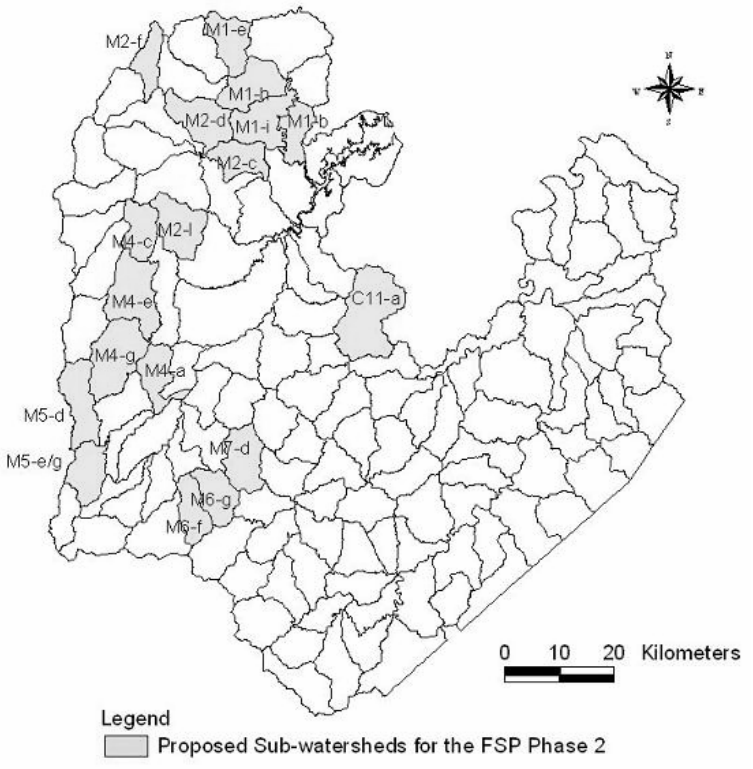
Japan Bank for International Cooperation (JBIC) conducted a technical assistance scheme called Special Assistance for Project Implementation (SAPI) to review the progress of the JBIC funded Forestry Sector Project (FSP) and formulate an implementation program (I/P) for the Forestry Sector Project Phase 2 (FSP-2) from November 2002 to June 2003. The FSP in I/P covers the Upper Magat and Cagayan River, Upper Pampanga River, and Jalaur River basins.

[3] Target communities were 6, but Dapiz had 2 sub-associations
[4] US $ = ₱ 54. 6

The FSP-2 includes 19 priority SWSs in the Upper Magat and Cagayan River basin, which have an aggregate sub-watershed area of 130,900 ha, consisting of 120,500 ha of aggregated Protected Areas and Forestland and 10,400 ha of A & D and others. The 19 SWSs are listed in teble below and shown in the map below.

Region (Province)	SWS		Name of Sub-project Area	Land Classification of the Sub-project Area (ha)		
				PA&FL	A & D, Others	Total
Region CAR (Ifugao)	1	M1-b	Alimit East	4,800	0	4,800
	2	M1-e	Mayoyao	5,900	400	6,300
	3	M1-h	Ducligan	6,800	800	7,600
	4	M1-i	Alimit West	7,800	100	7,900
	5	M2-c	Ibulao	5,500	100	5,600
	6	M2-d	Lagawe	8,000	0	8,000
	7	M2-f	Upper Ibulao	4,300	0	4,300
	8	M2-l	Lamut	7,900	0	7,900
	9	M4-c	Cadaclan	5,500	0	5,500
			Semi-total	56,500	1,400	57,900
Region 2 (Nueva Vizcaya)	10	M4-a	Lower Matuno	4,600	1,200	5,800
	11	M4-e	Bukig	9,800	400	10,200
	12	M4-g	Upper Matuno	10,100	600	10,700
	13	M5-d	Cabanglasam	7,000	700	7,700
	14	M5-e &-g	Santa Cruz	5,300	800	6,100
	15	M6-f	Benay	4,200	1,100	5,300
	16	M6-g	Dupax	4,900	900	5,800
	17	M7-d	Manga	5,800	1,300	7,100
(Quirino)	18	C11-a	Ganano	12,300	2,000	14,300
			Semi-total	64,000	9,000	73,000
Sub-total				120,500	10,400	130,900

Source: Implementation Program, SAPI for Forestry Sector Project in the Republic of the Philippines, June 2003



Proposed components of the FSP-2 consist broadly of the following.

Summary of the FSP Phase 2 Components

Component	Implementer	Main Activity
(1) Preparatory Works	DENR, sub-contractors	Preparation of maps, collection of socio-economic baseline data, and establishing institutional organizations for ready implementation.
(2) PO Formation & CBFMA Acquisition	POs and SUSIMOs (assisted by AOs)	Forming appropriate size and number of POs, registration of the POs, and CBFMA acquisition.
(3) Participatory Planning	POs and SUSIMOs (assisted by AOs)	Formulation of CRMF and AWP with participatory approach. Screening of the POs for implementation.
(4) Site Development	POs (assisted by AOs)	Implementation of site development activities including forest tree plantation, agroforestry plantation, silvo-pasture development, and enterprise.
(5) Rural Infrastructure Development	Civil work contractors	Planning, designing, and construction of rural infrastructures including roads, bridges, etc.
(6) PO Capability Building (POCB)	AOs	Technical and managerial support for POs, including (i) assistance in PO formation, (ii) assistance in planning and (iii) assistance in the preparation of organizational structure and policy improvement.
(7) Institutional Strengthening	DENR and AOs	This will be provided for SUSIMOs, PMOs and NFDO, and include human resources development, provision of vehicles and equipment, and construction of SUSIMO offices.
(8) Initiative for Watershed Management Council and Cost Sharing Mechanism	DENR	(i) Creation of a Task Force, (ii) dissemination and consensus building among stakeholders, (iii) formulation of basic planning, rules and regulations, (iv) legislative authorization of the established council and mechanism.
(9) Terminal and Post Project Evaluation	DENR, sub-contractor	Physical validation and institutional/project impact assessment, and formulation of phase in/out.

Source: Implementation Program, SAPI for Forestry Sector Project in the Republic of the Philippines, June 2003

Implementation of the FSP-2 is scheduled to be completed over 11 years, the detailed schedule of which is given in **Table 9.5.3**.

The cost for implementation of part of the M/P that would be covered by FSP-2 was estimated at **₱ 3,264.8 million**, which correspond to about 35 % of the cost for the whole M/P.

Cost Estimate for Upper Magat & Cagayan River Basin Covered by FSP-2

Unit: MillionPesos

Work Item		Amount
1. Project Direct Cost		2,606.00
1)	Preparatory Work	75.9
2)	PO formation & CBFMA Acquisition	35.5
3)	Participatory Planning	0.2
4)	Rehabilitation (Degraded PA&FL)	2,112.0
5)	Community-based Enterprise Development	10.0
6)	Institutional Strengthening	139.9
7)	PO Capability Building	229.4
8)	Initiative for Watershed Management Council Establishment	1.8
9)	Initiative for Cost Sharing Mechanism Establishment	1.3
2. TA Consultant		208.48
3. Contingencies		281.45
4. Administrative Cost		168.87
Total		3,264.80

9.5.3 Indicative Annual Cost Schedule of the Project

By distributing the project cost to the relevant years in accordance with the action plan, an annual cost schedule of the Project was prepared as shown in **Table 9.5.4** and summarized as shown below.

Indicative Annual Cost Schedule

(Unit: million pesos)

Year	2004	2005	2006	2007	2008	2009	2010
Annual Cost	364	259	239	972	1,085	1,102	1,407
Year	2011	2012	2013	2014	2015		Total
Annual Cost	1,069	1,056	1,061	498	143		9,257

CHAPTER 10 INITIAL ENVIRONMENTAL EXAMINATION (IEE)

10.1 Objectives

According to the environmental guidelines of JICA, Initial Environmental Examination (IEE) is designed as a quick method of environmental impact assessment for development projects. IEE is an initial stage in the process of environmental considerations for a development project so that it is normally decided if an additional detailed environmental investigation, Environmental Impact Assessment (EIA), is necessary or not based on the result of IEE. Technical objectives of IEE are summarized as follows.

- To clearly identify/define development activities of a proposed project,
- To conduct a brief investigation on the present conditions of natural and social environment within and around the project area,
- To predict, in a rough manner, a level of negative environmental impacts that is possibly caused by a proposed project,
- To specify potential negative impacts and to recommend if a full scale Environmental Impact Assessment (EIA) study is required or not,
- To prepare contents and Terms of Reference (TOR) for an EIA if necessary.

