



JAPAN INTERNATIONAL COOPERATION AGENCY



DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
THE REPUBLIC OF THE PHILIPPINES

**THE MASTER PLAN STUDY
FOR
WATERSHED MANAGEMENT
IN
UPPER MAGAT AND CAGAYAN
RIVER BASIN
IN
THE REPUBLIC OF THE PHILIPPINES**



**Final Report
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**FINAL REPORT
VOLUME III: Appendixes**

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Forest Management

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APPENDIX 1

FOREST MANAGEMENT

CHAPTER 1 INTRODUCTION

1.1 Changes in the Forest Cover

In the Philippines, forestland is defined as “the mass of land of the public domain comprising of the public forest in permanent/established forests or forest reserves and other forest reservations.” According to PD 705 (Revised Forestry Code of the Philippines), area with slope more than 18% is regarded as forestland.

Approximately 27 million ha (90%) of the land in the Philippines was covered with forest during the 1600s. The forest cover has been reduced to 21 million ha (70%) in 1900 and 5.4 million ha (18%) in 1997. This reduction of the forests was largely due to massive industrial logging during the 1960s and 1970s. Timber production of the nation reached a peak with an annual production of about 10 million m³ in 1968, but it was reduced down to 69 m³ in 1998.

1.2 General Trends in the Forest Management

Dominant species composition of the natural forest in the Philippines is mainly Dipterocarp species. Natural Dipterocarp forest was estimated at about 4 million ha in 1991, of which 30,000 ha was cleared by 1996 with the rate of annual loss of 1.72% although industrial logging has been largely diminished for the last two decades. This reduction in the size of natural forest is mainly due to forest fire including *kaingin* and illegal logging. There are also other causes for the reduction of the forest such as typhoon but the significance of the natural cause may be minimal compared with the human cause. Therefore, management of various human activities particularly in upland areas plays a critical role in the forest management.

Size of plantation area reached a peak of 190,000 ha in 1990, and it ranges between 50,000 to 60,000 ha recently. Foreign founded projects occupy about 43% of the plantation areas followed by 30% of the DENR's regular founding. Main species for planting is Yemane (*Gmelina arborea*), which is a fast growing species and that there is a high demand from furniture industries.

CHAPTER 2 DATA COLLECTION AND ANALYSIS

2.1 Location and Topography

Exact location and boundary of the Study Area was confirmed on the NAMRIA Maps (1/50,000)¹. Provincial borders and mountain ridges dividing different watersheds were carefully looked at in this confirmation, particularly where part of the boundary were not clearly defined.

The general characteristics of the topography of each province were described as indicated in the provincial profile. Size of particular topographical areas was obtained using Geographic Information System (GIS) explained later.

2.2 Geology and Soils

Provincial profile of each province was used to understand soil condition and geology of the Study Area. Furthermore, data gathered in “The Feasibility Study of the Flood Control Project for the Lower Cagayan River” of JICA were also utilized in this Study.

2.3 Meteorology and Hydrology

Fully utilized and applied meteorological and hydrological data for the Study were those collected in a Master Plan Study on the Water Resources Development in the Cagayan Basin during 1986-1988 and the Feasibility Study of the Flood Control Project for the Lower Cagayan River. Rainfall stations where data were used for this Study are listed in **Table 2.1.1**.

2.4 Land Use and Vegetation

2.4.1 Overall Flow of the Survey

Present land use patterns and vegetation are analyzed using Satellite images with information from the 1/50,000 NAMRIA Map. Classification of land use/vegetation was performed by means of supervised classification of the image processing system. Then, those classified land use/vegetation data were plotted as Land Use and Vegetation Maps on a scale of 1/50,000 together with river system, road network and others. Digitization of the data was sub-contracted to A & A Geoinformatics Corporation (AAG) in April 2001. Detailed workflow of the analysis is illustrated in **Figure 2.1.1**.

Flow of the data processing is as follows:

- 1) Checking of the observation range and noise condition of the satellite data collected
- 2) Outputting false color satellite images for the primary field survey
- 3) Cutting of the analysis range: The object range for the Study was checked on the satellite picture and the data of the required range was cut out so that it covered the whole Study Area.

¹ Topographic maps on a scale of 1/50,000 produced and issued by NAMRIA (National Mapping and Resource Information Authority, DENR).

- 4) Mosaic Processing (after primary field survey): The object scenes to be analyzed consisted of two scenes. In satellite image data, mosaic processing was conducted to make them into one unit data covering the whole Study Area. Color correction due to the difference of observed dates between two scenes was also done in this processing.
- 5) Geometric Correction (after the primary field survey): Geometric correction was carried out using GCPs (Grand Control Points). The duplicated printing film of the NAMRIA Map (1/50,000) was used as the basic map for GCPs acquisition. GCPs were selected on a one-point-per-one-sheet basis as a standard. By the geometric correction, the final positioning error was limited to about one pixel (to be transferred to 30m as ground distance) in RMS (Root Mean Square).

2.4.2 Field Reconnaissance

Field reconnaissance was conducted twice, the first survey was conducted between March 26 and April 3, 2001. Similarity of forest types such as mossy forest, old growth forest, residual forest and sub-marginal forest was compared in the field.

The second survey was conducted as the ground truth to verify the categories classified in the primary data processing. Field observation was conducted between April 23 and May 13, 2001, which was in a similar season that the satellite image was taken so that any bias and seasonal changes were minimized in the verification.

2.5 Watershed Condition

Current condition of the Study Area as a watershed was studied through field reconnaissance in addition to the analysis of secondary data. Representative sub-watersheds particularly of degraded areas, well-managed areas, on-going forestry related areas and others were visited to understand the current condition of the watershed during the first phase of the Study. Field reconnaissance was mainly conducted in April, July, August and September 2001, and forest condition was also carefully examined. Distribution of grass land and reproduction brush was also examined. Unstructured interviews were sporadically conducted with PO members or farmers along with PENRO or CENRO officers in the field. Field reconnaissance in August 2001 was effective because there was a set of vegetation map available, which was prepared using GIS in this Study.

2.6 Field Survey on the Community-based Forest Management in the Study Area

A field survey was conducted during April-May 2001 on selected CBFM sites. The field survey was conducted based on the three components: 1) Interview with Chairman and/or Manager of the PO responsible for the CBFM program; 2) Interview with selected PO members; and 3) Site visits to areas where management was conducted through plantation, agroforestry and other management techniques.

Interview survey was conducted on 10 POs with 48 households in total, of which 9 POs with 46 households were analyzed. Eight of the POs were located within the Study Area, while one PO, J. V. Greeners Tree Planters Association Inc., was excluded from the analysis. The eight POs represent 21.1% of the total 38 POs located within the Study Area.

The name of POs and their location are listed below. For each PO, five households in principle were chosen by PO managers in accordance with the flexible application of Wealth Ranking Method².

List of POs for which the Field Survey was Conducted

Name of PO	Barangay	Municipality	Responsible CENRO
Nueva Vizcaya			
Yaway Farmers Multi-Purpose Cooperative Inc.	Yaway	Aritao	Aritao
Federation of Vista Hills, Kakongkong and Kakilingan Upland Farmers	Buena Vista	Bayombong	Bayombong
J. V. Greeners Tree Planters Association Inc.	Lublub	Alfonso Castañeda	Dupax
Quirino			
Ilongot Livelihood Association Inc (ILAI)	Landigan	Nagtipunan	Nagtipunan
Nuh-uh-uhhaan Inc	Asaklat	Nagtipunan	Nagtipunan
Baguio Village Intercultural Association	Baguio Village	Diffun	PENRO Quirino
Ifugao			
Hapid Agro-forestry Developers Association Inc.	Hapid	Lamut	Lamut
Mayoyao Environment Development Association Inc.	Mayoyao	Mayoyao	Alfonso Lista
Nunhabatan Greeners Livelihood Association Inc.	Hapid	Lamut	Lamut

² Based on discussion with PO managers, basic economic structure was gauged according to classifying the PO population into three relative wealth ranking, such as 1) Well off, 2) Median, and 3) Poorer economic classes. Based on the classification, five households were then chosen corresponding to the relative wealth structure of the PO.

CHAPTER 3 PRESENT CONDITIONS OF THE STUDY AREA

3.1 Location

The Upper Cagayan River and the Magat River join to form the Cagayan River that winds its way to Cagayan Valley. Cagayan Valley has a watershed area of about 2,728,100 ha. The Study Area of the Upper Magat and Cagayan River Basin is located within the watershed covering an area of 879,958 ha in the north part of the Luzon Island. It is surrounded by the Cordillera Mountains to the west, the Sierra Madre Mountains to the east and the Caraballo Mountains to the south.

3.2 Natural Conditions

3.2.1 Topography, Geology and Soils

(1) General Feature

The topography of the Study Area is generally sloping, having a large portion of the area with slopes greater than 30% (**Figure 4.3.1, Vol. I**). Large areas of the Cordillera Mountains ranging from 1,200 m to 2,900 m in elevation have been converted into agricultural and grazing lands. On the other hand, the Sierra Madre Mountains with elevation ranging from 1,100 m to 1,400 m hold relatively large areas of natural forest (**Figure 4.3.2, Vol. I**).

Geological condition of the Study area is largely different among provinces. Geological map of the area is shown in **Figure 4.3.4, Vol. I**.

Soil type of considerable part of the Study Area has been unidentified (**Figure 4.3.3, Vol. I**). It is generally characterized in various forms of clay loam and sandy loam soils. Soil types of a large portion of Nueva Vizcaya are Guimbalaon clay loam and Annam clay loam. Representative soil types of Ifugao are Nayon clay loam, Mayoyao clay loam and Longa silty clay loam. A large part of Isabela has Cauayan sandy loam, while Rugeo clay soil has been identified in Quirino.

(2) Nueva Vizcaya

1) Topography

The Study Area within the province of Nueva Vizcaya has a unique topography exhibiting various landforms of complex and rugged terrain characterized by numerous mountains, and a considerable number of valleys, rivers, creeks, plains and rolling hills. Three major ranges namely the Sierra Madre, Caraballo and Cordillera Ranges are located within the Study Area.

Approximately 63,071 ha of the watershed are mountainous characterized by very steep to steep landforms (above 50%), 180,583 ha are rolling to moderately steep (18 - 49%) and 114,074 ha are gently sloping (below 17%) to undulating and flat to near flat. Most of the mountainous areas are found in the southern part of Nueva Vizcaya. Agricultural areas are concentrated in the north where flat to gently sloping areas are found.

The province is located in the uppermost reaches of the Cagayan and the Magat Rivers with elevation ranging from 100 to 2,000 m above sea level (a.s.l) within the proximity of Mt. Pulag in Kayapa. Areas with lower elevation, 100 to 300 m a.s.l are found in the municipalities of Solano, Bagabag, Villaverde and some parts of Diadi. These municipalities have a dominant elevation of 300-500 m a.s.l. Those classified as uplands with an elevation of 500-2,000 m a.s.l are located mostly in the municipalities of the south sector but with Ambaguio in the north having some extensive uplands.

2) Geology and Soils

A soil map prepared by the Bureau of Soils and Water Management (BSWM) in 1995 (**Figure 4.3.3, Vol. I**) shows that the dominant soil texture of the watershed is clay loam. This could be attributed to the abundance of the fine-grained volcanic rocks, sedimentary derivatives and pyroclastics. Along the river terraces, silt loam is also dominant. The watershed is underlaid by two rock types, igneous and sedimentary rocks. Igneous rocks are found to be the largest deposit in the area while sedimentary rocks are scattered and notable only in the northern portion of the watershed.

General depth of the soil is moderately deep except those that are developed from ultra basic rocks and limestone and in areas where rock fragments are dominant. The soil has moderate to high water holding capacity except those along river terraces and the sedimentary hills. All upland soils are considered well drained both internally and externally except in clay alluvial plains. Quality of the soil varies from slow to moderately rapid-to-rapid in the upland and along the river terraces. Infiltration varies from slow to moderate in all uplands. The level of fertility is very high.

(3) Quirino

1) Topography

The Study Area within the province is generally mountainous. More than half of the total area of the province is mountains and highlands. The major topographic features are series of connecting mountains: the Sierra Madre Mountain Range provides a natural barrier on the eastern and southwestern part of the watershed. Most of the Range is found to be steep to very steep (above 50%) which is about 45,202 ha, and moderately steep area (18 - 49%) of about 122,515 ha. Most of these areas are found in the municipality of Aglipay and just patches within Maddela and Nagtipunan. Elevation ranges from 100 to 1,595 m asl.

2) Geology and Soils

No major study has been conducted on the existence of significant ground ruptures in the area but it is known that proximity to the fault line at the boundary of Dingalan, Aurora and Gabaldon, Nueva Ecija stretching out to Nueva Vizcaya affect geological movements in the area.

There are two main classifications of underlying rocks in the watershed. These are the igneous and sedimentary rocks. Igneous rocks have the largest deposit with four major groups of soils such as andesite flow, volcanic agglomerate, metarock and volcanic rock. Volcanic agglomerate is found exposed along the base of the Casecanan River while metarock is extensively found in the Sierra Madre and Mamparang Ranges. Sedimentary rocks found in the watershed are alluvium, sandstone/conglomerate series,

shale/sandstone/mud stone sequence, conglomerate, coralline limestone, crystalline limestone, and shale/sandstone/limestone complex. The soil was found to have a high permeability and infiltration rate. It is fertile to very fertile upland as well as lowland crops.

(4) Isabela

1) Topography

Small portion of the Upper Magat River Watershed (Section 3.2.2) belongs to the province of Isabela specifically in the municipalities of Angadanan, Jones, San Agustin and San Guillermo. The terrain varies from plains to very steep and is dotted with rolling hills and mountains. About 502 ha of the area are found to be steep to very steep (above 50%), and 12,956 ha are classified as moderately steep (18 – 49%). Elevation ranges from 100 to 1,000 m a.s.l.

2) Geology and Soils

The BSWM study reveal three well-drained soils, Bago, Bigaa and Sta. Rita soil series, to be dominant in the watershed area. These were developed from recent alluvial deposits found in both the upland and lowland.

The structural configuration of the various rock formations is dominated by a thrust fault between the ultramatic complex and the basement complex which traverses from north to south and dips to the west. Other faults confined mostly in the cretaceous paleogene rocks and the basement complex are of lesser magnitude. The faults generally follow north 40 degrees to 50 degrees west and north to south. These dominant trends appear to be oriented parallel to the longitudinal axis of the Sierra Madre Mountain Range. There is also an indication that the watershed has a potential of a limestone base specifically in Jones.

The soil in the watershed is generally fertile to very fertile. It has a high water holding capacity, which is prone to erosion. The rate of infiltration and permeability is high.

(5) Ifugao

1) Topography

The Upper Magat River Watershed within the province of Ifugao has various landforms characterized by numerous mountain ranges, the Caraballo, Sierra Madre and Cordillera. It is generally mountainous where most of its area has slopes greater than 50%.

One of the most remarkable characteristics of the watershed is various high relief and steep landforms. The watershed is oriented north to south by a relatively large and thick alluvial zone, manifested by a wide expanse of flood plain deposits.

The watershed has an elevation ranging from 100 to 2,000 m a.s.l. Some portions of Lamut have dominant elevation of 300 to 500 m. Level of slope significantly varies in various locations. They are characterized as rugged, undulating and mountainous features. It has only a small portion of flat lands that could be safely utilized for agriculture and settlements. Approximately 58,413 ha (33.4% of the province within the Study Area) of the area is considered as steep to very steep (above 50%), and 81,748 ha of the area is

moderately steep (18 - 49%). The total area of these two categories covers 80.1 % of the Study Area in Ifugao province.

2) Geology and Soils

The watershed lies within the area of the Cordillera Central Range. The Philippine Fault Zone generally extends northwest and northeast. The central part of the area up to the north and northwestern part of the watershed is occupied by metarock formation, which is evidence of diastrophism like faulting and folding. The eastern and southeastern part of the province is covered with Andesite-Basalt and pyroclastic formation due to successive volcanism.

The mineral resources in the province are mostly non-metallic such as sand, gravel and limestone deposits. There is also an indication of the presence of copper and gold in the watershed.

Based on the study of BSWM in 1985, the dominant soil texture of the watershed is clay loam. The soil is found to be fertile to very fertile. It has a high water holding capacity with slow infiltration and low permeability rates.