10.2 JICA's Environmental Considerations

JICA has general guidelines for environmental considerations for different sectors of development. JICA's guidelines such as "Guidelines for Environmental Considerations on Forestry (XV)[1]" was particularly applied in this study. One of the principles of the guidelines is sustainable development.

An IEE is normally conducted during a Master Plan study (M/P) or at an early stage of a Feasibility Study (F/S) so that potential environmental impacts could be detected at an initial stage of a development project. Therefore, the IEE provides valuable information to make an analytical scope of an EIA considerably effective.

Primary focus of the IEE is to conduct a screening on potential environmental impacts and scoping for an EIA. An environmental screening does not have to be based on quantified data, and a qualitative analysis of potential impacts is a main focus on making a decision on if the EIA should be conducted or not.

Scoping with the IEE is to identify potential impact factors, and JICA suggests that using a check-list be adequate and effective. Upon identification of environmental factors that will likely to be affected with a proposed development project, appropriate environmental parameters to predict a level of impacts can be selected for the subsequent EIA study.

[1] JICA (1994) Guidelines for Environmental Considerations on Forestry (XV)

10.3 Environmental Impact Statement (EIS) of the Philippines

10.3.1 General Feature

Environmental Management Bureau (EMB) of the DENR is in charge of making recommendations on rules and regulations for environmental impact assessments in the Philippines[2].

Environmental Impact Statement (EIS) System was established with the Philippine Environmental Policy, Presidential Decree No. 1151, in 1977. It is stated that an Environmental Compliance Certificate (ECC) must be acquired with environmentally critical projects (ECPs) and projects within environmentally critical areas (ECAs). This EIS System was further strengthened and refined, and the latest form was issued as DENR DAO No. 96-37 in 1996. Main objectives of this order are:

- Ensure the environmental considerations are incorporated at the earliest possible stage of project development.
- Further streamline the current procedure in the conduct of the EIA in order to improve its effectiveness as a planning, regulatory and management tool.
- Enhance maximum public participation in the EIA process to validate the social acceptability of the project or undertaking so as to ensure the fullest consideration of the environmental impact of such project or undertaking.

10.3.2 Environmentally Critical Project (ECP)

Environmentally critical projects are listed in the Procedural Manual for DAO 96-37. Forestry projects are listed in the Manual as follows:

- Logging
- Major wood processing projects
- Introduction of fauna (exotic animals) in public/private forests
- Forest occupancy
- Extraction of mangrove products
- Grazing

10.3.3 Environmentally Critical Area (ECA)

This area is environmentally sensitive and is so listed under Presidential Proclamation No. 2146, series of 1981 as well as other areas where the President may proclaim as environmentally critical in accordance with Section 4 of PD 1586. Environmentally critical areas include:

- All areas declared by law as national parks, watershed reserves, wildlife preserves, and sanctuaries;
- Areas set aside as aesthetic potential tourist spots;

[2] List of laws and regulations on environment in the Philippines is shown in **Table 10.3.1**.

- Areas which constitute the habitat for any endangered or threatened species of indigenous Philippine wildlife (fauna and flora);
- Areas of unique historic, archaeological or scientific interest;
- Areas which are traditionally occupied by cultural communities or tribes (indigenous cultural communities);
- Areas which are frequently visited and/or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity, etc);
- Areas with critical slopes;
- Areas classified as prime agricultural lands;
- Recharged areas of aquifers;
- Important water sources and bodies;
- Mangrove areas;
- Coral reef areas;

Projects located in ECA are under the jurisdiction of the DENR Regional Office (DENR-RO). Therefore, all EIA/IEE should be submitted to DENR-RO for review and evaluation.

10.3.4 General Procedures

The main features of DAO 96-37 presented in the Procedural Manual are as follows.

(1) Scoping

This process is to define the range of issues, actions, alternatives and impacts that should be included in the EIS. All environmental considerations should be incorporated to facilitate a thorough examination of potential environmental impact.

(2) EIS and IEE

ECPs are generally required to submit an EIS to the EMB. However, for ECAs, it is normally required to submit an IEE to the concerned Regional Office. IEE is a simplified form of environmental review in both depth and extent of data required compared to those of EIS. Scoping is not mandatory in the preparation of an IEE, which is a basis for making a decision on whether to issue an ECC or to require a further environmental study, an EIS, relatively in a short period of time.

(3) Timetable for Review of EIS/IEE

An appropriate review process should be completed within 120 and 75 days after acceptance of the EISs and IEEs, respectively.

(4) Public Participation and Social Acceptability

Public participation and transparency of the EIS are mandatory to make a decision on an issue of ECC. DAO ensures that the concerns of the stakeholders, particularly the affected local communities, are fully considered.

(5) Environmental Monitoring and Guarantee Fund

It is also required to establish certain fund. The Environmental Monitoring Fund (EMF) is used primarily to monitor the operation of the project after CEE is issued. On the other hand, the Environmental Guarantee Fund (EGF) is utilized for rehabilitation and compensation of damages caused by the projects.

10.4 Result of the Initial Environmental Examination (IEE)

10.4.1 Overall Results of Screening with the M/P

Checklist for this M/P was prepared referring to the JICA's guidelines for forestry sector. All plans and programs developed in this M/P (**Chapter 9**) were evaluated as an environmental screening, and the result is shown in **Table 10.4.1**. There was no obvious negative environmental impact was predicted. Main components of the watershed management of the M/P, which were subject to this IEE were as follows:

- Land Use Plan
- Forest Management Plan: Rehabilitation and Restoration Plan
- Resource Development and Management Plan
- Soil and Water Conservation Plan
- Livelihood and Enterprise Development Plan
- Institutional Strengthening Plan (DENR, LGU and PO)

10.4.2 Significant Environmental Impact

(1) Natural Environment

As clearly stated in Chapter 1, one of the most important objectives of this M/P is to develop a watershed management plan that is to attain sustainable use of resources in the area. In natural environment, alleviation of soil erosion by reforestation and rehabilitation of degraded Protected Areas and Forestland is the main impact. However, it is difficult to quantify this effect, because actual field data were not measured in the Study. Rainfall data, hydrological data and erosion data have to be measured systematically in the field to quantify the effect of the plan, which is time consuming and expensive. Therefore, erosion was estimated using USLE method in this M/P.

It is planned to enlarge the coverage of the Protected Areas in this M/P. Management activities employed within the Protected Areas are based on conservation, particularly applying no timber harvesting policy and natural regeneration to old growth and mossy forest. In residual forest, the concept of Forest Stand Improvement (FSI) is introduced,

which includes planting native species of trees instead of exotic species. Furthermore, extraction of NTFP and timber are controlled with the aim of conservation and watershed management.

In the Forestland, livelihood improvement is focused unlike the management activities in the Protected Areas. However, old growth and mossy forest of the Forestland are to be protected as those in the Protected Areas. Logging in reforestation areas is permitted, but logging methods such as selective logging and small-scale clear cutting that minimize negative impacts is suggested.

Reforestation contributes to enhance water holding capacity of the area and reduce soil erosion. As discussed in the above, some extraction of forest resources is permitted in this M/P but controlled and ecologically acceptable manner. Therefore, positive environmental impact is most likely to be the result of these plans, which is the most possible impact in natural environment.

(2) Social Environment

No resettlement involved in the M/P, but there is a risk of residential conflict if discussion at local level is not enough and participatory approach is not properly addressed. This M/P plans to expand mainly participatory watershed management in CBFMA/CADC areas to the Study Area, but there are some overlapping barangay and municipal borders, which may create some conflict. It is suggested, therefore, that through discussions be made to have a consensus before the introduction of the plan.

Other plans of the M/P causing social impacts involve mainly positive impacts. Livelihood development suggested in the M/P can raise living standards of local residence, but it is unlikely to change their life style so that no negative impact is predicted with the plan.

Institutional strengthening plans for DENR/NCIP, LGUs and POs/IPOs have positive impacts. Implementation of CBFMA/CADC area development and management in the Study Area is limited at the present time, and the most serious problem of it is lack of capacity of their staff. Increasing the number of staff, particularly of DENR/NCIP and strengthen their knowledge and skills allow a smooth operation of CBFMA/CADC areas, which can lead to a successful watershed management as a whole.