3.2.2 River Systems and Sub-Watersheds

The Cagayan River, the main river of the Study Area, flows from south to north for 520 km in the Cagayan Valley (**Figure 4.3.5, Vol. I**). The Upper Cagayan River transverses 220 km along the foothills of the Sierra Madre Mountains on the eastern side of the Study Area. The tributaries on the east are generally steeper in slope and smaller in scale. Main tributary of the river is the Upper Magat River, which forms one of the major watersheds. The Addalam River is also a tributary of the Cagayan River but forms a smaller sized watershed. The Study Area is divided into the three watersheds where the Upper Magat River Watershed holds the largest portion (48%) of the total study area followed by the Upper Cagayan River Watershed (39%) and Addalam River Watershed (13%). Moreover, the three watersheds are further classified into smaller sub-watersheds using the 1/50,000 NAMRIA map (**Figure 4.3.6, Vol. I**).

- Upper Magat River Watershed : 417,663 ha (61 sub-watersheds)
- Upper Cagayan River Watershed : 342,166 ha (54 sub-watersheds)
- Addalam River Watershed : 114,773 ha (18 sub-watersheds)

This classification is mainly based on physical features of the landscape, which can be divided primarily by mountain ridges. The study area of 879,958 ha is divided into a total of 133 sub-watersheds for management and planning purposes (**Figure 4.3.6, Vol. I**).

3.2.3 Meteorology and Hydrology

(1) Meteorology

The Study Area is affected by two tropical monsoons: the southwest monsoon and northeast monsoon. The southwest monsoon brings a large portion of the annual rainfall. Major storms including typhoons often strike the area from July to December. Overall annual rainfall of the Upper Cagayan River Watershed is estimated at 2,600 mm. The maximum monthly rainfall appears in July or August. Rainfall records at various stations are listed in **Table 3.2.1**.

According to the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), most of the Study Area falls under climate Type III. This climatic type is characterized by not very pronounced seasons with relatively dry weather condition from November to April while the remainder of the year is noted as wet weather condition. The rest of the Study Area, especially the western part, falls under climate Type II, which has two pronounced seasons, dry from November to April and wet for the rest of the year.

Cordillera Mountains, west of the Study Area and Sierra Madre Mountains, east of the Study Area, affect the rain patterns in connection with the monsoons. Since the area is located between these mountains, rainfall is lower than those of opposite slopes of the mountains. North central part of the Study Area, around the lower Magat area, is drier than that of other areas.

Seasonal climate variability in the Philippines fluctuates in connection with the El Niño. Based on the National Oceanic and Atmospheric Administration (NOAA) of the USA, most recent El Niño was observed in the years of 1972-73, 1976-77, 1982-83, 1986-87 and 1991-94. These records indicate that El Niño occurs almost every three years.

The hottest month of the area is May or June, while the coldest month is January. The monthly mean ambient temperature ranges from 23.1 °C in January to 29.0 °C in May. Ambient temperature is summarized in **Tables 3.2.2** and **3.2.3**.

Evaporation is highest in April and lowest in December. Relative humidity is relatively high in the area ranging between 70 to 90%.

(2) Hydrology

Stream flow was analyzed to understand the hydrologic cycle in the Cagayan River. Data on run-off were collected and annual average run-off was compared between the two JICA studies, “1987 Master Plan” and “The Feasibility Study of the Flood Control Project for the Lower Cagayan River (2001 F/S).” There was not much difference in these data.

Comparison of Annual Average Runoff Between the Studies in 1987 and 2001

River	Annual Average (m ³ /s)	
	1987 M/P	2001 F/S
Upper Cagayan River	291.6	289.3
Magat River	262.6	269.8

Source: The Feasibility study of its Flood Control Project for the Lower Cagayan River, JICA, 2002

3.2.4 Fauna and Flora

(1) Fauna

Biological diversity of the Philippines is considered high and endemism of wildlife is as high as 67%. Of the total 561 bird species, 177 species are considered endemic to the Philippines. According to the World Conservation Union (IUCN) Red List, 86 species of birds are considered as threatened species and 49 species are near-threatened.

There is a record of 180 mammalian species inhabiting the Philippines, and 110 species of which are endemic. Most mammalian species occur only in lowland forest, montane forest, or mossy forest. Bat is distributed widely in lowlands, and its abundance has an inverse relationship with elevation. Small animals other than the bat, on the other hand, show a steady increase in diversity with increasing elevation. Therefore, it is necessary that protected areas include the full elevational gradient so that many important wildlife species can be secured effectively.

The following table summarizes records of terrestrial fauna within the Cagayan Valley. According to existing data, a total of 75 families and 182 species of terrestrial fauna were recorded. Among these species, there are some endangered animals inhabiting the valley. One of the most well known critically endangered species is the Philippine Eagle (*Pithecophaga jefferyi*), and there are some records of spotting the birds in the Study Area. It seems that a small number of the species inhabit Upper Bingo, Kasibu, Nueva Vizcaya and in the boundary of Quirino and Nueva Vizcaya particularly in the barangays of Gumiad, Yabee and Diayan, Dupax del Norte, Nueva Vizcaya as per sightings by the Regional Office Eagle Watch Team. Population size in the area has not been estimated. Total size of the population is about 200 individuals throughout the nation.

Summary of the Record on Terrestrial Fauna in the Cagayan Valley

Class	Family	Species	Conservation Category	
			Listed in IUCN	Listed in CITES
Amphibians	3	11	1	0
Birds	49	119	13	19
Mammals	10	20	2	4
Reptiles	13	32	3	6
Total	75	182	19	29

IUCN: International Union for Conservation of Nature and Natural Resources

CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora

Source: DENR Region 2

(2) Flora

It is known that approximately 79 families and 298 plant species exist in the Cagayan Valley. Some endangered tree species grow in Nueva Vizcaya, which includes Kalantas (*Toona kalantas*). Terrestrial flora in different categories is summarized in the following table. It is said that there are still unknown plant species within the area particularly in the tropical pristine forests.

Summary of Terrestrial Flora in Different Categories within the Cagayan Valley

Item	Total Number	Remarks
Family	79	-
Species	298	-
Endemic	37	Species found only in the Philippines
Indigenous Species	80	Defined as those found in the country and elsewhere in southeast Asia, but not necessarily exotic in the whole region.
Endangered Species	7	-
Rare Species	10	-

Source: Provincial Ecological Profile of Cagayan, Isabela and Nueva Vizcaya

In Ifugao, dipterocarp species cover approximately 34% of the forestland, and Benguet Pine (*Pinus kesiya*) is relatively abundant in Asipulo, Banaue, Hungduan and Tinoc. Dominant species of natural forest in Quirino are, Dao (*Dracontamelon dao*), Dungon (*Heretierra silvatica*), Mayapis (*Shorea palosapis*), and White lauan (*Shorea contorta*).

3.3 Land Classification

3.3.1 Classification of Forestland

Presidential Decree No. 705, 19 May 1975, Revised Forestry Code of the Philippines is regarded as the “forest law” in the Philippines and determines basic criteria for the classification of forestland. Lands more than 18% in slope are classified as forestland but there are some alienable and disposable lands (A & D) in the areas more than 18% of slope. Therefore, these A & Ds should be reclassified as forestlands by DENR. No grazing land is permitted in the forestland with 50% in slope or over.

Furthermore, the following lands, even if they are below 18% in slope, are needed for forest purposes, and may not, therefore, be classified as A & D:

- Areas less than 250 ha which are far from, or are not contiguous with, any certified A & D land;
- Isolated patches of forest of at least 5 ha with rocky terrain, or which protect a spring for communal use;
- Areas which have already been reforested;
- Areas within forest concessions which are timbered or have good residual stocking to support an existing, or approved to be established, wood processing plant;
- Ridge tops and plateaus regardless of size found within, or surrounded wholly or partly by, forestlands where headwaters emanate;
- Appropriately located road-rights-of-way;
- Twenty-meter strips of land along the edge of the normal high waterline of rivers and streams with channels of at least 5 m wide;
- Strips of mangrove or swamplands at least 20 m wide, along shorelines facing oceans, lakes, and other bodies of water, and strips of land at least 20 m wide facing lakes;
- Areas needed for other purposes, such as Protected Areas, national historical sites, game refuges and wildlife sanctuaries, forest station sites, and others of public interest;
- Areas previously proclaimed by the President as forest reserves, Protected Areas, game refuge, bird sanctuaries, national shrines, national historic sites.

3.3.2 The 1987 Constitution of the Philippines

Based on Article XII, Sec 3, lands of the public domain are classified into:

- Agricultural Lands
- Forest or Timber Lands
- Mineral Lands
- Protected Areas (referred to as Protected Areas)

Definition of terms in land classification is given by DAO 15. Alienable lands of the public domain are limited to agricultural lands. Private corporations or associations may not hold such alienable lands of the public domain except by lease, for a period not exceeding 25 years, renewable for not more 25 years, and not to exceed 1,000 ha in total area.

With a consideration of the requirements of conservation, ecology, and development, and subject to the requirements of agrarian reform, the Congress is to determine, by law, the size of lands of the public domain which may be acquired, developed, held, or leased and the conditions.

Size of area for each classification of the lands in the Study Area was obtained using various thematic maps (e.g. land use map, vegetation map and others) provided by PENROs and CENROs and listed in the following table. **Figure 4.7.1, Vol. I** shows distribution of these areas. Forestland and A & D make up nearly 90% of the total Study Area.

Land Classification of the Study Area

Land Classification	Area (ha)	% of the Study Area
1. Protected Area	89,067	10.1
2. Forestland	571,505	65.0
3. Civil Reservation	4,455	0.5
4. A & D	209,574	23.8
5. Magat Reservoir	5,356	0.6
Total	879,958	100

Source: JICA Study Team

The following table shows the break down of each category of land classification into provincial level.

Land Classification of Each Province within the Study Area

Category	N. Vizcaya	Quirino	Ifugao	Isabela
1. Protected Area	67,519 (18.9)	15,493 (6.7)	701 (0.4)	-
2. Forestland	207,385 (59.9)	174,959 (76.0)	160,484 (91.8)	23,401 (22.0)
3. Civil Reservation	3,175 (0.9)	1,281 (0.6)	-	-
4. A & D	78,857 (22.0)	38,462 (16.7)	11,260 (6.4)	80,995 (76.0)
5. Magat Reservoir	787 (0.1)	-	2,434 (1.4)	2,135 (2.0)
Total	357,723 (100)	230,195 (100)	174,879 (100)	106,531 (100)

Source: JICA Study Team

The following table shows land classification in the three different watersheds of the Study Area. The Study Area is divided into three main watersheds with 133 sub-watersheds as the unit for watershed management by the Study Team (**Section 3.2.2**). The Upper Magat River Watershed holds the largest area of forestlands followed by the Addalam River Watershed. Area of forestland in the Upper Cagayan River Watershed is less than 50%.

Land Classification of the Main Three Watersheds within the Study Area

Category*	Addalam River Watershed	Upper Cagayan River Watershed	Upper Magat River Watershed
1. Protected Area	36 (0.1)	78,417 (22.9)	10,614 (2.6)
2. Forestland	78,106 (68.0)	163,750 (47.9)	329,649 (78.9)
3. Civil Reservation	-	4,456 (1.3)	-
4. A & D	36,635 (31.9)	95,543 (27.9)	77,396 (18.5)
Total	114,777 (100)	342,166 (100)	417,659 (100)

*) Magat Reservoir of 5,356 ha is excluded from the classification

Source: JICA Study Team

3.4 Land Use and Vegetation

3.4.1 Land Use and Vegetation within Each Land Classification

Overall land use and vegetation is shown in **Figure 4.6.1, Vol. I**. The following table shows land use and vegetation within each land classification. Most of the natural forests such as old growth and mossy forest occur in Protected Areas and Forestlands. Total area of the natural forest accounts for 35.8% of the Protected Areas. The largest area in Protected Areas is residual forest (37.4%). Reproduction brush and grassland occur in only 9.5% and 8.3% of the area within Protected Areas, respectively.

The largest area of the forestland is residual forest (32.1%) followed by old growth forest (20.8%). There are relatively large areas of grass land (17.1%) within the Forestland, which indicates there are many gaps and open space in the forests.

Land Use and Vegetation Type of the Land Classification within the Study Area

(Unit: ha)

Category	Protected Area	Forestland	Civil Reservation	A & D	Total
1. Old Growth Forest	29,321	118,636	614	2,060	150,631
2. Mossy Forest	2,555	4,665	2	26	7,248
3. Residual Forest	33,334	183,595	1,775	14,428	233,132
4. Sub-marginal Forest	3,608	19,652	52	4,573	27,885
5. Pine Forest	28	613	0	56	697
6. Reproduction Brush	8,453	75,515	571	21,485	106,024
7. Other Plantation	302	9,492	19	7,607	17,420
8. Grass Land	7,313	97,635	965	64,319	170,232
9. Agricultural Land	3,262	50,514	349	75,485	129,610
10. Bare/Rocky Land	834	10,839	108	18,596	30,378
11. Built-up Area	3	2	0	253	258
12. Water body	45	199	0	687	931

Category	Protected Area	Forestland	Civil Reservation	A & D	Total
13. Unidentified	9	147	0	0	156
Sub-Total	89,067	571,505	4,455	209,575	874,602
<i>Magat Reservoir</i>					5,356
TOTAL					879,958

Source: JICA Study Team

There is only one Civil Reservation in the Study Area located in Conwap Valley between Nueva Vizcaya and Quirino. The largest portion of the area is residual forest (40%), which was used as a source of wood for the settlers. There is also a relatively large amount of grass land (21.8%) in the reservation.

Much of the A & D area is agricultural land (36%) and grass land (30.7%). There is not much forest in this area, although plantation (3.6%) including private plantation forests occurs in flat areas.

3.4.2 Land Use and Vegetation in Each Province

Land use and vegetation type of each province is summarized in the following table. Relatively large area in Nueva Vizcaya is residual forest (27.7%) followed by grass land (20.6%) and reproduction forest (19.4%). Old growth accounts only for 15.6% of the province.

The largest portion of Forestland in Quirino is residual forest (34.7%). The province has the largest area of old growth (61,485 ha) among the provinces within the Study Area. Most of the old growth occurs in the Sierra Madre Mountains, the eastern side of the province. There is also a fair amount of agricultural land (9.9%) and grass land (9.7%) in the province.

Land Use and Vegetation type of Each Province within the Study Area

(Unit: ha (%))

Category	N. Vizcaya	Quirino	Isabela	Ifugao
1. Old Growth Forest	55,649 (15.6)	61,485 (26.7)	2,274 (2.1)	29,569 (16.9)
2. Mossy Forest	2,391 (0.7)	1,667 (0.7)	2 (Nil)	788 (Nil)
3. Residual Forest	99,990 (27.7)	79,852 (34.7)	9,033 (8.5)	40,587 (23.2)
4. Sub-marginal Forest	4,383(1.2)	16,217 (7.0)	2,698 (2.5)	4,564 (2.6)
5. Pine Forest	552 (Nil)	11 (Nil)	16 (Nil)	65 (Nil)
6. Reproduction Brush	69,542 (19.4)	8,029 (3.5)	6,156 (5.8)	20,721 (11.8)
7. Other Plantation	2,766 (0.8)	10,022 (4.4)	4,466 (4.2)	164 (Nil)
8. Grass Land	73,777(20.6)	22,354 (9.7)	34,151 (32.1)	39,810 (22.8)
9. Agricultural Land	42,585 (11.9)	22,707 (9.9)	33,069 (31.0)	31,140 (17.8)
10. Bare/Rocky Land	5,724 (1.6)	7,486 (3.3)	12,203 (11.5)	4,963 (2.8)
11. Built-up Area	250 (Nil)	-	303 (Nil)	6 (Nil)
12. Water body	267 (Nil)	234 (Nil)	0 (0)	127 (Nil)
13. Unidentified	25 (Nil)	131 (Nil)	0 (0)	0 (0)
<i>Magat Reservoir</i>	788(Nil)	0 (0)	2,135 (2)	2,432 (1.4)
Total	357,689 (100)	230,194 (100)	106,508 (100)	174,936 (100)

Source: JICA Study Team

Approximately half of the total area of Ifugao consists of residual forest (23.2%) and grass land (23.1%). Most of the province is classified as forestland (91.8%), but old growth is only 16.9% of the total land (**Section 3.3.2**). Proportion of the agricultural area is relatively high compared to the other provinces in the Study Area.