CHAPTER 11 Conclusions and Recommendations

11.1 Conclusions

(1) Urgent Implementation of the Master Plan

Considering the on-going expansion of the degraded area in the Protected Areas and Forestland, the implementation of the Master Plan (M/P) is urgently needed for restoring the inherent functions of the watersheds in the Study Area.

In particular, the implementation of the following is extremely important to facilitate appropriate watershed management:

i) Re-delineation of Protected Areas and Forestland;

ii) Implementation of the FSP-2, which includes 19 priority SWSs; and

iii) Implementation of the watershed management plan in CADC areas in the priority SWSs because 77.8 % of the present CADC areas are situated in the proposed Protected Areas, where they play a vital role as critical watersheds of the Upper Magat and Cagayan Rivers.

(2) Funds for Watershed Management

It is quite obvious that realizing sustainable watershed management requires continuous and considerable input in the forms of finance, manpower, and material, of which the most critical one for the government is financial one. In order to acquire the finance, there are several conceivable options such as funds allocated from the national budget, financial aid from donor counties, current trust funds legalized with DOE Energy Regulation 1-94, and contributions from the relevant stakeholders.

Out of the options, cost sharing by the relevant stakeholders, including the already legitimated trust fund is most likely to meet the requirement of providing continuous and considerable amount of funds. In this context, establishing the cost sharing mechanism is essential to maintain the restored watershed after the implementation of the M/P.

11.2 Recommendations

11.2.1 Overall Recommendations for Implementation of the M/P

(1) It is recommended that the M/P be implemented in accordance with the conclusions stated above.

(2) It is recommended that DENR promote the implementation of the FSP-2 with financial assistance from JBIC.

(3) It is recommended that the NCIP seek financial sources for the implementation of the watershed management plan in the CADC areas.

(4) It is recommended that re-delineation of the proposed Protected Areas and Forestland be legitimized and that its boundaries be established with appropriate surveys on the ground accordingly.

11.2.2 Improvement of Policy Environment for M/P Implementation

(1) Conflicts in Land Use

The major land use conflict in the Study Area is jurisdictional overlaps among the NIPAS Act (RA 7586), the Mining Act (RA 7942) and the IPRA (RA 8371). There are different interests of various stakeholders on the same lands, which are: i) the preservation of biodiversity and unique landscape; ii) the rights of the indigenous peoples in the area; and iii) the investments and potential revenues derived from mining activities. Resolution of these issues has to be sought out.

Thorough discussions and negotiation is an avenue that could lead to a solution. This discussion has to be pursued by DENR and NCIP with the participation of Mines and Geosciences Bureau (MGB) including stakeholders concerned, the IPs, the mining companies and general public.

(2) Development Activities in the Magat River Forest Reserve

Livestock farming is one the viable enterprise development options open to CBFM POs. There are areas within the Magat River Forest Reserve (MRFR) that has been being utilized as grazing lands. Under proper grazing/pastureland management such as the cut and carry system with attendant planting of forage crops which serve as soil cover, the area will exhibit lower soil erosion rates. Taking cognizance of this fact the M/P is proposing to classify 57,100 ha for silvipasture use within the Proposed Forestland.

It is therefore recommended that: i) the establishment of sub-classification of grazing lands or pasturelands under the Forestland (production forestlands) be included in the proposed national land use act or in the sustainable forest management act; and ii) PD 705 should also be reviewed and amended in the definition of the critical watershed so that guidelines on land classification in the NIPAS Act could be fully reflected in the definition.

(3) Policies on Harvesting Fallen and Damaged Trees from the Forestland

Political stability is one of the key conditions of maintaining sustainable use of natural resources. However, there are some incidences where improper sanctions are imposed and put POs in confusion.

There are some cases where a suspension of RUP was imposed over the entire region although violation in the use of damaged and fallen trees was only found in one province. This sanction affected POs in other provinces within the region and discouraged CBFM activities. Therefore, a through investigation should be undertaken and the sanction should cover only alleged areas.

(4) Permit to Harvest and Transport Plantation-Grown Timber

Most people-oriented forest management projects previously implemented under DENR and LGUs have planted fast growing tree species such as *Gmelina* because of the expected income that people would earn when the trees are harvested on minimal rotation. However, the owners of the trees have to prove ownership of the trees to obtain a permit prior to cutting from the CENRO concerned, which is normally a time consuming and difficult process. This regulation should be reviewed and rationalized to meet people's requirements, otherwise it will erode the credibility of DENR and discourage people from observing the regulation because of its difficulty to comply with.

The recommended process on the above matter is that legitimate ownership of the trees be certified by the president of the PO concerned and that the permit be issued by the president for the PMO. By so doing, the applicants need not go to the CENRO office concerned to obtain the permit.

Secretary Elisea Gozun of DENR stated during the 52nd anniversary celebration of the Philippine Wood Producers Association (PWPA) that she would pursue a policy that trees planted in private lands be no longer subject to inspection while in transit. This policy, in turn, would encourage people to plant trees on their private lands. Since plantations were established by individuals in the CBFM areas, the trees (including rattan and bamboos) coming from these plantations should also be extended the same policy.

(5) Tax Incentives for Plantation Development in Private Lands

On the same occasion of the 52nd anniversary of the PWPA, Secretary Gozun also announced that DENR and Department of Interior and Local Government (DILG) would look into the possibility of providing tax incentives to owners of private lands developed into forest plantations. The incentive is the suspension of real estate taxes for 5 years. This should be materialized so that private landowners could be further encouraged to develop forest plantations in the Study Area.

(6) Pricing Policy on Water from Watersheds

The mandate of control, supervision and regulation of utilization, exploitation, development and protection of water resources is exercised by the National Water Resources Board (NWRB) under the Department of Public Work and Highways (DPWH)[1]. Applications for water permits, including those from NIA and the Local Water Districts (LWD) have to be filed with the NWRB. However, NWRB does not set a price for water with a levy.

A system for pricing raw water should be developed during the implementation phase of the Project including a mechanism for compensating LGUs for the water coming from watersheds within their jurisdiction. This way, the LGUs would have resources to implement programs to maintain the ability of watersheds to provide quality water at the desired quantity and time that it is needed.

[1] Audit on Institutional Framework, Formulation of a Watershed Management Strategy and Investment Programme. Ministry of Foreign Affairs, DANIDA, the DENR and FMB. February 1998.

11.2.3 Improvement of Institutional Arrangements for M/P Implementation

(1) Devolution of Management of Small Watersheds to LGUs

LGUs could carry more responsibility for local development and resources management if certain national functions were devolved to them. Assuming these responsibilities, LGUs will become more responsive to the needs of their constituents and, therefore, would become more capable of implementing projects. Devolution will also create more opportunities for LGUs to make decisions, become more accountable to the people, and provide more opportunities for people to participate in local governance.

Maintenance and protection of some small watersheds have been devolved to LGUs in the Study Area. This management action will be pursued to the provincial government or even municipalities and barangays. However, selection of the municipality or barangay should be made carefully to determine those that have the right attitude and the financial and personnel resources to pursue such management responsibility.

(2) Co-management of Watershed Resources

A co-management scheme has been put into effect between the DENR and the Provincial Government of Nueva Vizcaya in the management of the 24,000 ha Lower Magat Forest Reserve.

The co-management mechanism is an approach to manage Forestland and watersheds, and is innovative in respect of creating synergy between DENR and LGU. Ultimately, it is foreseen that management of the watershed will be transferred/devolved to the Provincial LGU when it has been shown that it is possible. This approach to watershed management is worth replicating in other watersheds.

(3) Tree for Legacy Program

The Tree for Legacy Program is a program whereby individuals can participate by planting trees in designated places on government land and on private lands.

This program provides an opportunity for private citizens to directly participate in improving the environment and have monetary benefits from the program. School children are encouraged to plant trees under the program as an investment to finance their education or as a source of capital for business enterprise development in the future. At the moment, Nueva Vizcaya and Quirino have this program. This could be adopted in the Isabela and Ifugao as well. This will be pursued as a complementary project in the management of watersheds close to urban and settlement areas.

(4) Ancestral Woodlots or Muyong and Communal Forests or Ala-a

In Ifugao, a traditional system of private woodlots, usually located in the Forestlands, are managed by clans. The private woodlot or *muyong* is usually established for the purpose of producing timber and non-timber forest products and for the protection of small watershed areas adjacent to rice terraces.

Traditional communal forests (*ala-a*) are not as extensive as the *muyong* but are as important in the context of traditional management of forest resources. They are managed through a common consensus in the community that the resources are to be shared, that there should be no burning, and that community members are prohibited from gathering more than what they need. Forests that are regarded as sources of water for domestic supply and for irrigation purposes are protected and not subject to utilization.