Unlike in other provinces, much of the land of Isabela consists of A & D (76.0%), made up of high proportion of grass land (32.7%) and agricultural land (31.2%). Bare and Rocky land (11.7%) is highest compared to the other provinces within the Study Area, but it seems that agricultural activities might have affected satellite imagery, particularly in the season for tillage. Not much natural forest remains in that part of the province within the Study Area.

3.4.3 Land Use and Vegetation in the Main Watersheds

The following table summarizes land use and vegetation type of the three main watersheds within the Study Area. The largest portion of the Addalam River Watershed consists of residual forest (34%) followed by grass land (16.3%), old growth (15.4%) and agricultural land (15.2%).

The highest proportion of the Upper Magat River Watershed is grass land (25.8%) followed by residual forest (21.4%) and reproduction brush (18%). The size of agricultural land is larger than those of other watersheds.

There is a large area of natural forest in the Upper Cagayan River Watershed, and the highest proportion of the area is residual forest (30.6%) followed by old growth (23.8%). There is almost the same amount of grass land (12.8%) and agricultural land (12.7%) within the watershed.

Land Use and Vegetation Type of the Three Main Watersheds within the Study Area

Category	Addalam River Watershed (%)	Upper Magat River Watershed (%)	Upper Cagayan River Watershed (%)
1. Old Growth Forest	17,697 (15.4)	51,516 (12.3)	81,422 (23.8)
2. Mossy Forest	254 (0.2)	4,716 (1.2)	2,178 (0.6)
3. Residual Forest	39,079 (34.0)	89,419 (21.4)	104,638 (30.6)
4. Sub-marginal Forest	5,379 (4.7)	6,092 (1.5)	16,410 (4.8)
5. Pine Forest	4 (Nil)	670 (0.2)	23 (Nil)
6. Reproduction Brush	9,756 (8.5)	75,046 (18.0)	21,224 (6.2)
7. Other Plantation	2,781 (2.4)	2,136 (0.5)	12,503 (3.7)
8. Grass Land	18,691 (16.3)	107,554 (25.8)	43,946 (12.8)
9. Agricultural Land	17,448 (15.2)	68,695 (16.4)	43,500 (12.7)
10. Bare/Rocky Land	3,552 (3.1)	11,062 (2.6)	15,757 (4.6)
11. Built-up Area	-	256 (0.1)	1 (Nil)
12. Cloud and Shadow*	0 (0)	4 (Nil)	151 (Nil)
13. Water body	136 (0.1)	393 (0.1)	413 (0.1)
Total	114,777 (100)	417,659 (100)	342,166 (100)

Note: Magat Reservoir of 5,356 ha is excluded.

*: Cloud and shadow appear in satellite imaginary

Source: JICA Study Team

CHAPTER 4 PRESENT WATERSHED MANAGEMENT

4.1 National Integrated Protected Areas System (NIPAS)

4.1.1 General Policy

The policy of NIPAS is to: i) secure all native plants and animals; and ii) conserve soil and water in critical watersheds through the establishment of a system of integrated protected areas within the classification of the Protected Area as provided in the Constitution. Basic criteria for the establishment of the Protected Area is to identify virgin forests including mossy forest as well as any contiguous residual forest of good quality and the lands above 1,000 m in elevation or with a slopes of 50% or more.

The Protected Area is defined in the NIPAS Act as:

- Identified portions of land and water set aside by reason of their unique physical and biological significance, managed to enhance biological diversity and protected against destructive human exploitation.

It includes the following sub-classes within the NIPAS areas for management purposes:

- Strict nature reserve
- Natural Park
- Natural monument
- Wildlife sanctuary
- Protected landscape and seascapes
- Resource reserve
- Natural biotic areas
- Other categories established by law, conventions or international agreements which the Philippine Government is a signatory.

Protected area management takes place with the direction of a site specific Protected Area Management Board (PAMB).

4.1.2 Protected Areas in the Study Area

The proclaimed Protected Areas under NIPAS in the Study Area are 100,282.8 ha in total, breakdown of which is listed in the following table. There are some discrepancies between the figure in the following table and the one indicated in the table of land classification in **Section 3.3.2** probably because of having different data sources. There are 46 Barangays that are associated with Protected Areas for management. Background, general features and current condition of each Protected Area are also indicated in **Table 4.1.1**.

List of the Protected Areas within the Study Area

Name	Procl. No.	Date Proclaimed	Location	Area (ha) ¹⁾
1. Bangan Hill National Park	RA7954	29 Mar '95	N. Vizcaya	12.0
2. Casecnan Protected Landscape ³	289	23 April '00	N. Vizcaya & Quirino	88,846.8
3. Mt. Pulag National Park	75	20 Feb '87	N. Vizcaya & Ifugao	5,860.0
4. Salinas Natural Monument	275	23 Apr '00	N. Vizcaya	5,564.0
Total				100,282.8

Source: Socio-economic Profile of Salinas Natural Monument, General Management Plan on Mt. Pulag N.P. (2000), Proclamation 289

4.1.3 Currently Proposed Protected Areas in the Study Area

It has been proposed that part of Central Mayoyao Forest Reserve be proclaimed under NIPAS by CENRO Alfonso Lista in Ifugao. Four Barangays (Mayoyao, Balonogon, Itab and Majlong) of the Municipality Aguinaldo, are located within the proposed area. The area covers the northern part of the province facing to the border with Mountain Province. The areas compose a long belt of vegetative area extending west to east along the border. These proposed areas are also the primary source of water for the Magat reservoir.

Central Mayoyao Forest Reserve is located in the municipal boundary of Mayoyao including Mt. Amuyao, the highest peak in Ifugao. Elevation of the area ranges from 500 to 1,700 m asl, which holds a large area of natural forests. The most remarkable feature of this area is that there are several magnificent waterfalls in the area. In addition, there are wildlife habitats for many endemic species of birds so that the area can be a tourist destination.

Dupax Watershed Forest Reserve of 424.8 ha in Nueva Vizcaya was proclaimed as a forest reserve on 08 Aug 1934 (Proclamation 720). Further to this proclamation, the area has been also proposed for a protected landscape under the NIPAS Act in 2000. Administrative process for this proposal is underway but has not been completed yet. Areas that have been proposed for Protected Areas in Ifugao are listed in the following table.

³ This protected landscape includes Dupax Watershed Forest Reserve of 424.8 ha that was proclaimed in 1934 (Proclamation 720).

Currently Proposed Areas in Ifugao for NIPAS in the Study Area

Name of Area	Proposed Year	Location	Size (ha)
1. Mapawey Wetland	1998	Mayoyao, Ifugao	1,000
2. Tinugtog Wetland	1998	Mayoyao, Ifugao	1,732
3. Ohalale Wetland	1998	Aguinaldo, Ifugao	1,425
4. Central Mayoyao Forest Reserve	1999	Mayoyao, Ifugao	4,500
5. Butae Wetland	1999	Aguinaldo, Ifugao	525
6. Talete Wetland	1999	Talete, Aguinaldo, Ifugao	925

Source: PENRO Ifugao, CENRO Alfonso Lista

4.2 Forest Reserves in the Study Area

There exist forest reserves proclaimed before establishment of the present land classification system that was introduced mainly with PD 705, the Constitution 1987 and NIPAS Act. According to the proclamations for the forest reserves listed in the following table, it was defined as the forest that is reserved for wood production, watershed, soil protection and other forest purposes, subject to private rights. According to the terms of land classification defined in DAO 15, the forest reserve contains the definition of both Protection Forest and Production Forest.

List of Proclaimed Forest Reserves Around the Study Area

Name	Proc. No.	Proc. Date	Province	Area (ha)
1. Bontoc-Ifugao Forest Reserve	636	16 Oct '40	Banaue, Lamut, Ifugao	1,006.0
2. Central Cordillera Forest Reserve	217	1929	Mt. Province, Benguet, Ifugao, Kalinga, Apayao, N. Vizcaya	74,630.0
3. Central Mayoyao Forest Reserve	156	1969	Ifugao	13,420.0
4. Ifugao-Isabela Forest Reserve	76	1961	Ifugao, Isabela, Mt. Province	35,750.0
5. Magat River Forest Reserve	573	26 June '69	N. Vizcaya	430,860.5
6. Mt. Santo Domingo Forest Reserve	73	09 Aug '66	Ifugao	9,693.0
7. Natonin Forest Reserve	166	1967	Mt. Province, Ifugao, Isabela	7,836.0
Total				572,189.5

Source: Each Proclamation

Included in the Protection Forests are critical watersheds, second growth, old growth, mossy forests, pine forest, and grassland/plantation in the areas above 50% slope and more than 1,000 m in elevation where NIPAS has not been applied.

Production Forests cover forest lands primarily for timber production. These areas are below 50% in slope and less than 1,000 m a.s.l in elevation, which include both natural and man-made forests.

4.3 Government Forest Management

The Study Area comprises approximately 571,000 ha of the Forestlands in the Study Area (**Section 3.3.2**). Direct responsibility for management of these lands rests with the government. However, the government has accorded tenurial agreement on many parts of the Forestlands with communities, upland farmers and various private entities, for joint management, for which the government provide them with various services.

4.3.1 Management by DENR, through Regional Offices, PENROs and CENROs

DENR with field offices implements programs relevant to forest management in watersheds. The Study Area covers part of two regions and that there are two Regional Executive Directors (REDs), which manage four Provincial Environment and Natural Resources Offices (PENROs) and eight Community Environment and Natural Resources Offices (CENROs). The PENRO operates through CENRO.

The CENRO is DENR's frontline office. It provides direct service to the people and directly implements DENR programs and projects.

(1) Authority of PENROs and CENROs

The PENROs and/or CENROs have authority over selected forest management functions as summarized below, subject to certain limits quantified in hectares, cubic meters or money value as the case may be.

PENRO - Approval of CBFMA and issuance of rattan cutting permit.

PENRO and CENRO – (i) confiscation of illegal forest products: issuance of apprehension receipt, seizure receipt/order, (ii) disposition of confiscated forest products via donation or through public auction, (iii) issuance of cutting permit, (iv) renewal of ordinary minor forest products license except rattan (PENRO), and (v) issuance of cutting permit for planted trees within A & D lands, (vi) issuance of tenurial instruments such as CSC and SIFMA.

CENRO – (i) issuance of certificate of origin for timber, lumber, veneer, plywood, and minor forest products, certificate of verification for planted trees, and special cutting permits for trees in ISF/CSC areas.

(2) Forest Management Activities

Forest management activities are implemented by PENRO and CENRO based on their authorities and mandates. Main functions of PENRO are to conduct planning, coordination, controlling and updating plans for the various activities in the province and also provide guidance, supervision, advising and logistics to CENRO operations. However, PENROs of Region 2 directly manage certain areas. In these areas, the PENRO carries out all forest management activities, details of which for CBFM areas are described in **Chapter 4 of the Appendix 2**.

Interview surveys were conducted with CENROs to identify their principal activities and level of responsibilities in delivery of forest management services. Responses are summarized below.

Forest Management Responsibilities in CENRO

Activity	Level of responsibility			Frequency					
	1	2	3	A	B	C	D	E	F
1. Seedling production and distribution		x							x
2. Plantation establishment		x							x
3. Plantation maintenance & protection	x				x				
4. Conduct patrols to protect natural forests	x			x					
5. Establish firebreaks		x							x
6. Extinguish forest fires		x							x
7. Confiscate illegally cut forest products	x						x		
8. Dispose of confiscated forest products	x								x
9. Renew permits for ordinary minor forest products	x								x
10. Inspect forest products & issue certificate of origin	x				x				
11. Issue permit to transport forest products	x				x				
12. Issue certification of planted trees	x							x	
13. Issue special permits for trees in ISF/CSC areas	x					x			
14. Survey CSC areas	x								x
15. Issue CSCs	x								x
16. Convert existing tenure into CBFMA	x								x
17. Hold meetings/assemblies to federate CBFMA holders	x								x
18. Conduct timber inventory in CBFMA areas	x								x
19. Review/affirm CRMF	x								x
20. Review/approve RUP	x								x
21. Review/approve AWP	x								x
22. Supervise field work done by CBFMA holders		x						x	
23. Conduct training for Pos		x							x
24. Prepare/Revise/Update watershed management plans	x								x
25. Implement soil stabilization measures	x								x
26. Disseminate pasture improvement technology	x								x
27. Survey/delineate protected areas	x								x
28. Conduct IEC on nature conservation	x							x	
29. Conduct patrolling in protected areas	x				x				
30. Attend PAMB meetings		x							x
31. Coordination with LGUs and other agencies			x					x	

1 - Directly responsible for implementing the activity.

2 - Supervision of non-DENR staff, e.g. reforestation contractors

3 - Technical assistance to POs, LGUs & other agencies or individuals (e.g. tree farmers) Frequency

A - Daily routine. Full time staff assigned.

D - Average one time each month

B - Average one time each week

E - Average one time every three months

C - Average more than one time each month

F - Occasionally (e.g. semi-annually or as needed)

Whether these are appropriate levels and frequency of activities related to budget or disposition of personnel is not clear. Among the various sectors of operations, forest management service received the largest share of the budget and personnel.

4.3.2 Management by Other Government Agencies

The following watershed-related programs are being implemented in the Study Area by other government agencies (OGAs) in coordination with DENR:

(1) National Irrigation Administration (NIA)

Pursuant to LOI 1002 issued on 20 March 1980, the National Irrigation Administration (NIA) was vested with authority to manage, develop and rehabilitate the watershed areas of the Pantabangan and the Magat multi-purpose dams. Magat watershed has a total area of about 413,000 ha and is located within the Study Area. NIA has implemented tree plantation and agroforestry projects on the watershed of 7,500 ha. A total of 6,808 ha were planted at the end of the project in 1989. However, more than 50 % of the total plantation area was burned. Assessment made in June 2000 showed that only 4,196 ha of the area remained, including more than 2,000 ha of re-plantation area.

In 1995, NIA transferred to the National Power Corporation (NPC) about 4,300 ha within Ifugao province, under a Memorandum of Agreement (MOA) with NPC. Remaining 3,200 ha is retained under the management of NIA. Present status of the plantation is shown below.

Present situation of NIA Plantation at Magat watershed

Category	NIA area (ha)	NIA-DENR Tie-up	NPC Area	Total
Area Planted, 1980-1989	-	-	-	6,808
Existing area of plantation	2,066	1,113	1,017	4,196

Source: Watershed Management Section, NIA-Magat Dam Division

Current activities include:

- a) Reforestation: replanting of burned areas, 100 ha/yr
- b) Maintenance of mango plantations: fertilizer and pest control, flower inducement.
- c) Protection : IEC, establishment of firelines, foot patrol; coordination with DENR on apprehension of illegal loggers.
- d) Community forestry in a pilot area of 100 ha cultivated by farmers in Brangay Escoting: Tenurial instrument is MOA with individual farmers. NIA provided seedlings, fertilizers and pesticides, and technical assistance.

(2) National Commission on Indigenous Peoples (NCIP)

The NCIP was created under R.A. 8371 or the Indigenous People Rights Act (IPRA). It is a primary government agency responsible for the formulation and implementation of policies, plans and programs to promote and protect the rights and well being of indigenous people (IPs) including recognition of their ancestral domains. Matters concerning IPs in the Study Area are under the administration of the Office for Northern Cultural Communities (ONCC) which is part of the NCIP. The NCIP is presently responsible for administration of nine CADCs in the Study Area (**Figure 4.7.3, Vol. I**).

(3) Local Government Units (LGUs)

Under the Local Government Code⁴, LGUs share responsibility with the national government in the management of natural resources “subject to the supervision, control and review of DENR.”

To implement the devolved functions effectively, LGUs are encouraged (by the Code) to organize Environment and Natural Resources Offices (ENRO). Each province in the Study Area has the ENRO.

In Nueva Vizcaya ENRO, forest management activities include: i) the 439 ha Barobbob (Masoc) Watershed Management Project; ii) 24,000 ha Lower Magat Forest Management Program including 7,000 ha of A&D land; iii) Tree for Legacy Program covering approximately 3,000 ha.

Forest management activities in Isabela ENRO are the production of forest and fruit tree seedlings for distribution to the public in a provincial nursery and planting and maintenance of trees along the road under the Isabela Ecology Highway Project. These activities are carried out outside of the Study Area.