These systems of management of watersheds should be given legitimacy by the government only to assure the *muyong* and *ala-a* owners of the intention of the government in propagating these traditional practices. This will be pursued as major management options especially where the tradition is strong. Assistance should be provided by way of providing planting stock and technical assistance in proper silvicultural treatment of the forest. The planting and utilization of non-timber forest products should be encouraged because their harvest has a low impact on the forest but can provide adequate income for the households.

11.2.4 CBFM Initiatives

(1) Size of CBFMA Area

It was estimated that the total area of the Protected Areas and Forestland in the Study area is approximately 660,600 ha and that the number of households in the same is about 80,000. Simply calculated, therefore, one household could occupy 8.25 ha if it is assumed that the 660,000 ha is equally allotted to the 80,000 households.

In the Study Area, there are 38 CBFMAs occupying 59,303 ha of land with a total of 3,932 members. This means that the average land lot size occupied by the members is 15.1 ha, which correspond to almost double of the 8.25 ha. This is much larger than the available land for the CBFMA because the 8.25 ha include the Protected Areas to some extent.

According to laws and regulations pertaining to the CBFM, however, there is no prescription on the restriction of the size of CBFMA area to be granted. If a PO claims an extensive size of land for CBFMA beyond its informal territory, it is hardly possible to restrict it legally. It may be that a PO could claim an extensive area covered with dense forest where timber harvesting is likely as the CBFMA area.

These possibilities would be seeds of land conflict in the future after CBFMA areas have been awarded extensively. A restriction of area size for one PO should be considered.

(2) Formulation of Quantitative CRMF

Guidelines for the CRMF were promulgated as DAO 97-12. Existing CRMFs indicate only conceptual resource management framework, probably due to the fact that these guidelines provide no prescriptions requiring a quantitative plan.

In order for CBFM POs to protect, preserve, rehabilitate, develop and manage natural resources in CBFMA areas in a sustainable manner, CRMFs should be site specific with quantitative goals.

The current guidelines, therefore, should be revised so that the CRMF can be formulated in a quantitative manner with at least topographic condition, slope distribution, existing land use & vegetation, and proposed land use plan indicated on a detailed topographic map of 1:10,000 scale.

To this end, it is not enough to collect traditional and indigenous information with a sociological approach. At the same time, it is important to collect relevant data and information in a scientific manner.

Tables

Table 2.3.1 Existing and Proposed Land Use by Province in Region 2 (1992 & 2022)

(Unit:ha)

Land use type	Region Total		Batanes		Cagayan		Isabela		Nueva Vizcaya		Quirino	
	1992	2022	1992	2022	1992	2022	1992	2022	1992	2022	1992	2022
1. **Production land use**	1,593,314	1,533,256	457	457	554,643	531,877	698,028	677,696	201,291	192,982	138,895	130,244
1.1 Croplands	772,859	772,859	457	457	248,397	248,397	400,054	400,054	79,764	79,764	44,187	44,187
1.2 Fisheries	9,352	17,238			9,352	9,352		2,184		1,627		4,175
1.3 Production forest	811,103	751,045			296,894	274,128	297,974	277,642	121,527	113,218	94,708	86,057
Residual dipterocarp	313,353	219,348			125,336	87,736	135,257	94,680	35,347	24,743	17,413	12,189
Grazing rangeland	400,380	220,208			151,768	83,472	135,546	74,550	55,393	30,466	57,673	31,720
Indus. forest plant'n	44,279	104,336			11,600	34,365	13,200	33,532	15,553	23,862	3,926	12,577
Agro-forestry (ISF)	53,091	113,148			8,190	30,955	13,971	34,303	15,553	23,543	3,926	24,347
Community forestry		94,005				37,600		40,577		10,604		5,224
1.4 Mining areas	128,501	155,020	20		20,872	25,000	51,396	62,000	29,746	36,000	26,487	32,000
2. **Protection land use**	883,052	883,052	20,323	20,323	250,112		272,515	272,515	179,942	179,942	160,160	160,160
2.1 NIPAS areas	260,552	260,552	20,323	20,323			240,229	240,229				
2.2 Non-NIPAS areas	862,729	862,729			250,112	250,112	272,515	272,515	179,942	179,942	160,160	160,160
Reserved 2nd growth Forest	373,663	373,663			105,039	105,039	73,288	73,288	92,829	92,829	102,507	102,507
Mangroves	4,459	4,459			3,398	3,398	1,061	1,061				
Old growth	277,689	277,689			86,065	86,065	152,616	152,616	3,408	3,408	35,600	35,600
Mossy forest	93,466	93,466			30,500	30,500	42,006	42,006	15,560	15,560	5,400	5,400
Pine forest	1,600	1,600							1,600	1,600		
Parks	6,811	6,811			3,530	3,530	819	819	2,462	2,462		
Grassland/brush land & plantations within areas about 50% slope & 1000m elev.	105,041	105,041			21,580	21,580	2,725	2,725	64,083	64,083	16,653	16,653
3. **Built-up areas & Infra/ utilities**	207,449	267,685	202	380	95,512	118,278	95,913	116,245	9,157	17,466	6,665	15,316
4. **Unclassified**	178		178									
Total Area	2,683,993	2,683,993	21,160	21,160	900,267	900,267	1,066,456	1,066,456	390,390	390,390	305,720	305,720

Source: Regional Physical Framework Plan, Region II, 1993-2022

Table 2.3.2 Area Distribution by Land Type of CAR in 1990

Land Type	Abra ha	%	Benguet ha	%	Ifugao ha	%	Kalinga Apayao ha	%	Mt. Province ha	%	Regional Total ha
I Forestlands											
1 Protection Forests	**76,742**	**16**	**44,996**	**9**	**58,580**	**12**	**227,027**	**46**	**84,568**	**17**	**491,913**
(1) Old Growth	41,409		6,672		11,625		133,960		23,146		216,812
(2) Mossy Forest	12,200		2,325		18,000		70,032		39,036		141,593
Pine forest on the (3) Area>84%slope,	5,825		17,242		1,330		1,308		3,747		29,452
Other vegetation on the (4) Area>50%slope,	17,251		0		24,249		20,389		16,514		78,403
(5) Areas established by law											0
- Critical watersheds	0		9,895		0		0		0		9,895
-National parks	57		8,862		3,376		1,338		2,125		15,758
2 Production Forests	**222,393**	**22**	**132,645**	**13**	**167,789**	**17**	**397,058**	**40**	**76,914**	**8**	**996,799**
Pine forest on the (1) Area<84%slope,	6,441		113,414		475		409		14,040		134,779
Other vegetation on the (2) Area<50%slope, El	208,622		575		161,089		362,026		52,766		785,078
(3) Agriculture areas	6,500		10,932		6,225		34,180		10,108		67,945
(4) Mineral lands											0
-Leased	830		6,441		0		443		0		7,714
-Patented	0		1,283		0		0		0		1,283
II A&D	**98,420**	**29**	**87,897**	**26**	**25,409**	**7**	**80,679**	**24**	**48,251**	**14**	**340,656**
Built-up Area & Others											
Total	**397,555**	**22**	**265,538**	**15**	**251,778**	**14**	**704,764**	**39**	**209,733**	**11**	**1,829,368**

Source: DENR-CAR, ENR Regional Development Plan for the Medium Term 1993-1998, 1993

Table 2.3.3 Proposed Built-up Areas for CAR by Year 2023

(Unit;ha)

	Abra	Benguet	Ifugao	Kalinga	Apayao	Mt. Province	CAR
A & D lands & other lands <18% slope exclusive of agricultural lands and protection forest	45,300	13,770	5,580	9,635	11,950	9,190	95,425
Areas of the public domain 19-30% slope exclusive of agricultural lands and outside of protection forest	8,050		3,020	1,970	4,770	2,595	20,405
Areas of the public domain 31-50% slope exclusive of agricultural lands and outside of protection forest	17,450	1,600		4,550	7,650	800	32,050
Potential agricultural expansion areas for probable conversion to urban use	3,103	900	732	4,042	7,649		16,426
Total	73,903	16,270	9,332	20,197	32,019	12,585	164,306
Existing built-up areas	2,664	4,595	490	371	600	1,450	10,170
% average annual increase	13.10	4.79	11.53	15.96	15.87	8.33	10.85