In Ifugao, environment and natural resources management functions are performed by the Provincial Agriculture, Environment and Natural Resources Office (PAENRO). PAENRO’s activities concentrate principally on food security. The only significant forest-related activity is production of seedlings in nurseries managed by schools and the provincial agriculturists office. However, most PAENRO initiatives are relevant to agroforestry such as: i) promoting the use of high quality crop seeds and seedlings; ii) production of fish fingerlings at affordable prices; iii) agri-infra support projects; iv) promotion of integrated pest management (IPM), high-value crops and organic farming; and v) development of varieties for cool elevated areas of the Cordilleras.

In Quirino, the vision of PNREO aims to promote the well-being of the people through sustainable development of forest resources, optimal utilization of lands and minerals, social equity and efficiency in resource use and effective environmental planning and management. The PNREO was actively involved in the two German-supported projects, the Debt For Nature Swap Initiative Project and the Community Forestry Project-Quirino (Section 4.7.3). In both projects, PNREO staff members were seconded to the project.

4.4 Traditional Forest Management

In Ifugao province of the Study Area, indigenous (i.e. traditional) forest management systems have been practiced for many generations. In the past, and up to the present, these systems have contributed significantly to forest development and conservation. The systems developed over time and became part of the culture. Principal objectives are (i) the production of timber and non-timber forest products for domestic use, and (ii) the protection of small watershed catchments adjacent to irrigated rice terraces. These systems can be divided into two categories:

- private woodlots called “*muyong*” in the Kiangan, Lagawe and Hingyon areas, and “*pinugo*” in central Banaue;⁵ and
- communal forests (“*Ala-a*” or “*inalahan*”).

⁴ Republic Act 7160.

⁵ For purposes of brevity, the term “Muyong” is used in this report in reference to both “*muyong*” and “*pinugo*”

4.4.1 **Muyong System**

Muyong is a private woodlot that evolved from clan-owned swidden fields (“*tayans*”) that were left to fallow. Segregation into individually-owned plots occurred when a clan member, with consensus from other members, converted part of a *tayan* into his own private woodlot.

Almost all *muyongs* fall within the areas classified as “Forestland,” owned by the state. However, most of which have been privately managed for at least three generations. Many of these are older than the Philippine Republic itself. There are no written records of when and where the “*muyong*” practice began. Some scholars believe that the oldest woodlots were established during the Spanish period when people realized the need for accountability in managing local resources. There is also a contention that woodlots were started by the “*nawotwot*”⁶ social class as a means to uplift their economic and social status. Whatever the reason, it is clear that the practice has been handed down through generations.

There are three types of woodlots: i) being handed down through generations; ii) being recently-established out of fallowed swidden; and iii) being established within the natural forest through a claim. A woodlot can only be designated as such once transferred to next of kin, subject to recognition of the transaction by the community. A family may have one or more woodlots that may or may not be adjacent.

The average *muyong* woodlot is less than 1 ha. Recently, with the introduction by DENR of the *Muyong* Resource Permit (MRP) and the advent of commercial harvesting, some woodlots have been claimed within the natural forest. At present, DENR has issued 84 MRPs covering approximately 240 ha.

MRPs Issued by DENR

Year	No. of MRPs	No. of Trees	Volume (m ³)	Area (ha)
1996	9	486	442.4	39.2
1997	27	1,031	921.7	86.8
1998	22	330	372.9	59.0
1999	12	155	139.9	21.1
2000	12	183	147.8	29.6
2001	2	23	16.5	4.8
Total	84	2,208	2,041.1	240.4

Source: PENRO Ifugao as of March 2001

The long history of the *muyong* system is further evidenced by clear rules regarding boundary delineation, conflict resolution, the need to secure permission from a *muyong* owner before harvesting fuelwood and so forth. There are words in the language to identify these rules and the procedures for implementation; e.g. conflict resolution (“*haddaan*”), restitution if there is illegal cutting (“*mihaliv*”), messengers who convey demands for restitution (“*mungkalon*”), an authorized negotiator (“*baal*”), a mediator (“*mangihapit*”).

⁶ In the traditional caste system of the area, the “*nawotwot*” were considered the lowest class.

The *muyong* owner⁷ practiced tending like weeding, removal of vines and “undesirable” trees, keeping the boundary clean and protection of brush and preferred tree species, including fire prevention, thus gradually developing a woodlot. Furthermore, many *muyong* owners also implemented inter-planting either by direct-seeding or transplanted wildlings from natural forests.

These methods are consistent with basic principles of the Assisted Natural Regeneration (ANR) system, and enrichment planting, both of which are components of DENR reforestation techniques.

Traditionally, the use of potted seedlings was not included in enrichment planting. There are many *muyong* owners who plant potted seedlings in addition to uprooted wildlings and direct seeding. One species commonly planted by direct-seeding is “*palayong*” or oak (*Lithocarpus llanosii*). Present practices also involve the planting of introduced species such as mahogany (*Sweitenia macrophylla*), and gmelina (*Gmelina arborea*). A generation ago, there were extensive plantings of raintree (*Samanea saman*), as evidenced by many mature trees in the Kiangnan areas. This is a popular carving wood and many older trees were harvested over the last two decades when there was a strong export market for Ifugao carved wood products. Rattan is also planted in *muyongs* near the owner’s house, the most popular species is “*lituko*” which is known for its fruit. Bamboo is also planted for construction material along with palms (*Areca catechu*) for flumes and betel nut. The woodlots are also inter-planted with fruit trees like citrus. Interviews with some *muyong* owners indicate that they perceive it primarily as a timber management system. Other *muyong* owners contend that their ancestors developed the system due to the relationship between stable water supply and existence of forest. In either case, it is clear that the system is an important factor in forest management in Ifugao province.

Numbers and coverage area of “*muyong*” have not been surveyed. According to DENR Partial Survey of Legitimate *Muyong* holders in only Banaue, Hungduan and Hingyon municipalities of Ifugao, the existence of 2,294 “*muyong*” woodlots covering more than 2,000 ha have been confirmed. Based on the information from DENR personnel indicate that there should be additional “*muyong*” woodlots still to be identified.

4.4.2 Communal Forest

While not as extensive as the *muyong*, communal forests (*Ala-a*) are also important in the context of traditional forest management. *Ala-a* are located on lands that are: i) not cultivated as swidden; ii) too far from a settlement to be covered by a private claim; or iii) identified as hunting grounds. In general, the *Ala-a* are located on sloping areas with naturally growing trees that are not being actively managed or claimed by any individual. The *Ala-a* are communally tapped for fuel, construction materials, food, medicine and other products that may be used in the household or farm. In some sitio of Barangay Kinakin, Banaue municipality, water catchments at the source of irrigation systems are designated as purely protected areas where cutting of trees is prohibited.

Communal forest boundaries are usually equivalent to the points reached by hunting parties of adjacent villages. However, boundaries are not very clear, which can often be a source of conflict. Markers are usually in the form of pits used to trap wild pigs.

⁷ The terms “*muyong* owner” and “*muyong* holder” are used inter-changeably in this document. The people prefer to identify themselves as “owners,” while government considers them “holders” of a resource owned by the government.

Unlike the *muyong* woodlots, communal (*Ala-a*) forests are not systematically maintained to improve the vegetation. However, use of the *Ala-a* is controlled through a common consensus that the resource has to be shared. There are two basic rules: i) no burning; and ii) villagers are prohibited from gathering more than they need for their own use. Penalties include criticism, ostracism and fines. In some cases superstition is used as a deterrent to harvesting of certain species such as “*alimit*” wherein spirits are believed to live and protect springs.

In common with the *muyong* woodlots, the “*Ala-a*” (communal forest) is used primarily to grow wood for fuel and construction needs. It also serves as “*pun-anupan*” or communal hunting ground from the word “*anup*”(hunt). In the past, forests that were the source of water were segregated as protection zones (“*a-puhan*,” “*chanum*” or “*nahaub*”). Protection zones were not used as a source of construction timber. Thus, all use of forest resources was limited to supplying needs of the community. The “*al-a*” was not perceived as sources of wood for sale outside the village. However, upon the commercialization of woodcarving, people started to harvest trees within the communal areas in order to generate cash income.

In the village of Barangay Cambulo, Banaue, groups comprising 20-35 families protect selected hillside communal forests to ensure that their terraced rice fields will have sustained irrigation water. These protected communal forest are called “*hinoob*.” Disturbance to the tree is not allowed but gathering of medicinal plants and hunting are permitted.

4.5 Land Tenure in the Forestlands

(1) Forestry-related Tenure in the Study Area

All lands of the public domain and natural resources are owned by the State in the Philippines. Therefore, various forms of tenurial instruments have been forged and applied for different purposes of land management. The exploration, development, and utilization of natural resources shall be under the full control and supervision of the State. The State may undertake such activities based on an agreement for land use, but such an agreement may be for a period not exceeding 25 years, renewable for not more than 25 years.

Policy and institutional constraints make existing issues to be even more complicated and difficult in the adoption of improved watershed management. Various tenurial instruments have been issued in the Study Area, but some of them overlapped each other and bring up some confusion in terms of land tenure. This issue is not only related to how the household members make use of individual land areas but also to the way in which how common property resources are utilized (i.e. pasture and forests).

Different kinds of tenure have been introduced into the Study Area. Summary of the on-going forestry-related projects is shown in the following table, and the principal programs/projects are briefly described in the following sections. All on-going projects are listed in the table below.

Summary of the On-going Forestry Project in the Study Area

Province	Ifugao		Isabela		Nueva Vizcaya		Quirino		Total	
Project	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)
CBFM	7	5,950	3	5,691	12	9,014	16	38,649	38	59,304
(CBFM)	(8)	(2,247)	(1)	(203)	(15)	(3,884)	(20)	(2,013)	(44)	(8,347)
CPEU	2	341	1	203	1	240	1	349	5	1,132
FLMA	-	-	-	-	-	-	5	314	5	314
Refo-A	6	3,636	-	-	8	16,576			14	20,212
Refo-C	7	2,222	-	-	12	1,186	19	1,664	38	5072
SIFMA	-	-	95	816	-	-	24	95	118	863
ITP	-	-	1	2,723			-	-	1	2,723
TFLs	-	-	29	87	790	4,122	115	467	954	4,676

Note: Area is plantation area. CBFM in the bracket has been converted from other projects.

Source: Records of PENROs and CENROs.

(2) Forest Land Management Program (FLMP)

This program was established through DAO 71 dated August 9, 1990. It is an outgrowth of the contract reforestation initiative launched in 1988 with financial support from the Overseas Economic Cooperation Fund (OECF: JBIC at present) and Asian Development Bank (ADB). Under the FLMP, areas previously developed via contract reforestation are turned over to private parties. The turnover is accomplished through issuance of a Forest Land Management Agreement (FLMA) that has a duration of 25 years, renewable for another 25 years. Under terms and conditions in the FLMA, the private party is responsible for sustained maintenance and management of the area previously reforested via contract. The FLMA also allows harvesting of the planted trees when they mature. Among the sites in the Study Area that were included in the OECF-ADB funded contract reforestation, only five of them are now covered by FLMAs covering 314 ha, all located within Quirino province (**Table 4.5.1**).

(3) Socialized Industrial Forest Management Agreement (SIFMA)

The SIFMA was established on August 23, 1996 through DAO 96-24. Under this program, the government allocates lands to private individuals and organizations for development of tree plantations to produce and sell timber and other products. It is designed for small-scale operations (e.g. 1-10 ha). The allocated areas are covered by 25-year lease, renewable for an additional 25 years. There are presently 95 SIFMA projects in Isabela and 24 in Quirino, but none in other provinces of the Study Area (**Table 4.5.2**). All SIFMA holders are individuals. In Isabela, each SIFMA site covers approximately 10 ha, and in Quirino approximately 2 ha.

4.5.1 CBFM in the Forestlands

(1) CBFM in the Study Area

There are about 20 million people in the Philippines living in the uplands. The CBFM program gives upland communities located within the Forestlands the right to manage natural resources delineated by the area designated under the CBFM Agreement.

The government adopted CBFM program as the national strategy for sustainable management of the country's Forestlands, pursuant to the provisions of Executive Order No.263 dated July 19, 1995. As the national strategy the CBFM program foresees to develop, protect and conserve the existing resources in the delineated Forestlands, with management right awarded to the residing organized populations.

CBFM applies to all areas classified as Forestlands, including allowable zones within Protected Areas not covered by prior vested rights. The program has integrated all previous people-oriented forestry approaches, including Integrated Social Forestry (ISF) Program, Community Forestry Program, Coastal Environment Program, and recognition of Ancestral Domains. The areas eligible for CBFM program include as the followings:

- 1) Uplands and coastal lands of the public domain.
- 2) Areas covered by Timber License Agreements, Pasture Lease Agreements, Industrial Forest Management Agreements and other forest land contracts, leases, permits or agreements.
- 3) Areas covered by expired permits for non-timber products.
- 4) Multiple use zones, buffer zones and other areas within the protected areas where utilization activities may be allowed.
- 5) Forestlands assigned by law under the administration and control of government agencies.
- 6) Certified ancestral lands and domains and other areas occupied by indigenous cultural communities, known to be ancestral but not yet covered by CALC or CADC, provided the community opts to join CBFM.

As of the first quarter 2000, a total of 4,828 CBFM sites were established nationwide. These sites covered an aggregate area of 5,338,080 ha involving 425,352 households of which 1,044 sites with an area of 1,759,956 ha were found within watershed areas. There were 2,013 Peoples Organizations (PO) consisting 308,362 households, organized under the CBFM. Of these, 550 were issued CBFMA covering 762,516 ha consisting 81,135 household⁸.

Land coverage of the CBFM projects including CBFMA, ISA, CFMA and CFSa within the study area is summarized in the following table. Overall, 10.5% of the total study area, or 91,518 ha, are covered under the CBFM projects. The percentage was highest in Quirino, amounting to 20.2% covered under CBFM projects, followed by 8.3% in Ifugao, 7.0% in Nueva Vizcaya, and 5.3% in Isabela.

8 Quote from the source, Briefing Material and Status of CBFM Project Implementation in Regions CAR and 2.

Land Area Covered Under the CBFM Projects within the Study Area

(Unit: ha)

Province/ Region	Total Land Area	Study Area	CBFMA	ISF	CFMA/ CFSA Area	Total	% of the Study Area	% of Province Area
N. Vizcaya	390,387	357,728	9,013	14,220	3,963	24,908 ⁽¹⁾	7.0	6.4
Quirino	305,720	230,191	38,649	9,266	-	46,443 ⁽²⁾	20.2	15.2
Ifugao	1,066,456	174,876	5,950	8,527	-	14,477	8.3	1.4
Isabela	251,778	106,529	5,690	0	-	5,690	5.3	2.3
Total	2,014,341	869,324	59,302	32,012	3,963	91,518	10.5	4.5

(1) Physical land coverage: an aggregate area of 27,196 ha discounting 1,001.15 ha and 1,287 ha under ISF and Community Forestry Management Agreement (CFMA)/Community Forest Stewardship Agreement (CFSA), respectively located within CBFMA area:

(2) Physical land coverage: an aggregate area of 47,915 ha discounting 1,472.46 ha under ISF located within CBFMA area.

Table 4.5.3 lists all projects formulated based on CBFMA located within the Study Area. There are 38 projects, extending 59,302 ha, which is 6.7% of the total study area. These CBFMA projects involved 3,932 households within the Study Area⁹, equivalent to the population of 24,260¹⁰. Most of the existing CBFM projects in Nueva Vizcaya, Quirino and Ifugao are found within the boundary of the Study Area while only 16.7% of the CBFM projects are located within the Study Area in Isabela.

Table 4.5.4 shows funding sources for each CBFMA project within the Study Area. A variety of foreign agencies assisted with initial and maintenance funds for CBFMA projects. Such agencies include the World Bank, ADB, ITTO, CASCADE, JBIC (OEFC), GTZ/KfW, and USAID. Among the 38 CBFMA projects existing within the Study Area, 10 projects were funded by DENR regular funding, covering 4,518.8 ha, corresponding to 7.6 % of the total CBFM area of 59,304.0 ha. Meanwhile, the remaining 93.1% or 55,209.2 ha have been assisted with foreign funds. On-going foreign-assisted project coverage amounted to 35,717.0 ha, or 60.2% of the total CBFM area.

The dependency on foreign funds varied according to the provinces. In Ifugao all of the existing CBFM projects were initiated with foreign assistance. In Quirino the dependency on foreign assistance reached 96.9% in terms of area coverage, followed by 87.9% in Isabela and 75.4% in Nueva Vizcaya. Those CBFM projects currently under foreign assistance covered 84.5% in Ifugao, 69.0% in Quirino and 44.6% in Nueva Vizcaya in terms of area coverage. In Isabela, none of the three CBFM projects located within the Study Area were currently under foreign assistance.