Source: CAR RPFP, 1994-2023

Table 2.4.1 Comprehensive Development Targets of Quirino Province for 1999-2003

Objectives	Targets	Activities	Estimated Costs (of areas targeted)					Total (P'000)
			1999	2000	2001	2002	2003	
A. Protected Area and Wildlife Services 1. Manage effectively natural resources for sustainable utilization and ecological balance 2. Develop and promote eco-tourism	1. Management and protection of IPAS areas	1. Establishment of buffer zone (ha) 2. Management of buffer zone (ha) 3. Prepare Mgt. Plan 4. Mgt of virgin forests (ha) 5. Resource protection (ha) 6. Resource restoration (ha)	392 392 46,170 92,730 90	392 784 45,220 92,740 190	391 1175 1 44,270 92,720 280	 1175 43,320 92,720 370	 1175 1 42,370 92,710 470	26,318 8,814 200 2,160 31,360
B. RP-German Project	1. Upland communities as forest managers which will provide technical assistance for development alternative source of income	1. Conservation and protection of natural forest 2. Forest plantation dev't & rehabilitation of degraded forest 3. Agro-forestry 4. Agriculture 5.Infrastructure	36,137	29,362	14,316	9,384	26,833	116,032
C. CBENRM[1] Project	Cover 14,975 hectares of watershed areas	1. Establishment & maintenance of on-farm agro-forestry model farms 2. Dev't of soil and water conservation structures 3. Provision of perennial tree seed & nursery materials 4. Support of field research 5. Provision of farm tools & equipment 6. Establishment & maintenance of nurseries 7. Reforestation thru ANR 8. Infrastructure & facilities 9. Training	159,780 328 30 50 132 192.16 480 105 682.8	210,320 328 30 40 99.16 480 634.2	39,520 328 30 71.62 480 628	27,360 323.5 15 46.68 360	 264 15	436,980 1,571.50 120 90 132 409.68 1,800 105 1,945

Source: Comprehensive Development Plan of the Province of Quirino

Table 3.3.1 Relevant Functions of DENR (1/3)

Offices/Bureaus	Powers/Functions	Issuances
DENR	1. Formulate, implement, and supervise the government's policies, plans and programs pertaining to management, conservation, development, use and replenishment of natural resources 2. Promulgate rules and regulations in accordance with law governing exploration, development, conservation, extraction, disposition, use and other commercial activities causing the depletion and degradation of natural resources 3. Exercise supervision and control over forestlands, alienable and disposable lands, and mineral resources, and impose appropriate fees, charges, rentals and collect such revenues 4. Establish policies and implement programs for 4a. the preservation of cultural and natural heritage through wildlife conservation and segregation of national parks and other protected areas 4b. greater people participation and initiative in natural resources management 5. Promulgate rules and regulations necessary 5a. to harness forest resources in a sustainable manner to assist rural development, and support forest-based industries … 5b. on the issuance of co-production, joint venture or production sharing agreements, licenses, permits, leases, concessions …. 5c. for the conservation of the country's genetic resources and biological diversity and endangered habitat	EO 192, 1987
Regional Offices	1. Implement laws, policies, rules, regulations, plans, programs and projects to promote the sustainability and productivity of natural resources, social equity in natural resource utilization and environmental protection 2. Provide efficient and effective delivery of services 3. Recommend and upon approval implement programs and projects on forestry, minerals, and land management 4. Evolve regional budget 5. Supervise the processing of natural resources products and monitor the movement of said products 6. Conduct field research for appropriate technologies recommended for various projects 1. Supervise all activities of the PENRO in his jurisdiction 2. Monitor all foreign-assisted and special projects	EO 192, 1987 DAO No. 1, Series of 1988
PENRO	1. Absorb the functions of the District Offices of bureaus which are abolished 1. Plans, coordinates, controls and update plans for the protection of the environment, development and conservation of natural resources 2. Coordinate environmental and natural resources management activities in the province 3. Enforce environment and natural resources laws, rules and regulations 4. Investigate and recommend action to resolve claims and conflicts involving natural resources 5. Supervise activities of holders of permits, leases, and licenses 6. Evaluate performance of personnel in providing administrative and financial support to CENROs	EO 192, 1987 DAO No. 1, Series of 1988

Table 3.3.1 Relevant Functions of DENR (2/3)

Offices/Bureaus	Powers/Functions	Issuances
CENRO	1. Absorb corresponding functions of District Offices of bureau which are abolished 1. Undertake and implement projects for the development and conservation of natural resources at the community level 2. Implement laws, rules and regulation for the protection of the environment and conservation of natural resources 3. Maintain up-to-date data on environmental and natural resources conditions 4. Conduct surveys of areas covered by applications for lease and permits 5. Collect and account fees 6. File in court criminal cases against violators of environment and natural resources laws 7. Initiate the settlement of conflicts between or among users of natural resources	EO 192, 1987 DAO 1, Series of 1988
Forest Management Bureau (FMB)	1. Recommend policies and programs for the effective protection, development, occupancy, management and conservation of forestlands and watersheds including grazing and mangrove areas, reforestation and rehabilitation of critically denuded forest reservations … 2. Advise regional offices in the implementation of above policies and/or programs 3. Develop plans, programs, operating standards and administrative measures to promote the Bureaus objectives and functions 4. Assist in the monitoring and evaluation of forestry and watershed development projects to ensure efficiency and effectiveness 5. Undertake studies on the economics of forestry and forest-based industries, including supply and demand trends on the local, national and international levels, identifying investment problems and opportunities	EO 192, 1987; DAO 1, Series of 1988
Ecosystems Research and Development Bureau (ERDB)	1. Formulate and recommend an integrated research program relating to Philippine ecosystems and natural resources such as minerals, lands, forests as holistic and inter-disciplinary fields of inquiry 2. Assist the Secretary in determining a system of priorities for the allocation of resources to various technological research programs of the department 3. Provide technical assistance in the implementation and monitoring of aforementioned research program 4. Generate technologies and provide scientific assistance in the research and development of technologies relevant to the sustainable uses of Philippine ecosystems and natural resources 5. Assist the Secretary in the evaluation of the effectiveness of the implementation of the integrated research program	EO 192, 1987; DAO No. 1, Series of 1988

Table 3.3.1 Relevant Functions of DENR (3/3)

Offices/Bureaus	Powers/Functions	Issuances
Protected Areas and Wildlife Bureau (PAWB)	1. Formulate and recommend policies, guidelines, rules and regulations for the establishment and management of Integrated Protected Areas Systems (IPAS) such as national parks, wildlife sanctuaries and refuge, marine parks and biosphere reserves 2. Formulate and recommend policies, guidelines, rules and regulations for the preservation of biological diversity, genetic resources, the endangered Philippine flora and fauna 3. Prepare up-to-date listing of endangered Philippine flora and fauna and recommend a program of conservation and propagation of the same 4. Assist the Secretary in the monitoring and assessment of the management of the IPAS and provide technical assistance to the regional offices in the implementation of programs for these areas	EO 192, 1987; DAO No. 1, Series of 1988
Mines and Geo-sciences Bureau (MGB)	1. Recommend policies, regulations and programs pertaining to mineral resources development and geology 2. Advise the Secretary on the granting of mining rights and contracts over areas containing metallic and non-metallic mineral resources 3. Assist in the monitoring and evaluation of the Bureau's programs and projects to ensure efficiency and effectiveness thereof 4. Develop and promulgate standards and operating procedures on mineral resources development and geology 5. Supervise and control development and packaging of nationally applicable technologies on geological survey, mineral resource assessment, mining and metallurgy, the provision of geological metallurgical, chemical and rock mechanics laboratory service	EO 192, 1987; DAO No. 1, Series of 1988 and RA 7942
Local Government Unit (LGU) PENRO	1. Transformation of forest-based communities to become self-reliant through a sustainable system of production geared towards ecological stability 2. Conservation, utilization and development of natural resources and the restoration/rehabilitation of denuded watershed and forest areas 3. Development enforcement of environmental laws, rules and regulations devolved to the province	Prov. ENRO

Sources: Executive Order 192, 1987. Providing for the Reorganization of the Department of Environment, Energy and Natural Resources, Renaming it as the Department of Environment and Natural Resources, and for other purposes

DENR Administrative Order No. 1, Series of 1988. Implementing Guidelines for the Reorganization of the Department of Environment and Natural Resources Pursuant to Executive Order No. 192

DENR AO No. 99-51, 1999. Prescribing a Detailed Definition of Functions for the Realigned Regional Divisions