(2) CBFM Projects Covering Existing ISF Projects

Existing ISF projects are listed in **Table 4.5.5 (a-d)**. In Ifugao, 49 ISF projects were issued, of which 21 projects are located within the Study Area, extending 4,877 ha with 587 CSCs issued. In Isabela, 12 ISF projects were formulated with 1,140 CSCs of 2,446 ha in total. All of these projects are located within the Study Area.

9 3,932 refers to the number of members pertaining to the 38 POs existent within the Study Area. It was assumed that each member represented one household.

10 The average size of a median household was estimated at 6.17 persons/unit in Cagayan Valley, based on 2001 Philippine Statistical Yearbook (p1-4, p1-33); 2,756,000(The pop. of Cagayan Valley)/446,839(# of H.H)=6.17.

Summary of the ISF projects located within the Study Area

Province/Region	No. of ISF Projects	No. of CSC	Area (ha)	% of Total Land Area (ha)
N. Vizcaya	210	7,108	14,220	3.6%
Quirino	97	3,737	9,266	3.0%
Ifugao	21	587	4,877	1.9%
Isabela	12	1,140	2,446	0.2%
Total	340	12,572	30,809	

Source: Data available from Table 4.7.3 (a-d).

In Nueva Vizcaya as shown in **Table 4.5.5 (a)**, four CBFMA projects were formulated consolidating existing ISF projects, while the remaining 11 CBFM projects in the province were formed without the presence of CSCs issued within the project area. In Quirino, five out of the total 16 CBFM projects were formulated integrating preceding CSC tenurial arrangement areas (**Table 4.5.5 (b)**).

In Ifugao (**Table 4.5.5 (c)**) and Isabela (**Table 4.5.5 (d)**), all existing CBFM projects were formed without covering any areas where CSCs preceded to be issued under ISF projects. As can be observed in those tables, while CBFMA projects were often formulated covering existing ISF project area, not all areas under CSCs were incorporated into CBFMA projects.

4.5.2 CBFM in the Protected Areas

DAO 2000-44 provides specific guidelines for the establishment and management of CBFM within the Protected Areas. PAMB and PASU are to take active roles in all stages of project implementation, and an issue of CBFMA has to be endorsed by PAMB and approved by the RED. CBFMA are permitted with the following conditions within the Protected Areas.

- Allowable areas: multiple use zones and buffer zones of the protected areas
- Qualified participants: tenured migrant communities as defined under the NIPAS law

Introduction of CBFM into Mt. Pulag Protected Area and Salinas Natural Monument has been proposed, but no CBFMA has been accorded for either area. PAMB of Salinas Natural Monument is currently in the process of forming a PO for CBFMA. However, multiple use zone and buffer zone of the area still have to be surveyed before the acquisition of CBFMA. There is no proclaimed Protected Area in the Study Area where CBFM has been implemented so far.

4.5.3 Integrated Forest Management Agreement (IFMA) and Socialized Industrial Forest Management Agreement (SIFMA)

DAO No. 99-53 in 1999 stipulates application of Integrated Forest Management Agreement (IFMA). IFMA is also to bring ecologically sound, socially acceptable and culturally appropriate management of natural forests, forest plantations and lands, but it

does not exist in the Study Area at present time. Areas available and some conditions for IFMA are:

- Objectives: rehabilitate degraded forest lands; ensure continuous supply by encouraging private sector to engage in industrial forest development; improve economic well-being of forest communities.
- Available areas: open and denuded lands, brush lands, degraded residual forest; areas covered by cancelled/expired Forest Land Grazing Agreement of pasture permit or leases; Government reforestation projects; production residual forest; areas under cancelled and expired Timber Land Agreements (TLAs)
- Prohibited areas: protected areas under NIPAS, ancestral lands and domains, CBFM project areas, areas under existing valid permits, leases or agreements
- Size of areas: 500 - 40,000 ha

According to DAO No 24 issued in August 1996, Socialized Industrial Forest Management Agreement (SIFMA) is to grant security of land tenure for the purpose of providing the people to participate actively in forest plantation development. Areas available and some conditions for SIFMA are:

- All grasslands, brushlands and open and denuded forestlands under the jurisdiction of the DENR.
- Areas proclaimed under NIPAS, CADC and CALC are excluded.
- 1 to 10 ha for individuals/single family
- 10 to 500 ha for association/cooperative

Current management activity of one of the most developed SIFMAs in Magsaysay, Quirino is described in this section as an example.

Yemane is the main tree species that has been planted in the area of 48.0 ha with 2 × 2 m spacing by Spiritwood Corporation. Many of the seedlings have grown up to about 10 m in three years, and this growth rate is remarkably high. In adjacent area, therefore, an additional 81 ha of plantation was planned as of August 2001.

This plantation is located along a creek so that nutritional alluvial soil is likely to support the high growth rate of the trees. In addition, this is a DENR-LGU Coordinated Project so that sufficient technical support described in **Section 4.6** has been applied in this area. For example, brush cutting is carried out for three to four times in the first year and ring-weeding (1 m in diameter) is adopted for three to four times in the second year. Approximately 50 kg/ha of fertilizer (mainly 14-14-14 and urea) is also applied in the third month after planting.

4.5.4 Forestland Grazing Management Agreement (FLGMA)

Forestland Grazing Management Agreement (FLGMA) is a new tenurial instrument, which is a production sharing agreement between a qualified person, association and/or corporation and the government to develop, manage and utilize grazing lands. Existing tenurial instrument such as Pasture Lease Agreement (PLA) and Forest Land Grazing Lease Agreement (FLGLA) are no longer eligible for renewal. However, there is a five-year transitory period since 1999 to allow PLA and FLGLA holders to convert them

into FLGMA. DAO No. 99-36 of 10 August 1999 stipulates rules and regulations governing the administration, management and development of the forestlands used for grazing purposes:

- Grazing under the FLGMA is confined and restricted to those portions of the agreement area under 50% in slope.
- Permits 25 years lease and renewable for another 25 years.
- Area from 50 to 500 ha for individuals and not more than 2,000 ha for association, cooperatives or corporation.
- Grazing to be confined in areas under 50% in slope. Areas with 50% in slope are to be maintained under forest cover or forage utilized under a cut and carry schemes.
- Permits 10% of the area to be used for the purpose of food production.
- At least 10% of the area should be improved as pasture.
- Within the protected areas (NIPAS areas), grazing is allowed only in multiple use zone and buffer zone.
- Grazing is prohibited in certified ancestral lands and domains (CADCs/CALCs), except when the Indigenous Cultural Communities (ICCs)/Indigenous People (IPs) opt to participate.
- The holder of the FLGMA may transfer, sell or assign any right or interest.

DAO No. 2000-23 is to amend certain sections of DAO No. 99-36 entitled “Revised Rules and Regulations Governing the Administration, Development and Disposition of Forest Lands Used for Grazing Purposes.” Primary amendments are:

- All cancelled and expired pasture leased areas, which have not been renewed and there is no new applicant, shall be automatically reverted to forest tree production including the production of non-wood forest products.
- Non-grazeable areas shall be reforested at the rate of 10% of all area or at least 25% has been reforested at the expiration date which shall be a primary condition for the renewal of the FLGMA.

“Procedural Manual” was issued in the Memorandum Circular No. 99-26. This manual stipulates detailed rules and regulations regarding the conversion of PLA and FLGLA to FLGMA with the following guidelines:

- No application and survey /assessment fee shall be collected on PLAs/FLGLAs that are not yet expiring during the year when conversion is effected;
- The PLA/FLGLA holders shall post a cash or surety bond deposit in the amount of ₱ 500/ha and shall submit all pertinent requirements as attendant thereto.

Furthermore, PLA, FLGLA and FLGMA may have the option to convert part or whole of the grazing areas into SIFMA, IFMA or other tenurial instruments. The manual also stipulates the following guidelines:

- No application, inspection/survey fee shall be collected on PLAs, FLGLAs and FLGMAs that are not yet expiring during the year when conversion is effected;

- The areas have been found suitable for SIFMA, IFMA or other tenurial instrument based on the criteria prescribed under existing regulation as assessed/evaluated by the assessment team;
- The PLAs, FLGLAs or FLGMAs shall be deemed automatically cancelled upon the issuance of SIFMA, IFMA or other tenurial instruments by the concerned authority.

Total area of the existing pasture lease is 4,467 ha (**Table 4.5.1**). Most of these areas are PLAs and FLGLAs and have not been converted to FLGMA. However, there is one FLGMA (500 ha) in Bagabag, Nueva Vizcaya at the present time. Approximately 90 to 100 cows are kept within the pasture, and cut and carry feeding is carried out particularly in the dry season. As pasture management, controlled burning is expected to take place once a year with about 1 ha of controlled area, which is shifted every year. Napier grass (*Pennisetum purpureum*) has been used for pasture improvement.

Most of the pasture areas within the Study Area appear to be average to poor condition. Grazing capacity of cattle in the Philippines is approximately 1 cattle/2-3 ha¹¹. It varies with the soil condition and dominant vegetation (i.e. grass species) of a given area. However, the grazing capacity of average condition of pastures in the Study Area has been suggested as 0.3 to 0.5 cattle/ha for natural pasture by researchers at the Department of Animal Science, the Central Luzon State University. Dominant grass species of most of the pastures in the area appears to be either cogon or themeda, which are considered as low nutritional fodder for the animals. It has been reported that optimum stocking rate for themeda is about 0.4 cattle/ha¹². Under this condition, the animals receive minimum supply of nutrition particularly during dry and stressful seasons.

4.5.5 Rights of Indigenous People

All the rights of Indigenous Cultural Communities (ICCs) and Indigenous Peoples (IPs) are secured within the framework of the Constitution. Within ancestral domains/lands (CADC and CALC), the holistic and integrated adherence of indigenous peoples to their respective customs, beliefs, traditions, indigenous knowledge systems and practices, and the assertion of their character and identity as peoples shall remain inviolable under this act. Tenurial instruments for ancestral land use by indigenous people within the forest land are Certificate of Ancestral Domain Claims (CADC) and Certificate of Ancestral Land Claims (CALC).

Areas that have been proclaimed under IPRA are listed in the following table. IPRA stipulates that the secretaries of the Department of Agrarian Reform (DAR), DENR, Department of the Interior and Local Government (DILG), and the Department of Justice (DOJ), the Commissioner to the National Development Corporation and any other government agency claiming jurisdiction over the area shall terminate any legal basis for the jurisdiction previously claimed. Therefore, this Act secures comprehensive and complete rights on the lands by indigenous people, which virtually prevails over any other tenurial instruments over the areas.

Ancestral domains/lands formally/presently recognized as CADC and CALC would be converted to a land title under CADT and CALT. All areas within ancestral domains,

¹¹ The Philippines Recommends for Pastures and Forage Crops (1976)

¹² Strengthening of the Philippine Carabao Research and Development Centre (1982) Jan.

whether delineated or not, are presumed to be communally owned and, pursuant to the indigenous concept of ownership, could not be sold, disposed nor destroyed.

List of CADC issued by DENR and turned over to NCIP in the Project Area

CADC No.	Municipality	Province	Tribe	Date Issued	Area (ha)
R2CADC-002	Nagtipunan	Quirino	Bugkalot	14 Jun 94	108,360.00
R2CADC-020	Dupax Norte	N. Viscaya	Bugkalot	29 Jan 96	17,972.31
R2CADC-021	Kasibu	N. Viscaya	Bugkalot	29 Jan 96	2,822.32
R2CADC-022	A. Castaneda	N. Viscaya	Bugkalot	29 Jan 96	21,842.20
R2CADC-023	Dupax del Sur	N. Viscaya	Bugkalot	29 Jan 96	31,112.96
R2CADC-053	Maddela & Nagtipunan	Quirino	Agta	14 Jun 96	10,971.00
R2CADC-118	Aritao & Santa Fe	N. Viscaya	Kalanguya-Ikalahan	19 Mar 98	40,069.30
CARCADC-046	Kiangan	Ifugao		04 Mar 96	20,419.00
CARCADC-036	Tinoc	Ifugao	Kalanguya/Kankama	04 Mar 96	27,787.00
Total					281,356.09

Source: FRDD, DENR Region 2, PENRO Ifugao

Total area of CADC in Casecnan, Nueva Vizcaya is approximately 73,570 ha (sum of R2CADC-020 to 023). This area also includes two rattan permits by Nueva Vizcaya Rattan Association, Inc. and Bugkalot Rattan Association, Inc., which will be expired in March 2003 covering 18,500 ha.

The Casecnan CADC area is largely overlapped with the Protected Areas. The area still holds large areas of natural forest that are dominated by Dipterocarp species such as White Lauan, Red Lauan, Mayapis and other native species, and has an important role in watershed management as headwater of the Cagayan River. However, it seems that steep slopes are often used for agricultural purposes, which represents one of the most difficult issues in the management of Protected Areas.

4.5.6 Integrated Social Forestry (ISF) Program

The Integrated Social Forestry (ISF) Program was formally launched in 1982 to respond to the needs of the upland dwellers. It aimed to provide the upland farmers with security of tenure and promote ecologically sound farming practices. Under the ISF Program, two forms of certificate were issued: i) Certificate of Stewardship Contract (CSC) awarded to individual household; and ii) Certificate of Community Forestry Stewardship (CCFC) awarded on collective basis to the community.

While adoption of agroforestry method was mandatory under CSC, it was not a requirement under CCFS, as long as 30% of the project area was covered with either forest or fruit tree species. CSC was awarded as tenurial instrument in exchange for introducing agroforestry system. There were cases however, in which no such practice was introduced.

Tenurial instrument under ISF was awarded on individual basis through CSC (Section 4.5.7). Very few examples were confirmed on the issuance of CCFS within the Study Area.

While the latter organization still retained CCFS without having converted the title into CBFMA, the tenurial instrument of the former was converted into CBFMA in 1995.

4.5.7 Certificate of Stewardships Contract (CSC)

For the participants of ISF program, stewardship contracts secure land tenure over the subject land for a period of 25 years, renewable for additional 25 years. The stewardship contract refers to an agreement by an individual forest occupant or forest community association or cooperative and the government allowing the right of peaceful occupation and possession over the designated area. Certificate of Stewardship Contract (CSC) refers to the document issued by the government pursuant to the agreement. CSCs that have been issued within the Study Area is listed in the following table.

List of CS in the Project Area

Province	CENROs	No	No. of CSC	Area (ha)
Nueva Vizcaya	Bayombong	31	2,703	4,819.18
	Aritao	46	1,834	4,101.88
	Dupax	22	1,979	3,905.25
	<i>Sub-total</i>	99	6,516	12,829.31
Quirino	Diffun	44	2,430	8,099.67
	Nagtipunan	18	2,201	5,520.57
	Aglipay	76	3,058	7,686.71
	<i>Sub-total</i>	62	4,631	13,620.24
Isabela	Cauayan	13	1,312	3,535.67
	San Isidro	20	1,960	3,461.40
	<i>Sub-total</i>	33	3,272	6,997.07
Ifugao	Lamut	47	1,440	3,275.72
	Alfonso Lista	2	38	116.02
	<i>Sub-total</i>	49	1,478	3,391.74
Total		243	15,897	36,838.36

Source: FRDD, DENR Region 2, PENRO Ifugao

ISFs have been devolved to LGUs since 1992, but this process has not been completed. Remaining ISFs are still in the process of devolution, and those existing CSCs remain as tenurial instrument that is eligible for renewal until its final expiration. However, a new CSC will not be issued.

Existing CSCs can be included under CBFM, which is not only applicable for tree planting but also agriculture and agroforestry. It was observed that one of the most common practices of CSC is agroforestry. Mango, Jack, avocado and other fruit bearing trees are often planted. Furthermore, rice is often cultivated and small irrigation facilities such as small scale check dams with impoundment are also developed with CSC.

4.5.8 Resettlement Land

Two resettlement lands listed in the following table have been proclaimed in the Study Area under the administration and disposition of DAR. The Comprehensive Agrarian Reform Program (CARP) started in 1988 according to Republic Act No. 6657 for the purpose of sound rural development and industrialization. Under this program, the maximum of 3 ha of land title can be given to beneficiaries as Certificate of Land Ownership Award (CLOA). The provision of the land title allows owner to cut, collect and dispose of timber stands in the area with the purpose of development of the settlement, subject to forestry rules and regulations.