Provincial Environment and Natural Resources Office, Bayombong, Nueva Vizcaya

Table 3.4.1 Monitoring and Evaluation Systems for Regular and Special Projects (1/3)

Offices/organizations Involved	DAO 99-38 SOP for Performance Monitoring	CBFMP (DAO 96-29)	DENR-CARP (DAO 99-28)	SIFMA (DAO 24 S1996)	FLGMA (DAO 99-36)	FSP (MC No. 2001-04)
People's Organization	Report monthly accomplishments to CENRO using Form O3			Member of team with LGU & CENRO with latter as team leader, regularly monitor and evaluate progress of SIFMA		1. Provides information to NGO conducting monitoring and evaluation 2. Helps assess results of evaluation, feedback NGO on results
LGU						1. Helps assess results of evaluation, feedback NGO on results
NGO				Member of team with NGO & CENRO with latter as team leader, regularly monitor and evaluate progress of SIFMA		1. Contract with Project to undertake **physical validation of accomplishments**, or the **institutional and benefit monitoring** 2. Physical validation is done 1 year after planting & at 6 months interval 3. Validation & final reports to be completed 4 months before completion of project 4. Presents results of monitoring and evaluation to PO, SUSIMO, CENRO, PENRO, Regional Office, & LGU
Operating/Implementing Unit; Project Managers	Measurement and report monthly actual performance, submit to CENRO prior to 25th of month					
CENRO	Consolidate reports of field implementers and managers, submit to PENRO prior to 27th day of month	Submit periodic report to PENRO for evaluation		1. Heads team with LGU and NGO monitor and evaluate progress of FLGMA 2. Submit periodic reports to PENRO for evaluartion		1. Helps review evaluation, feedback NGO on results
PENRO	Prepares own report of accomplishment, submit to RED with the CENRO report prior to 30th of month	Submit periodic reports and maintain database for all CBFMP projects in the province		1. Analyze and consolidate report and submit to RED with findings & recommendations 2. Maintain database for all SIFMAs within province		1. Helps review evaluation, feedback NGO on results

Table 3.4.1 Monitoring and Evaluation Systems for Regular and Special Projects (2/3)

Offices/organizations Involved	DAO 99-38 SOP for Performance Monitoring	CBFMP (DAO 96-29)	DENR-CARP (DAO 99-28)	SIFMA (DAO 24 S1996)	FLGMA (DAO 99-36)	FSP (MC No. 2001-04)
RED (Regional Coordinators for DENR-CARP)	Consolidates reports and submit to Planning and Policy Studies Office (PPSO), DENR not later than 10th of following month. Also forms validation team for quarterly inspection and validation of accomplishments	1. Identify division as repository for data and information 2. Submit periodic report to Secretary thru Usec for Operations including monitoring & evaluation, copy furnished FMB & PAWB	1. Responsible for monitoring of all CARP related projects. 2. Submit on specified forms all data required to CBFMO-FMB. 3. Submit to RED physical accomplishment and fund utilization 4. Establish database, data coming from Provincial Coordinators 5. Regional Secretariat submits consolidated reports to the National Secretariat based on data submitted by PENROs 6. AREDs monitor Agrarian Reform Fund	1. Submit periodic report to Secretary through the FMB 2. FRDD is the repository of data and information of SIFMA in region	1.Create a team to conduct evaluation of FLGMA, yearly for new agreements and every 2 years thereafter 2. Furnish copy of evaluation report to Secretary through the FMB	1. Approves starts of validation of plantation; notifies NGO to adjust schedule if there is delay in plantation development 2. Helps review evaluation, feedback NGO on results

Table 3.4.1 Monitoring and Evaluation Systems for Regular and Special Projects (3/3)

Offices/organizations Involved	DAO 99-38 SOP for Performance Monitoring	CBFMP (DAO 96-29)	DENR-CARP (DAO 99-28)	SIFMA (DAO 24 S1996)	FLGMA (DAO 99-36)	FSP (MC No. 2001-04)
FMB	Sector Bureau and line Bureaus submit individual accomplishment reports to PPSO not later than 10th of ensuing month	1. Prepare and monitor implementation of national CBFM program of action 2. Develop and maintain improved MIS on CBFMP	1. CBFMO-FMB monitors program at national level 2. Establish database from reports submitted by Regional CARP Coordinators 3. Consolidate sector reports and submit to National Secretariat	1. Prepare simplified format to be accomplished by CENRO 2. Register all SIFMAs issued 3. Prepare and submit regular consolidated report to Secretary	1. Analyze evaluation and report to Secretary results of analysis	
NFDO						1. Process and recommends approval of NGO contracts 2. Along with SUSIMO review evaluation results
PPSO	Consolidate and analyze reports, submit to Secretary not later than 15th of following month, furnish sector and line bureaus copy of report. Coordinate validation of reports of accomplishments; validation done during 1st quarter of the ensuing year					
Secretary	Creates validation team for annual general inspection. Membership comes from regions other than the one whose performance is validated					

Source: The indicated issuances of DENR

Table 3.5.1 DENR Budget Profile (1997-2001)

(Unit:P'000)

	2001	2000	1999	1998	1997
DENR	**4,545,422**	**4,545,422**	**4,272,802**	**4,707,834**	**4,761,084**
General Administration and Support Services (GASS)	864,966	864,966	924,256	877,472	695,243
Support to Operations	432,950	432,950	381,459	457,910	411,950
1. *Forestry Sector*	**1,504,805**	**1,504,805**	**1,467,692**	**1,610,430**	**2,025,587**
2. *Lands Sector*	675,931	675,931	666,378	689,061	628,663
3. *Environment Sector*	1,750	1,750	168,601	141,975	305,403
4. *Research Sector*	229,271	229,271	228,192	257,355	146,068
5. *Protected Area Sector*	199,515	199,515	193,826	268,760	200,136
Projects	636,234	636,234	242,398	404,871	248,034
Mines and Geo-sciences Bureau[1]	333,795	333,795	394,906	364,210	200,184

[1]MGB has a separate budget appropriation

[2] There is no budget approved by Congress for 2001

Source: General Appropriations Act (1997-2000)[2]

Table 4.2.1 Summary of the Administrative Jurisdiction of the Study Area

code	Region	code	Province	code	Municipality	No. of Barangay
02	Region 2	50	Nueva Vizcaya	01	Ambaguio	8
02		50		02	Aritao	22
02		50		03	Bagabag	17
02		50		04	Bambang	25
02		50		05	Bayombong	25
02		50		06	Diadi	10
02		50		07	Dupax del Norte	15
02		50		08	Dupax del Sur	18
02		50		09	Kasibu	30
02		50		10	Kayapa	22
02		50		11	Quezon	12
02		50		12	Santafe	15
02		50		13	Solano	22
02		50		14	Villaverde	9
02		50		15	Alfonso Castaneda	5
02		50			*Sub-total*	*255*
02		57	Quirino	01	Aglipay	24
02		57		02	Cabarroguis	5
02		57		03	Diffun	11
02		57		04	Maddela	32
02		57		06	Nagtipunan	15
02		57			*Sub-total*	*87*
02		31	Isabela	01	Angadanan	28
02		31		09	Cordon	2
02		31		12	Echague	25
02		31		15	Jones	40
02		31		27	San Agustin	23
02		31		28	San Guillermo	21
02		31		24	Ramon	1
02		31			*Sub-total*	*140*
14	CAR	27	Ifugao	01	Banaue	18
14		27		02	Hungduan	9
14		27		03	Kiangan	14
14		27		04	Lagawe	20
14		27		05	Lamut	18
14		27		06	Mayoyao	27
14		27		07	Alfonso Lista	1
14		27		08	Aguinaldo	9
14		27		09	Hingyon	12
14		27		10	Tinoc	12
14		27		11	Asipulo	9
14		27			*Sub-total*	*149*
Total					38	631

Table 4.3.1 List of Sub-watersheds within the Study Area

Upper Magat River Basin

No. of sub-watershed	ID_1	ID_2	Size of Area (ha)
1	M	1-a	6,646
2	M	1-b	4,788
3	M	1-c	5,244
4	M	1-d	12,206
5	M	1-e	6,258
6	M	1-f	7,314
7	M	1-g	6,791
8	M	1-h	7,600
9	M	1-i	7,900
10	M	1-j	7,489
11	M	2-a	8,022
12	M	2-b	6,788
13	M	2-c	5,631
14	M	2-d	8,039
15	M	2-e	6,699
16	M	2-f	4,332
17	M	2-g	5,649
18	M	2-h	7,304
19	M	2-i	7,613
20	M	2-j	9,064
21	M	2-k	9,488
22	M	2-l	7,863
23	M	3-a	21,347
24	M	3-b	12,024
25	M	3-c	4,569
26	M	4-a	5,782
27	M	4-b	7,454
28	M	4-c	5,521
29	M	4-d1	6,809
30	M	4-d2	7,402
31	M	4-e	10,179
32	M	4-f	7,220
33	M	4-g	10,732
34	M	5-a	7,503
35	M	5-b	3,422
36	M	5-c	6,682
37	M	5-d	7,689
38	M	5-e	3,090
39	M	5-f	4,050
40	M	5-g	3,046
41	M	6-a	3,604
42	M	6-b	4,667
43	M	6-c	6,833
44	M	6-d	8,296
45	M	6-e	4,690
46	M	6-f	5,269
47	M	6-g	5,758
48	M	6-h	3,697
49	M	7-a	6,246
50	M	7-b	5,367
51	M	7-c	6,183
52	M	7-d	7,065
53	M	7-e	6,254
54	M	8-a	6,033
55	M	8-b	4,448
56	M	8-c	6,899
57	M	8-d	4,862
58	M	8-e	8,035
59	M	8-f	8,654
60	M	8-g	7,894
61	M	8-h	3,658
Total			417,663

Upper Cagayan River Basin

No. of sub-watershed	ID_1	ID_2	Size of Area (ha)
62	C	1-a	8,455
63	C	1-b	5,877
64	C	1-c	7,787
65	C	1-d	6,833
66	C	1-e	6,620
67	C	2-a	5,976
68	C	2-b	4,965
69	C	2-c	7,117
70	C	2-d	5,223
71	C	3-a	5,678
72	C	3-b	8,332
73	C	3-c	5,425
74	C	3-d	6,859
75	C	3-e	5,221
76	C	4-a	2,881
77	C	4-b	3,946
78	C	4-c	5,022
79	C	4-d	4,927
80	C	5-a	6,044
81	C	5-b	4,024
82	C	5-c	8,744
83	C	5-d	6,064
84	C	5-e	7,833
85	C	6-a	8,901
86	C	6-b	5,491
87	C	6-c	6,654
88	C	6-d	4,507
89	C	6-e	7,050
90	C	7-a	8,154
91	C	7-b	5,585
92	C	7-c	10,177
93	C	8-a	7,704
94	C	8-b	7,073
95	C	8-c	5,140
96	C	8-d	7,631
97	C	8-d	5,507
98	C	8-e	5,608
99	C	8-f	5,349
100	C	8-h	8,290
101	C	8-i	4,824
102	C	9-a	3,804
103	C	9-b	5,685
104	C	9-c	5,829
105	C	9-d	6,237
106	C	9-e	3,693
107	C	9-f	4,574
108	C	9-g	5,227
109	C	10-a	9,386
110	C	10-b	6,420
111	C	10-c	5,282
112	C	10-d	5,374
113	C	10-e	8,248
114	C	10-f	4,656
115	C	11-a	14,255
Total			342,166

Addalam River Basin

No. of sub-watershed	ID_1	ID_2	Size of Area (ha)
116	A	1-a	7,139
117	A	1-b	4,827
118	A	1-c	6,371
119	A	2-a	5,858
120	A	2-b	6,100
121	A	2-c	4,782
122	A	2-d	6,138
123	A	2-e	5,609
124	A	2-f	5,910
125	A	3-a	4,218
126	A	3-b	5,907
127	A	3-c	5,370
128	A	3-d	6,719
129	A	3-e	5,989
130	A	3-f	6,109
131	A	3-g	4,130
132	A	4-a	10,586
133	A	4-b	13,010
Total			114,773

Table 4.3.2 Summary of Rainfall Record

Station	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1. Baligatan	1976-85	29.4	10.7	37.6	98.7	206.8	177.0	234.2	213.1	231.0	202.9	160.2	50.9	1,652.5
2. Banga-An	1963-78	27.2	7.6	22.0	78.8	218.7	274.8	302.4	375.6	274.5	148.8	115.3	26.4	1,872.1
3. Barat, Bambang	1968-80	23.8	10.1	35.8	90.0	226.7	224.8	271.4	323.1	302.7	337.8	156.4	104.9	2,107.5
4. Baretbet (Dumayup)	1977-85	21.1	12.5	58.9	128.1	262.7	184.7	231.4	194.9	254.4	250.8	125.1	49.4	1,774.0
5. Barlig	1963-85	134.4	41.0	92.9	95.2	309.7	402.6	394.7	411.6	372.1	407.8	499.5	326.3	3,487.8
6. Bauko	1963-80	6.5	7.5	43.8	169.1	284.5	304.8	371.0	421.4	313.4	188.7	67.9	54.4	2,233.0
7. Bontoc	1963-85	17.9	11.9	46.6	127.6	263.8	294.5	390.5	267.9	302.8	204.8	152.5	54.4	2,135.2
8. Casiguran	1961-84	234.2	113.8	176.5	136.3	242.3	229.4	284.7	251.9	592.5	421.7	628.8	402.9	3,715.0
9. Consuelo, Santa Fe	1956-85	33.5	18.0	44.0	70.9	221.5	252.6	380.4	331.0	325.5	263.9	211.8	60.5	2,213.6
10. Dakgan	1972-82	18.4	11.3	29.8	23.1	134.5	158.8	234.2	176.5	216.5	273.1	274.6	68.9	1,619.7
11. Echague	1976-85	17.5	9.1	18.2	91.7	114.5	97.1	148.8	259.9	189.6	272.8	128.0	142.3	1,489.5
12. Gabong	1952-72	38.6	13.0	25.5	33.4	128.5	179.9	251.5	216.7	229.0	230.0	284.9	90.3	1,721.3
13. Hapid, Lamut	1976-85	15.4	21.7	42.8	115.2	222.5	167.9	209.4	173.7	241.4	213.4	109.4	29.9	1,562.7
14. Ilagan	1965-84	59.1	20.9	32.3	62.6	155.4	172.8	144.7	186.0	172.2	291.1	315.9	191.1	1,804.1
15. Lagawe	1968-82	176.0	88.5	65.2	190.1	171.3	265.0	362.0	319.9	341.4	331.6	394.3	146.3	2,851.6
16. Mt. Data, Benguet	1950-78	27.2	25.0	74.6	187.9	357.0	413.5	619.4	563.3	465.2	296.3	220.4	78.2	3,328.0
17. Mt. Polis, Banague	1963-80	160.4	134.0	110.1	157.7	337.3	457.1	516.8	553.5	453.0	378.1	370.9	246.6	3,875.5
18. Nayon, Lamut	1968-80	63.4	25.5	69.9	89.5	217.2	200.4	207.8	243.6	220.4	240.2	185.7	99.3	1,862.9
19. Poblacion Lagawe	1976-85	44.9	37.5	62.7	117.9	240.1	183.3	284.8	267.4	230.1	250.7	136.3	64.3	1,920.0
20. Sto Domingo	1976-85	28.6	14.6	29.7	115.3	113.9	161.7	193.5	157.3	232.7	245.3	116.3	44.8	1,453.7

Source: Feasibility Study of the Flood Control for the Lower Cagayan River (JICA)

Table 4.3.3 Mean Maximum Ambient Temperature (°C)

Station	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1. Baretbet	1981-84	26.1	28.2	31.2	31.0	30.1	29.9	29.1	28.8	29.8	28.4	27.8	25.9	28.9
2. Consuelo	1981-84	25.5	28.7	30.3	30.9	31.7	31.1	29.2	27.6	28.6	27.4	27.1	24.8	28.6
3. Echague	1980-97	27.1	29.4	32.3	34.5	34.9	34.4	33.2	33.3	32.2	31.5	29.5	27.2	31.6
4. Hapid, Lamut	1981-84	23.7	24.6	25.7	27.3	28.5	28.2	27.7	26.8	28.2	26.7	25.5	23.0	26.3
5 Lagawe	1981-84	29.1	29.0	28.9	28.8	29.7	30.2	29.7	29.9	29.7	29.7	29.6	28.4	29.4
6. San Isidro	1976-80	27.3	28.2	30.6	33.1	33.0	31.9	31.7	31.6	31.3	29.2	27.3	26.2	30.1
7. Sto Domingo	1981-84	27.7	29.1	28.9	31.0	32.2	32.7	31.9	30.1	30.0	29.4	30.1	27.2	30.0