Resettlement Lands in the Study Area

Province	Municipality	Proc. No.	Date	Area (ha)	Land Classification (ha)
N. Vizcaya Quirino	Dupax del Norte & Nagtipunan	1498	11 Sep '75	40,000	Forest land: 34,000 A & D: 6,000
Ifugao	Lamut	157	9 May '55	528.24	A & D

Conwap Valley (4,000ha) covering part of Nueva Vizcaya and Quirino was disposed for 20,000 ha so far, which includes A & D areas as well as forestlands. Most of the settlers within this area were relocated from the construction of Ambuklao Dam and Binga Dam in Benguet. Part of the Conwap Valley was proposed for a Civil Reservation (CRTL No. 11). This reservation was set aside as a resource of timber for the settlers.

Most of the settlers in Lamut, Ifugao, were migrated from the construction of Ambuklao Dam and Bokod Dam in Benguet. Approximately 115 free patents were awarded by DENR with a total area of 301.4 ha. All of these areas belong to A & D areas.

4.6 Forestry Technology

4.6.1 Establishment of Forest Plantations: Yemane

Ecosystems Research and Development Bureau, DENR has issued the standards of popular planting tree species in Research Information Series on Ecosystems (RISE). These standards derived from project experience and technical studies conducted over decades. The standards deal with site characterization, species-site matching, timing, seed collection methods, seed treatment, nursery practice, planting density, planting methods, frequency of weeding, timing for pruning and thinning and other relevant topics in forestry.

Field activities and guidance for reforestation, consistent with the standard, is perceived as a practical way to avoid technical problems. The most-frequently planted species on a national scale are Yemane (*Gmelina arborea*), Large-leaf mahogany (*Swietenia macrophylla*), Bagras (*Eucalyptus deglupta*), and Falcata (*Paraserianthis falcataria*). At present, the most popular plantation specie in the Study Area is Yemane, and other species for planting are listed in **Table 4.6.1**.

In the Study Area, Yemane is the most extensively planted species and that the species can be found in reforestation projects, industrial tree plantations, parks, backyard gardens, farm boundaries and along roadsides.

The following section provides an example of the standard for afforestation/ reforestation, with specific reference to Yemane. Similar information on other species is presented in **Table 4.6.2**.

(1) Common Tree Species for Planting: Yemane

Planting techniques for Yemane are generally consistent with the methods applied for other tree species commonly-planted in the Philippines. The following information is cited from the publication entitled: “Planting stock production and plantation establishment technology for Yemane (*Gmelina arborea* Roxb.).”¹³

(2) Seed Technology and Seedling Production

Yemane usually starts blooming about four years after planting. Fruit maturity and fruit collection extends from March to August. The peak months for seed collection are May and June. Seeds should only be collected from Seed Production Areas (SPA) or genetically superior plantations to ensure the quality of planting stocks.

The seeds should be sun dried for two days or until the deposited pulp in the hallow pit of the seeds is completely dried. The following methods may be used to hasten germination:

- 1) Newly or freshly collected seeds
 - Soak seeds in tap water for 24 hours
 - Soak seeds in lukewarm water and allow to cool-down for 12 hours
- 2) Stored Seeds for at least for 3 to 6 months
 - Soak seeds in tap water for 24 hours

(3) Seedling Production

Seeds should be germinated in sandy loam or clay loam soil in a seedbed. A convenient size for the seedbed will be 5 m long and 70 cm wide. It should be slightly elevated, about 10 cm higher than pathways between the beds. These pathways should be at least 50 cm wide to facilitate watering and other care. Seeds may also be germinated in an elevated seed box.

The following procedures should be applied when sowing the seeds:

- Bury the pointed end of the seed and the opposite end should at least be 0.5 - 1.0 cm deep from the soil surface.
- Spacing along rows or furrows and between rows is 1.0 cm and 3 - 5 cm, respectively.
- Cover lightly with soil

¹³ Henry P. Patricio (1999) Regional Technology Forum, December 20-22

- Water the seed bed sufficiently at least twice a day during dry season or as the need arises
- Seed germinate in warm, damp conditions
- Mulching with grasses or old newspaper helps to prevent evaporation and keep the seeds bed warmer at night. Mulch must be removed as soon germination starts.

(4) Potting

- Sizes of plastic bags: Flat size of 4" × 6" × 0.003
- Potting media: Mixture of top soil and humus (1:1 mixture) never use sub soil or sand
- Time of potting: Germinants are picked from the seed bed to the pot bed at least two weeks after germination or when the seedlings have at least 2-3 pairs of leaves
- As soon as the cotyledons have fully emerged from the seeds
- Root and leaf pruning: This is to be performed when the germinants or seedlings have reached a height of 10 cm or above. At this time the seedlings have already developed top roots and leaves. Pruning of roots is advisable. Cut at least 1/3 the length or about 2/3 of the roots.

(5) Maintenance and Cultural Treatments of Potted Seedlings

- Provide temporary shade to newly potted seedlings then gradually reduce by half after two weeks and completely removed after another two weeks.
- Watering: keep the seedlings well watered at least twice a day during summer or whenever necessary.
- Spacing: Allow an ample spacing of seedlings for better growth and development for at least 5 cm along rows of pots.
- Culling: Weak and damaged seedlings must be discarded.
- Fertilizer application: Analysis of the potting medium will indicate what elements are needed. It is advisable to apply the fertilizer when the seedlings are in a condition to make immediate use of it. Apply at the rate of 0.5g/plant, either as pellets (granules), or in solution, two months after potting. If applied in solution, count the number of plants in one meter of seedbed. Normally, one meter of seedbed will require about 5 liters of water. Dissolve the appropriate amount of fertilizer, based on the number of plants.

(6) Establishment of Plantation Sites

The following condition should be carefully examined before outplanting.

- Vegetative composition: Identify plant composition or existing plant cover. Growth of Yemane is rather slow when planted in a cogon, themedra, amorseco dominated area. This is due to the presence of allelochemicals in the cogon soil.

Allelopathic effect of phenol and sugar are aggravated by low pH and soil fertility.

- Physiographic condition: This elevation exposure, slope category, drainage systems aspects, etc.
- Previous land use: General features of the land including previous pasture lands, *kaingin* area, cultivated for the production of cash crops, etc.
- Climatic factor data: Secondary data on rainfall and other meteorological information to be obtained.
- Land preparation for planting: Cutting and burning (controlled burning and strip-burning), ring weeding or patch clearing, strip-cultivation, ring cultivation, blanket cultivation, staking, pitting and hole digging.

(7) Outplanting

- Outplanting usually starts at the beginning of the rainy season until the peak of the rainy season, which is normally June to September.
- Bare root or naked seedlings: Seedlings must be at least 1 year old when planted. Long tap roots and abnormally long lateral roots are pruned. The size of leaf should also be reduced to one half by trimming. As soon as these are accomplished, they are mud-puddled and wrapped with a moist gunny sack.
- Stump planting: It is prepared from seedlings from which most of the crown are more or less cut back. This method requires only small portion of the root system and about 5 cm of the stem. The stem is severed with sharp slanting cut at a point 5 cm from the root collar. The long lateral roots are cut back to about 6 cm and tap roots to about 20 cm. The diameter of the stump should be from 1 to 2 cm.

(8) Maintenance and Culture Treatments of Plantation

Intensive cultural treatment is necessary during the first three years of the establishment. The following treatments are common techniques in maintenance.

- Fertilizer application: Basal application (10 g of 14-14-14 per seedling at the bottom of the planting hole) and side dressing (fertilizer in the trench of about 5 to 10 cm). Frequency of the application is once a year for the first two years at the beginning of or peak of the rainy season. The amount of fertilizer should be determined according to the recommendation of soil analysis.
- Weeding maintenance: Strip weeding is recommended. All sites dominated by cogon and other grass species should be weeded twice a year (June and October). Creeping species of mimosa, vines and legumes need to be weeded at two-month intervals during the wet season.
- Mulching: Each plant is to be provided with a 30 cm radius of mulch made of chopped grass and/or leaves at least 5 cm thick. This is used to provide cover at the base of the plant to minimize rapid evaporation and/or loss of moisture around the base of the plants.

(9) Silvicultural Treatment

- Pruning: This is to remove live or dead branches from standing trees. The correction of growth form is a very important aspect of tending in the younger stage of plantation development.
- Stage of Pruning: First pruning should be performed at the height of about 6 m. The second operation is when the stand reaches the top height of about 9 m, and the third operation is at a top height of about 12-13 m.
- Thinning: This is the removal of trees in the stand with the aim of retaining only the very best stems. The process is to remove all undesirable individuals at an early stage of the plantation.

(10) Fire Protection

Fire lines or fire breaks should be established as a fire control measure. Construct fire lines that are 10 m wide, from which grasses must be completely removed. This is particularly important when *kaingin* or similar agricultural techniques are practiced around the periphery of the plantations.

4.6.2 Improvement of Residual Natural Forest

Within the second-growth natural forests, government regulations prescribe implementation of selective cutting/sustained yield logging consistent with rules and regulations of the Philippine Selective Logging System (PSLS).¹⁴ The system is anchored on prescriptions of Annual Allowable Cuts (AAC) for each forest management unit; Principal features of the PSLS are: i) pre-harvest inventory; ii) marking of trees to be cut and to be retained as future crop trees; iii) directional felling; iv) extraction methods that minimize damage to residual trees, soil and water resources; v) post-harvest inventory; and vi) post-logging silvicultural treatments such as timber stand improvement (TSI)¹⁵ and enrichment planting. Implementation details are spelled out in annual, mid-term and long-term forest management plans submitted by forest users (e.g. timber concessionaires) and approved by the government.

TSI techniques incorporated in the PSLS aim at prioritizing the growth of specific premium tree species through application of various silvicultural treatments such as climber cutting, thinning, and felling of dead and diseased trees. These treatments are identified as either “refining” or “liberation.” Refining refers to climber cutting, and girdling of over-mature relic trees and badly-shaped or defective trees. Liberation is the elimination of competition by inferior neighboring trees that impede crown development. The removal of some trees through refining and liberation may induce natural regeneration in the gaps created. Enrichment planting may be applied in these gaps as part of TSI.

At present, there are no TSI operations in the Study Area. However, the Community Forestry Project in Quirino (RP-German project) considers, in the future, the inclusion of TSI training for POs involved in CBFM. The conventional TSI agenda appears to include

¹⁴ Implementation of the PSLS is governed by provisions of the HANDBOOK ON SELECTIVE LOGGING, published by the Bureau of Forestry, Second Edition, 1970.

¹⁵ TSI guidelines are provided in the publication entitled “Aspects of Management and Silviculture in Philippine Dipterocarp Forests” published jointly by the DENR and the Philippine-German Rainforest Development Project in 1982.

some measures that improve the overall health of the forests including non-timber forest products.

4.6.3 Introduction of Pioneer Species in Brush Land

The emergence of pioneer tree species in grass lands and brush lands is an indicator of on-going rehabilitation through the natural process of biological/ecological succession. In the Philippines, this process is expedited via application of Assisted Natural Regeneration (ANR). The ANR implementation in the Philippines was first initiated in 1978 by the University of the Philippines College of Forestry¹⁶, which recommended application of this methodology in reforestation programs. This recommendation was officially adopted in 1991 through issuance of DAO 31-91.

The ANR implementation begins with lodging (i.e. pressing) of fire-prone grass species with a lodging board. This retards growth of the grass and facilitates the growth of vines and bushes that shade out the grass. Deprived of sunshine, the grasses are gradually suppressed. After lodging, the DAO 31-91 prescribes ring-weeding and tending of the pioneer tree seedlings that sprout naturally from seeds dispersed by bats, birds, wind and so forth. In cases where the density of wild seedlings is low, additional wildlings, seedlings or seeds of hardy species are planted.

Under natural conditions, regeneration/restoration process takes from 10 to 15 years. By applying ANR, the important initial phases of the forest regeneration process can be completed in a few years, instead of 10 to 15. Currently however, no projects implementing ANR are reported in the Study Area.

However, the community resource management framework (CRMF) plans prepared by some communities involved in the CBFMP indicate the intention to introduce ANR as one of their envisioned activities. Brush lands and grasslands are widespread in the Study Area. ANR is a practical option for restoring forest cover on these lands.

4.7 Existing Forestry-related Projects

4.7.1 Center for People's Empowerment in the Uplands (CPEU)

After ISF projects were turned over to LGUs under the Local Government Code, the DENR decided to continue a limited involvement in ISF. Initially, this was carried out to pursuant to an un-numbered DENR Memorandum to all REDs dated September 19, 1992. Subsequently, DAO 05 was issued on January 28, 1993 to formally launch the CPEU. Both memoranda instructed REDs to retain control of one ISF project in each province. The REDs were further instructed to develop these projects into model sites to showcase application of sustainable agroforestry technology, while also serving as training centers for DENR staff, peoples organizations (POs), non-government organizations (NGOs) and other entities. According to DENR records there are now five CPEU sites covering 1,132 ha in the Study Area (**Table 4.7.1**). However, information obtained from DENR counterparts indicates that the CPEU sites in Isabela and Quirino were converted under CBFM projects and are now serving as Provincial Model sites for implementation of CBFM.

¹⁶ Project report: UP Upland Hydro-ecology Program, which has since evolved into the UP Institute of Environmental Science and Management (IESAM).

4.7.2 Forest Production Project (FPP)

The FPP was authorized under two DENR Memorandum Circulars, MC 99-09 issued on April 2, 1999 and MC 99-29 issued on September 21, 1999. The program was first established under MC 99-09 which authorized the setting aside of parcels of forest land for reforestation by DENR employees. FPP has several features, which distinguish it from other reforestation programs. They are: i) the principal focus is fruit trees rather than timber species; ii) planting is done through voluntary labor by DENR employees; and iii) it is intended that DENR employees will harvest and sell the products harvested from their plantings and turn over part of the income to the government under a profit-sharing scheme. Under the program, DENR identifies Forest Production Areas (FPA) for FPP implementation. The maximum size of an FPA is 5 ha for an individual and 150 ha for an association composed of DENR employees. DENR provides seedlings and technical assistance. There are currently 85 ha in Quirino and 34 ha in Ifugao developed as FPAs.

4.7.3 Reforestation by Administration (REFO-A)

REFO-A comprises reforestation conducted directly by DENR using paid employees. REFO-A projects are financed with Philippine Government funds included in the annual DENR budget. The principal targets are critical watersheds where rehabilitation of forest vegetation is considered urgent. Currently, there are 14 REFO-A projects in the Study Area but no new plantations are being established at present due to budgetary constraints (**Table 4.7.2**). The on-going activities are confined to protection. Meanwhile, two former REFO-A projects in Nueva Vizcaya have been converted into CBFM projects.

4.7.4 Reforestation by Contract (REFO-C)

Under REFO-C, the DENR hired private contractors to implement reforestation. Contractors included firms, NGOs, individuals, families, LGUs and civic organizations. REFO-C was the major DENR program under the OECF-ADB Loan I. At present, there are no new REFO-C projects due to lack of funds. However, 12 former REFO-C projects in Nueva Vizcaya, seven in Ifugao and 19 in Quirino have been incorporated in the CBFM program (**Table 4.7.3**). Thus, all existing CBFM projects include former REFO-C project areas.

4.7.5 Watershed Rehabilitation Project (WRP)

This is a DENR project financed by annual appropriations included in the DENR budget. Component activities are tree plantation establishment, construction of check dams, installation of water systems, bench terracing, and vegetative erosion-control measures such as wattling. There are presently three WRP projects in Ifugao, two in Isabela, two in Quirino and five in Nueva Vizcaya (**Table 4.7.4**). However, activities are limited to small scale constructions and vegetative cover works.

4.7.6 Tree for Legacy (TFL)

This is a reforestation program that was initially set up based on Memorandum Order No.14 Series of 1994 or the "Grow a Family Tree for Legacy in DENR Region 2." In the following year (1995), the program was strengthened and opened to private individuals,

groups and organizations. DENR implementation in the Study Area began in 1996 at Quirino province and in 1997 at Isabela province.

In Nueva Vizcaya, this program is jointly-implemented by DENR and the Provincial Government under a Memorandum of Agreement (MOA) signed by the DENR Regional Director and the Provincial Governor on August 7, 1999. The program intends to “restore the depleted forest cover of the province consistent with its vision to make the province the watershed of Region 2.” The program promotes involvement of public and private entities and the civil society in reforestation.

The program strategy encourages reforestation by ensuring that tree planters obtain financial benefits through harvesting and sale of products derived from trees they plant. The assurance is provided by issuance of Certificates of Tree Ownership or Certificates of Usufruct for the trees planted. The strategy is pursued through three approaches, as follows:

Tree for Legacy – which provides “rights to use” to individuals or groups of people for planting fruit trees in the Protected Areas of the watersheds.

Tree for education – which supports the raising of fruit and timber trees by students and entitles them to harvesting privileges in designated production areas of watersheds.

Tree for Enterprise – which entitles tree growers secure harvesting rights over fruit and timber trees planted in the Forestlands of watersheds.

The program establishes maximum area/size limitations for participants: 5 ha for individuals, 5-10 hectares for associations and cooperatives and above 100 ha for corporations. At present, there are 713 Tree for Legacy (TFL) sites having an aggregated area of 4,122.1 ha as of August, 2001 in Nueva Vizcaya, 40 sites with an aggregated area of 149.6 ha in Isabela, and 115 sites with a total area of 446.6ha in Quirino as of 2000.

4.7.7 Lower Magat Forest Management Project

This is a Co-Management Project of the DENR and the Provincial Government of Nueva Vizcaya. In accordance with the Memorandum of Agreement (MOA) signed by the two parties on February 25, 1998, “to jointly allocate, protect, develop and manage the forestlands in the 24,000 ha Lower Magat Reforestation Project, consistent with an indicative Protection, Development and Management Plan” jointly prepared by the parties.

Lower Magat Forest Management Office (LMFMO) was created in 1999 to implement the plans, programs and policies approved by the Steering Committee. The Provincial Government allocates human and financial resources for the operations of LMFMO. Personnel assigned to the Project are 13, of whom 11 are technical. DENR also assigns technical personnel and provides technical assistance to LMFMO.

LMFMO current activities include: i) land use validation/verification; ii) community organizing and research extension; iii) conflict management; iv) processing of tenurial instruments; v) forest protection.

Actual activities started in early 2000. Main activity at present is to promote application of tenurial agreement such as Agroforestry Land Management Agreement (ALMA),

Community-Based Agroforestry Land Management Agreement (CALMA) through appropriate land use.

4.7.8 Foreign Assisted Projects

(1) Caraballo and Southern Cordillera Agricultural Development Program (CASCADE)

Initially, this DA-implemented, EU-assisted project was designed to provide rehabilitation services to victims of an earthquake that occurred in 1990. It was originally identified as the Earthquake Rehabilitation Programme (ERP). Subsequently the agenda was expanded as CASCADE.

CASCADE is an integrated rural development project started 1997 (**Table 4.7.5**). Its overall objective is to help mainly indigenous rural people of highland areas in promoting an agriculturally based local economy. It has five major components, namely, Agricultural Production Systems Development, Micro-Enterprise Development, Social Development, Institutional Development and Rural Finance. Most investment expenditures were scheduled for years 1999 to 2002. As of Year 2000, the project has completed 15 irrigation systems serving 340 ha of farms. On-going construction scheduled for completion in 2001 includes 64 km of roads, 850m of trails and several bridges, as part of the Agricultural Production Systems Development component.

(2) Community Forestry Project – Quirino (CFP-Q)

This Project aims to attain sustainable forest management in Quirino, through community participation. It facilitates formation of peoples' organizations and helps develop the capability of local communities in planning, implementing, monitoring and evaluation of community-initiated forest resources management. CFP-Q also supports institutional strengthening of LGUs, NGOs and financial institutions as partners to sustain their efforts in project implementation.

The Project started in 1997 with a grant from the Federal Republic of Germany and ends in 2001. It seeks to organize and mobilize local communities to manage their renewable natural resources with support from LGUs and DENR.

Components are designed to: (i) support the capacity building of LGUs (Provincial and Municipal) in land use planning and natural resources management (ii) complement the capacity of DENR and LGU in the processing of land tenural instruments for issuance to organized communities (iii) support sustainable forest resource management and development by the local people (iv) promote sustainable farming systems as a support measure to community based forest management (v) promote rural finance schemes for forestry, agriculture and infrastructure, and (vi) promote income-oriented infrastructure as a support measure to CBFM.

The project covers 10 sites in the uplands of the province, which is the headwater of the Cagayan River. Sites comprise either a barangay or a micro-watershed, inhabited by indigenous peoples, the Agta and by migrants. There are 19 community-based organizations participating in the project of which five are involved in projects under the CBFM umbrella.

(3) ITTO –CBFM Project

This project is known as “Developing Tropical Forest Resources through Community-Based Forest Management.” It is the second phase of the DENR-ITTO Plantation Establishment Research Project completed in 1997 with an ITTO grant. It started in July 1998 and is scheduled to end in 2001. It was extended for one year or up to year 2002 to complete scheduled activities.

The project covers 3,000 ha of forestlands in Buenavista, Bayombong, Nueva Viscaya. It is managed by the Federation of Forest Communities under a CBFMA. The area is within the watershed of the Matuno River, a major tributary of the Magat River.

Objectives of the project is to (i) improve the productivity of degraded and regenerating forest lands through CBFM, complemented by the application of research validated plantation establishment methods to establish 100 ha of new forest plantation using research validated plantation establishment methods, (ii) manage 100 ha of regenerating natural forest, (iii) protect 1,500 ha of matured and secondary dipterocarp forests and manage/develop 1,300 ha of degraded lands through the CBFM strategy, (iv) strengthen community forest organizations and enhance their capacity of sustainable management of forest resources and (v) undertake livelihood activities and forest based enterprises.

The Project has (i) established 200 ha of forest plantations using techniques developed during the first phase (plantation establishment research), (ii) protected the entire CBFM area from illegal logging and other destructive agents, (iii) monitored growth and yield of plantations and (iv) implemented effective fire protection which has accelerated natural regeneration.

(4) RP-German Debt-for-Nature-Swap Initiative Program (DFNSIP)

This is a DENR-initiated community-based program, which focuses mainly on biodiversity conservation. It is a debt-conversion program between the Philippines and Germany, wherein a total of DM 12,775.8 million has been made available to implement projects for the protection and conservation of the environment. Of this budget, 30 % will be utilized for the DFNSIP. The project is to be implemented from December 1998 to March 2002, in 10 barangays within the municipalities of Maddela, Alglipay, Diffun, and Nagtipunan, Province of Quirino. Of those, one organization in Alglipay is under CBFM coverage.

Objectives are as follows: (i) to strengthen sustainable management of forest resources including biodiversity conservation within the forest ecosystem (ii) to promote social justice and improve the wellbeing of local communities by providing them legal access to benefit from the management of forest resources (iii) to develop, strengthen and institutionalize working partnership among local communities, local government agencies, NGOs, the private sectors and other groups committed to sustainable development of forest resources.

Components are to (i) support to community organization, (ii) participatory land use planning, (iii) forest management and biodiversity conservation, (iv) sustainable agroforestry/agriculture. And support components are (v) rural industrial development/livelihood, (vi) marketing, (vii) support to tree plantation and forest rehabilitation and (viii) Community-implemented infrastructure.

The Program management is composed of 20 detailed regular DENR personnel and three contractual personnel. The project is headed by a Program Manager (PM) who reports directly to the Regional Executive Director, Region 2. The PENRO has no direct supervision over the project, and is only furnished copies of reports. There are three units: Monitoring and Information Service, responsible for IEC and Training; Support Service, and Site Management, which is composed of site managers called PMOs.

(5) Forestry Sector Project (JBIC)

DENR launched the Forestry Sector Project with a financial assistance by Japan Bank for International Cooperation (JBIC) in August 1993. Main approach of the project is CBFM, and the objectives are as follows:

- Re-establishment of the vegetative and forest cover of currently denuded and degraded areas,
- Improvement of the living standards of inhabitants residing in the areas,
- Conservation of biodiversity, and
- Control of soil erosions to protect downstream areas from natural calamities.

The project is categorized into the following components:

- Watershed rehabilitation,
- Mangrove rehabilitation, and
- Community organization (CO)

The watershed rehabilitation component focuses on prioritized critical watersheds, and a total of 25 watershed sub-projects exist in 23 provinces currently. Approximately 140 barangays with 50 POs participate into these projects. A total area of 48,700 ha was planted by the year 2000, and about 26% (2,300 ha) of the target area (8,900 ha) for planting in the year 2001 had been completed by June 2001.

Three JBIC funded sub-projects, Lamut (1,031 ha), Mayoyao (2,317 ha) and Dumayop (2,246 ha) started in 1996 and are still on-going within the Study Area. Proportion of the area that has been accomplished at each site is Lamut (74%), Mayoyao (98%) and Dumayop (65%).

For an effective implementation of the project, the establishment of the Sub-project Site Management Office (SUSIMO) has been proposed for each mangrove and watershed project site. Special orders for designating SUSIMO staff were issued in December 2000 after the approval of the Guidelines (DAO 2000-65) by the DENR Secretary. As of the end of March 2001, a total of 325 personnel had been assigned as the SUSIMO staff.

4.7.9 Sierra Madre Biodiversity Corridor Project (SMBC)

Sierra Madre Biodiversity Corridor (SMBC) Project of Conservation International (CI) lies over 9 Provinces, which includes part of the Study Area in Neuva Vizcaya, Quirino and Isabela. The aim of the SMBC is to promote the conservation and protection of the Sierra Madre Ranges by reversing the progress in the fragmentation of natural ecosystems that hold rich biological diversity. Short-term objectives of the project are:

- Establish SMBC participatory planning and implementation framework;

- Gather additional socio-economic and bio-physical benchmark framework;
- Strengthen capacities of stakeholders of existing protected areas, CBFM projects, ancestral domains, and other newly created management units;
- Establish SMBC data base, communication and education framework, and monitoring and evaluation system; and
- Develop a corridor-wide economic and policy intervention.

Project consists of restoration/rehabilitation of the degraded ecosystems, protection of important habitats and watersheds, promotion of social, economic and cultural aspirations of the local communities toward conservation. Main components of the project are:

- Establishment of Sierra Madre Biodiversity corridor planning;
- Strengthening, creation and extension of individual protected areas;
- Connecting proximate protected areas to form core nuclei; and
- Connecting core nuclei to form the biodiversity corridor.

CHAPTER 5 MAIN FINDINGS OF THE STUDY

5.1 Roles of DENR in CBFM

5.1.1 Monitoring System

A questionnaire survey was conducted on the current status of periodical monitoring system as well as on technical assistance by DENR. The questionnaire was distributed to nine CENROs responsible for CBFM projects.

According to the study results summarized in table below, all offices except CENRO-Lamut affirmed the existence of periodical monitoring system on CBFM projects. Out of the nine offices, five offices replied that they had a monitoring system to conduct every month, and two offices affirmed on every-three-month monitoring system. The same percentage replied that the monitoring was conducted as the need arose.

Monitoring and Technical Assistance Systems on CBFM by DENR

CENRO	Province	Monitoring Yes(1) No(0)	Depends	Every month	Every 3 month	Tec. Asst Yes(1) No(0)	Depends	Every month
1 Lamut	Ifugao	1	1			1	1	
2 Alfonso Lista	Ifugao	1			1	1		1
3 Aglipay	Quirino	1		1		1		1
4 Nagtipunan	Quirino	1		1		1		1
5 RP-German	Quirino	1			1 ⁽¹⁾	1	1	
6 Aritao	N. Vizcaya	1	1 ⁽²⁾			1		1
7 Dupax del Norte	N. Vizcaya	1		1		1	1	
8 San Isidro	Isabela	1		1		1	1	
9 Cauayan	Isabela	1		1		1	1	
Total		9	1	5	2	9	5	4

(1) Three times / year (planting year), every 6 month (2nd yr after planting), once a year. (After the 3rd yr.).

(2) After the plantation is established.

Under the monitoring system, Site Coordinator and other responsible personnel of the CBFM Unit examine the progress and achievement of the targets and goals set forth and agreed upon between POs and DENR. Monitoring was often conducted for validation and billing purposes under various reforestation contract schemes. CENRO-Lamut and CENRO-Alfonso Lista noted of the validation being conducted for billing purposes to determine the extent to which contracted reforestation was accomplished. The validation was determined for inspection in the field.

CENRO-Aritao also noted of the formation of a joint PENRO-CENRO Evaluation Team to ascertain if the reported accomplishments really exist in the field under reforestation projects. Within the RP-German project sites, plantation areas were surveyed by GPS and mapping by GIS on survival counting, measurement of height and diameter on a sampling basis. Those data were being gathered and integrated.

5.1.2 Technical Assistance

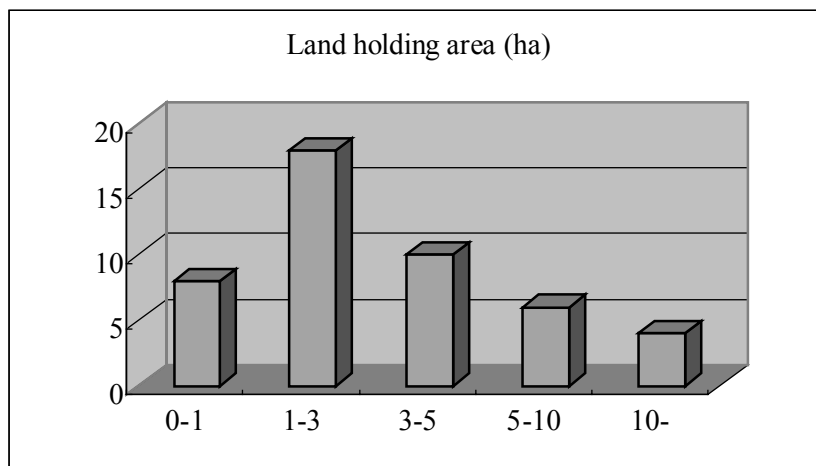
All CENRO offices also adopted systems on providing technical assistance. However, for five offices surveyed, the assistance was provided as the need arose instead of on a periodical basis. The needs for technical assistance had to be communicated by PO representatives to CENRO offices. On the other hand, four offices replied of the system of providing technical assistance on an every-month basis.

Normally, assistance was provided by being furnished sets of information, education and training. In training, PO members were given lectures, demonstration and actual practices to learn skills and technologies related to reforestation and other required matters. Technical assistance also included delineation and mapping surveys as well as preparation of project proposals.

5.2 Land Use in CBFM Areas

5.2.1 Land Holding Size

According to the survey results, an average size of area under land tenure of 46 households was 4.2 ha per household¹⁷. The following figure shows an overall picture of land holding size of the households. It was found that 39.1% of the population held a land of 1 to 3 ha, followed by 21.7% of 3 to 5 ha. Land owner with 0 up to 1 ha was about 4% of the total. Overall, 78.3% of the households had a land of up to 5 ha.



Source: Field Survey conducted during April – May, 2001.

Land holding size among the studied households (n=46)

5.2.2 Agricultural Use of the Land

Agricultural land use was the largest form (59%) of all the land use patters in the CBFM area. It was found that agricultural use consists of 1) Agroforestry (50%), 2) Vegetable farming (23%), 3) Tree plantation (18%), and 4) Rice Paddy (9%).

¹⁷ The largest holder had a tenure over 29 hectares in Mayoyao, of which 28 ha were held under Muyung system inherited from the holder's grand parents. The smallest holding was 0.2 ha declared by Ifugao also located in Mayoyao. In this case although the holding size is small, it can be expanded as he declares holding by cultivation.

5.3 Characteristics of Livelihood Patterns

5.3.1 Overall Revenue Patterns

The following table summarizes economic revenues in the sectors of; 1) Agriculture Sector, 2) Livestock Sector, and 3) Service Sector. Overall economic revenues during the past year (from April-May 2000 to April-May 2001) of 46 studied households amounted to PHP 1,900,995. The average yearly revenue per household was PHP 41,325.98, or PHP 3,443.83 per month. This was equivalent to yearly and monthly revenues of Yen 99,182, and Yen 3,443, respectively, at PHP=Yen 2.40 based on the approximate exchange rate during the field survey period¹⁸.