Source: Feasibility Study of the Flood Control for the Lower Cagayan River (JICA)

Table 4.3.4 Mean Minimum Ambient Temperature (°C)

Station	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1. Baretbet	1981-84	21.7	23.1	23.3	24.3	24.5	24.4	24.2	24.8	25.0	24.0	23.8	22.5	23.8
2. Consuelo	1981-84	20.4	21.5	23.7	24.2	25.4	25.2	24.0	23.4	23.6	22.9	22.0	21.1	23.1
3. Echague	1980-97	19.8	20.1	20.6	22.7	23.7	24.0	23.6	23.7	23.4	22.9	22.0	19.0	22.1
4. Hapid, Lamut	1981-84	21.2	20.5	21.1	22.7	23.3	24.1	23.8	23.2	23.0	23.4	22.0	20.5	22.4
5 Lagawe	1981-84	20.5	19.0	22.0	21.7	21.2	22.1	20.6	21.8	21.5	21.8	22.0	21.1	21.3
6. San Isidro	1976-80	21.3	21.1	23.0	24.9	25.4	25.7	25.6	25.5	24.6	24.1	22.8	21.6	23.8
7. Sto Domingo	1981-84	19.6	20.1	19.5	20.2	22.2	22.0	21.2	20.4	20.1	18.7	19.1	18.9	20.2

Source: Feasibility Study of the Flood Control for the Lower Cagayan River (JICA)

Table 4.5.1 Forest Products Production in Region II over the last 5 years

	Round Logs, m^3	Lumber m^3	Rattan, unsplit (lm)	Rattan, split (kg)	Almaciga resins (kg)	Bamboo (pieces)
National						
2000	800,087	149,624	32,335,617	97,289	518,191	2,341,593
1999	730,170	288,317	15,551,924	47,799	297,830	1,038,710
1998	633,797	221,988	10,463,538	5,114	260,605	447,616
1997	555,917	350,634	19,519,185	1,906	310,474	198,607
1996	771,322	3,122,652	24,612,882	17,426	890,383	671,074
Region II						
2000	17,472	1,447	1,292,898			
1999	16,189	1,051	2,493,189	1,590	5,000	
1998	11,545	3,374	1,715,578		15,000	
1997	10,903	8,950	2,447,260		12,000	550
1996	8,602	2,072	4,281,842	15,000		
CAR						
2000						
1999			504,189			18,744
1998			64,470			4,325
1997						
1996	379					
Ifugao						
2000						
1999						365
1998						
1997						
1996						328
Isabela						
2000	17,282	1,429	43,000			
1999	16,007	1,051	241,790	1,590	5,000	
1998	11,545	3,374	792,600			
1997	4,528	8,950	2,065,760		12,000	550
1996	6,664	2,072	368,600	15,000		
N Vizcaya						
2000			125,800			
1999			87,000			
1998						
1997						
1996	50		187,000			
Quirino						
2000	190					
1999			183,850			
1998						
1997						
1996			615,343			

Source: The Philippine Forestry Statistics, FMB, DENR, 1999

Fot.mwmpp.tableforprod.table5.3.2 3-1
September 2, 2001

Table 4.5.2 List of CS Holders Given Harvesting Permits in Nueva Vizcaya

Name of CS-holder	Location	Date Approved	CSC Number	Harvesting Permit No.	Volume Approved M^3
1. Rodolfo Yoro	Calaocan, Quezon	June 5, 2000	022411449	025	6.18
2. Bobby Donato	Calaocan, Quezon	May 22, 2000	022411447	024	14.49
3. Genaro Omarito	Mandiangat, Quezon	March 6, 2000		019	1.27
4. Ruben Ducusin	Danubba, Quezon	June 13, 2000	022411262	021	8.40
5. Joaquin Cablinan	Ocapan, Villaverde	April 22, 2000	022414885	022	47.65
6.Rafael de la Cruz	Kinacao, Bagabag	July 14, 2000	02411006	026	21.35
7. Mariano Ancheto	-do-	June 19, 2000	02240611	013	9.52
8. Christina Marcos	-do-	May 4, 2000	11-2413199	023	6.13
9. Ernesto Divina	Bintauan, Villaverde	October 2, 2000	520585	028	20.34
10. Joseph Dulman, Jr.	Ampakleng, Diadi	October 17, 2000	022406929	029	64.99
11. Olpiano Reyes	-do-	Nov. 7,2000	022405188	030	23.30
12. Severino Galasinao	-do-	Jan. 25, 2001	022411937	031	10.93
13. Marcela Valdez	-do-	March 13, 2001	022414979	032	24.26
14. Macario Carbonel	-do-	May 7, 2001	11-2413160	033	7.25
15. Julie Corpuz	-do-	June 13, 2001	022406923	034	47.30
16. Catalina Pascua	-do-	June 19,2001	022414978	035	41.16
17. Fidel Duka	-do-	July 18,2001	022411285	036	70.03
18. Editha Biag	-do-	July 18,2001	11-2413269	037	15.73
19. Joseph Dalnuan, Jr	-do-	August 9, 2001	022414890	038	11.91
20. Joaquin Cablinan	Ocapan, Villaverde	Sept. 12, 2001	022414885	039	22.57
Total					460.27

Table 4.6.1 Item and Definition of Land Use/Vegetation Classification

Item	Characteristics
Old-growth forest	Highly productive forests with many fully-grown trees. Dipterocarpceae is the dominant families. It is located in hilly areas. Little felling so far has ensured a high density. Tree height ranges from 15-25m. Forest with high redness from reflection of near infrared rays and smooth texture on the images were classified in this category.
Mossy forest	Forests with tree height of up to around 5m that are located in areas of high elevation higher than 1000m and which are often covered by epiphyte. Within areas of high elevation, those sections displayed as a red-black color on the images were classified in this category.
Residual forest	Forests with fully-grown trees but low density due to felling. These forests are distributed in areas of lower elevation than Old-growth forests. Species of trees are the same as for Old-growth forest. Tree height ranges from approximately 10-20m. Among forest areas, those forests with a rough texture on the images were classified in this category.
Sub-marginal forest	Forests with restrained or stunted tree growth due to soil and/or weather conditions. These forest conditions are deemed to be brought about largely by the limestone topography soil conditions and meteorological conditions such as the wind blowing from the sea.
Pine forest	Forest with pine trees as the dominant species. Areas with high density are shown on the images in a distinctive color. However, areas with low density are shown in a similar color as Reproduction brush and grass land on the images, so there is a possibility that Pine forest may have been classified into either of these two categories. Tree height ranges from around 15-25m.
Mangrove forest	N.A. (Mangrove forest is not distributed in the Study Area.)
Reproduction brush	Reproduction brush mainly comprises secondary forests incorporating brush and grass land and is distributed along the foothills of Residual forest areas and near roads. Tree species include Leguminosae and Dipterocarpceae, and tree height ranges from approximately 1m up to 15m.
Coconut plantation	There is some distribution of Coconut plantation in the continental areas.
Other orchard	This category includes fruit plantation such as mango, banana and jackfruit. Vegetation along roads and rivers was also included in this category.
Grass land	Grass land is distributed in plain and mountain areas and is used as grazing land. The color scheme of this category on the images resembles that of Agricultural areas with little vegetation.
Agricultural land	In addition to paddy fields, sugar cane, corn and vegetable fields were classified in this category. With regard to paddy fields, the reflection quantity of near infrared rays had a wide range, and the state of growth of rice plants and the state of paddy fields before/after harvest affected the images greatly. Harvested paddy field resembles the color of Grass land and Bare/Rocky land, while the color of plants in full growth resembles that of forest. Paddy fields and sugar cane fields were distributed mainly in plain areas, while other fields were distributed in mountainous regions.
Bare/Rocky land	Bare land including collapsed areas, dry riverbeds and beaches. It also includes cultivated lands without vegetation cover.
Built-up area	Urban areas, areas of development and areas containing large numbers of man-made structures such as roads and airports were classified in this category. The color scheme of this category is similar to that of Bare/Rocky land, so the following procedure was used in this Study. First both areas were classified as Bare/Rocky land, and then areas that showed clear evidence of man-made structures were classified into this category.
Water area	Rivers and lakes including fishponds were classified into this category. The water areas covered by this category were not counted in the Forest Register.
Cloud	Clouds that could not be removed by cloud removal techniques.
Shadow	Cloud shadow that could not be removed by cloud-removal techniques.