The Summary of Economic Revenues among the Studied Households (n=46)

PO Name	Agriculture		Livestock		Service		Total	
	PHP	%	PHP	%	PHP	%	PHP	%
Nueva Vizcaya								
Yaway Farmers Multi-Purpose Coop.	199,050	91.0	13,800	6.3	6,000	2.7	218,850	100
Vista Hills Upland Farmers Assn.	191,950	88.3	25,500	11.7	0	0	217,450	100
JV Greeners Tree Planters Assn	29,316	7.9	18,000	4.8	323,850	87.3	371,166	100
Quirino								
Ilongot Livelihood Assn. Inc. (ILAI)	138,500	53.5	37,500	14.5	82,700	32.0	258,700	100
Nuh-uh-uhhaan Inc	48,050	20.0	4,900	2.0	187,188	78.0	240,138	100
Baguio Village Intercultural Assn	73,694	66.8	0	0	36,600	33.2	110,294	100
Ifugao								
Hapid Agroforestry Developers (HADAI)	22,350	25.3	24,795	28.1	41,200	46.6	88,345	100
Nunhabatan Greeners Livelihood Assn	107,965	44.4	51,250	21.1	84,000	34.5	243,215	100
Mayoyao Env. Dev. Association (MEDAI)	8,925	5.8	36,200	23.7	107,713	70.5	152,838	100

Source: Field Survey conducted during April – May, 2001

It was found that the main income source was the agricultural sector in Nueva Vizcaya and Quirino while it was the service sector in Ifugao. However, it was noted that there were large differences in revenue among POs in each province. For example JV Greeners Tree Planters Association in Nueva Vizcaya showed high revenue (87.3%) in service sector, and similar trend was also found in Nuh-uh-uhhaan Inc. Therefore, although there is a general trend in the importance of agricultural sector and service sector, there seems to be considerable differences with different POs in each province. Characteristics of both sectors were further analyzed in the following sections.

5.3.2 Revenue Patterns in Agriculture

The following table summarizes agricultural revenue of the POs with the three categories; 1) vegetables, 2) crops, and 3) fruits. It shows differences in the main source of income with different POs. A sum of PHP 822,800 was obtained from those revenues among the total of 46 households. Vegetables sale was the highest in the Pos in Nueva Vizcaya while

¹⁸ The obtained values in Peso was converted into Yen in consideration for possible inflationary effects in Peso. The value may also be converted into US dollar to measure value in hard currency.

main source of income was from the sale of crops in Quirino and Ifugao. Only one PO (Nuh-uh-uhhaan Inc. in Quirino) showed high revenue from fruits.

Agricultural Revenues of the Studied Households (n=46)

Name of PO	Vegetable		Crops		Fruits		Total	
	PHP	%	PHP	%	PHP	%	PHP	%
Nueva Vizcaya								
Yaway Farmers Multi-Purpose Coop.	199,050	100.0	0	0	0	0	199,050	100
Vista Hills Upland Farmers Assn.	171,050	89.1	18,750	9.8	2150	1.1	191,950	100
JV Greeners Tree Planters Assn.	22,266	76.0	4,050	13.8	3,000	10.2	29,316	100
Quirino								
Ilongot Livelihood Assn. Inc. (ILAI)	5,000	3.6	133,500	96.4	0	0	138,500	100
Nuh-uh-uhhaan Inc.	2,750	5.7	2,800	5.8	42,500	88.5	48,050	100
Baguio Village Intercultural Assn	11,160	14.6	57,434	74.9	8,100	10.5	76,694	100
Ifugao								
Hapid Agroforestry Developers (HADAI)	1,350	6.1	20,100	89.9	900	4.0	22,350	100
Nunhabatan Greeners Livelihood Assn.	22,335	20.7	82,500	76.4	3,130	2.9	107,965	100
Mayoyao Env. Dev. Association (MEDAI)	6,125	68.6	2,500	28.0	300	3.4	8,925	100

Source: Field Survey conducted during April – May, 2001.

5.3.3 Revenue Patterns in Service Sector

The table below shows the study results on cash revenues derived from service sectors. Among the categories, the largest segment came from employment at public services¹⁹, occupying 47.2%. This was followed by small business revenues²⁰ of 13.6%, and the employment revenues at private entities of 12.4%.

Revenues from Service Sectors of the Studied Households (n=46)

Category	Public works	Reforest. project	Public servants	Private emplymt	Small business	Farm labour	Family assistance	Total
PHP	94,000	20,013	410,388	108,000	118,500	88,750	29,600	869,251
%	10.8	2.3	47.2	12.42	13.6	10.21	3.4	100

Source: Field Survey conducted during April – May, 2001

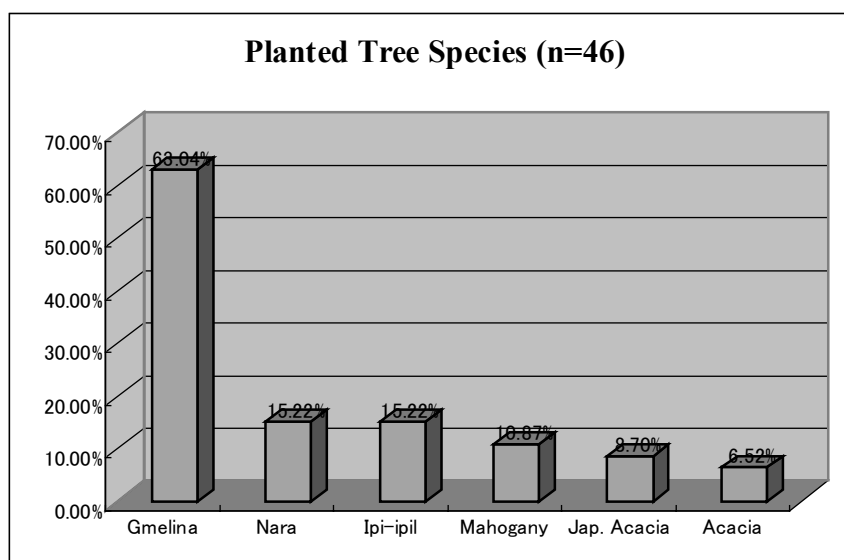
¹⁹ Public servants include public school teachers, civil servants at barangay office, utility services and operator of community-run rice mill.

²⁰ The small business includes owning sari-sari store, buy and sell of agricultural crops and tricycle transport service.

5.4 Forestry Practice in CBFM

5.4.1 Tree Species and Spacing Method Used by PBFM Participants

The figure below presents data on forest tree species planted by the studied households within land under their occupation (n=46). It was found that Gmelina was planted fur more frequently compared with other tree species including Nara (*Pterocarpus indicus*) and Ipi-ipil (*Leucaena glauca*) Mahogany (*Swietenia macrophylla*) and Acacia.



Source: Field Survey conducted during April – May, 2001.

Forest Tree Species Planted by the Studied Households (% , n=46)

The data was available for all households on spacing method used for Gmelina plantation. The dominant spacing of Gmelina plantation was 2 x 3 m (66.7%), and 20.7% of the households planted randomly such as shown in the following table.

Spacing Method Used for Gmelina Plantation (n=29)

Spacing	2m x 3 m	Random	2m x 2m	3m x 3m	4m x 8m	Total
# of H.H.	16	5	1	1	1	24
%	66.7	20.7	4.2	4.2	4.2	100

Source: Field Survey conducted during April – May, 2001.

5.4.2 Agroforestry

Fruit bearing trees planted by the studied households on their farm (n=46) are listed in the following table. It was found that mango and banana were the most widely planted fruits. Other fruit bearing trees that are frequently planted included Avocado, Jackfruit, Coconut, Guayabano, Pomelo, Calamansi and Coffee.

Fruit Bearing Trees Planted among the Studied Households (n=46)

Common Name	Scientific Name	# of H.H.	%
Mango	<i>Mangifera indica</i> ,L.	19	18.1
Banana	<i>Musa cocoina</i>	19	18.1
Avocado	<i>Persea Americana</i>	8	7.6
Jackfruit	<i>Artocarpus heterophylus</i>	8	7.6
Coconut	<i>Cocos nucifera</i> , L.	8	7.6
Guayabano	<i>Anona muricola</i> , L.	7	6.7
Pomelo	<i>Citrus maxima</i>	6	5.7
Calamansi	<i>Citrofortenella mitis</i>	6	5.7
Coffee	<i>Coffea rubusta</i>	5	4.8
Orange	<i>Citrus sinensio</i>	4	3.7
Pineapple	<i>Ananas comosus</i>	3	2.8
Rattan	<i>Calamus merrili</i>	3	2.8
Santol	<i>Sandoricum koetjape</i>	2	2.8
Apple	<i>Malus pumila</i>	1	1.0
Lemon	<i>Triphasia guranteola</i>	1	1.0
Tamarind	<i>Tamarindus indica</i>	1	1.0
Siniguelas	<i>Spondias purpuria</i>	1	1.0
Rambutan	<i>Nephelium philippinesis</i>	1	1.0
Tiesa	<i>Pauteria campuchiara</i>	1	1.0
Bamboo	<i>Bambusa vulgaris</i>	1	1.0
Total		105	100

Source: Field Survey conducted during April – May, 2001.

5.5 Lessons Learned

5.5.1 Constraints on Sustainable Forest Management

(1) Fire Control

An effective extension capability should be in place to help generate viable alternatives to slash-and-burn agriculture, and the annual burning of grasslands for pasture. These practices provide subsistence for livestock and are part of the culture, but are clearly not sustainable. Plantation establishment will require sacrifice of short-term benefits in order to create a more stable, long-term source of livelihood. Convincing people to change their production practices is not easy. Therefore, concurrent initiatives will be needed in environmental education and awareness to encourage farmers to adopt sustainable practices considering the future welfare for themselves, their children and the land.

Effective forest protection techniques are essential for success in afforestation and reforestation. Although disease control is also important, the urgency to protect against fire is paramount and cannot be over-emphasized. The principal risks are fires that spread from adjacent slash-and-burn farming or grazing (pasture) areas. It is crucial to prevent invasion of fire from these sources. Countermeasures to address the fire problem include fire prevention and fire fighting. Depending on site-specific conditions that relate to fire occurrence, preventive measures in the Study Area may include: planting fire resistant

trees, establishment of fire breaks, introduction of controlled burning and promotion of self-reliant establishment of the management of the awarded lands.

(2) Constraints on the Restoration of Forest Cover with Plantation

Field reconnaissance, observation and discussions with personnel of PENROs, CENROs and POs have identified several major technical constraints on successful establishment of forest plantations in the Study Area, as discussed below.

- 1) **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 the seeds is very limited at the present time given by the fact that one of the SPAs within the area, SPA at Salinas in Bambang, is not functioning. Major SPA for Yemane, for example, is virtually only in Nagtipunan within the Study Area. Average seed production of Yemane is 10L/Mother tree so that the SPA annual seed production is about 540 litters. There is an average of 400 Yemane seedlings that can be produced from 1 L of seeds so that approximately 216,000 seedlings are likely to be produced in Nagtipunan. Common Yemane planting is 2 × 3 m (1,600 seedlings/ha) so that this SPA has a capacity to produce seeds only for 135 ha of plantation.

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	400	9.7	Outside of the study area
	Yemane	59	2.5	
	Narra	88	2.0	

Source: ERDS, Diadi, Nueva Viscaya

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. Good seeds can be obtained from healthy mother trees in the above listed SPAs. However, collected seeds from these sources are used for seedling production in their own nursery. Production of good quality seeds cannot keep up with demand, especially for *Gmelina arborea* which is the most frequently-planted species.

- 2) **Seedlings that do not comply with standards for out-planting:** DENR standards prescribe pencil-size diameter and 1-1.5 feet 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.

- 3) **Insufficient site preparation:** Usually, strip brushing is applied for site preparation. But often, the strips are less than the recommended width (1 m). Furthermore, grass is not cut 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.
- 4) **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.
- 5) **Planting density and species:** Generally, two by three meter (2×3 m) spacing is observed in the Study Area. However, many plantations are established at 1×1 m spacing. Although planting density depends on management objectives, dense spacing usually produces very poor results. Well timed thinning of the proper frequency accelerate growth and improve 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.
- 6) **Insufficient maintenance:** Maintenance activities such as ring weeding and replanting are standard practices for efficient plantation establishment. Unfortunately, many plantations are deficient in this regard. Additionally, many reforestation and agroforestry targets are prescribed without first determining the number of hectares that have already been planted and need maintenance. This results in plantations that cannot be properly maintained due to lack of funds. For instance, there is no reliable data on how many hectares exist, of what age, and composed of what 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 into furniture or construction, as well as sustaining rural income and improvement of living standards.

5.5.2 Problems Identified by PO Participants

The survey identified problems, which were classified into the following six categories:

- 1) Financial problem due to lack of funds for further plantation establishment and maintenance, resulting in the forest fires;
- 2) Delayed approval on the part of DENR of timber harvesting through Resource Use Plan (RUP), resulting in illegal timber poaching;
- 3) Insufficient community organizing and PO strengthening;

- 4) Lack of livelihood income opportunities within the CBFM area, including delayed payments of contract labor;
- 5) Unfavorable natural conditions such as lack of water supply and unfertile soil for cultivation;
- 6) CBFM administration shortcomings not allowing sufficient geographical coverage under CBFMA, in addition to illicit land taxation on part of LGUs.

5.5.3 Community Organizing (CO) and Strengthening

Community organizing (CO) is considered one of the fundamental elements for successful implementation of the CBFM program. Appropriate CO is a prerequisite for any endeavour to manage the resources therein. Such recognition was shared by a number of interviewed PO managers. For example, managers of Yaway Farmers Multi-Purpose Cooperative claimed that within the Barangay Yaway of 700 inhabitants, only 58 members (8.3%) of the population participated in the Coop²¹.

The organized community should further be strengthened to do some planning including Community Resource Management Framework (CRMF) and to manage a variety of natural resources. Participating members may not be actively involved in the PO activities, or may not prioritize the development of the PO. Hence, various training and educational activities are necessary to strengthen the institution when it is established.

²¹ Personal communication with the first and the former manager of the Coop.

CHAPTER 6 PROPOSED PROTECTED AREAS AND FORESTLAND MANAGEMENT

6.1 Land Use Plan

6.1.1 Criteria Adopted in 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 an ecologically compatible land use plan, which attains 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 vital roles in planning, and the following criteria have been employed in this Study.

(1) NIPAS policy for protected areas: NIPAS Act of 1992

- Areas more than 1,000 m or
- Areas with slope above 50% or
- Areas covered with virgin forest (old growth and mossy forest)

(2) Slope category with potential erosion: Department of Agriculture, Bureau of Soils in the Philippines

- Below 18% : slight erosion
- 18 to 30% : moderate erosion
- 30 to 50% : severe erosion
- Above 50% : very severe erosion

(3) Main categories in the present land classification with vegetation and land use patterns

- Old growth (mossy forest)
- Sub-marginal Forest
- Residual Forest
- Reproduction Brush
- Grass Land
- Agricultural Land

(4) Agricultural land

- Secure sufficient size of land for the future agricultural use predicted by population growth by 2015 (approximately 120% of present agricultural land: 65,000 ha)

(5) Grazing land

- Secure a minimum of 50,000 ha for the use of grazing (silvopastoral) as indicated in the Regional Physical Framework Plan

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 have not yet been clearly identified in most of the Study Area. Therefore, such areas are delineated in this M/P (see the following section).

There are some areas that have been proposed for Protected Areas in Ifugao and Nueva Vizcaya. However, much of these locations/borders are left unclear so that it was assumed that these areas fall into the area under the NIPAS policy. Consequently, currently proposed areas for Protected Areas should be incorporated into the Protected Areas proposed in the M/P.

Important criteria also adopted in this M/P are a slope category with potential erosion defined by the Bureau of Soils in the Philippines. Land use patterns should differ with different slope gradient due to changes in the level of erosion. The steeper the slope, the range of activities is more limited to attain ecological sustainability in the use of land.

Existing vegetative composition and land use patterns are also used as criteria in land use planning of the M/P. Virgin forest should be left intact mainly with a purpose of conserving biodiversity, soil and water resources. Degraded part of residual forest, reproduction brush and grass land with a high potential of severe erosion should be rehabilitated with vegetative measures. Agricultural land on steep slopes (> 50%) should be reforested to reduce erosion while areas with less than 18% in slope can be utilized for production (i.e. agroforestry and agriculture).

Other criteria adopted in this study are the size of agricultural land and grazing area. Those areas are important in supporting livelihood of local people. Therefore, future land allocation for those uses should satisfy a minimum requirement.

6.1.2 Main Concept of the Land Classification in the M/P

(1) Application of the NIPAS Policy in the M/P

The Study Area is generally classified into four categories: (i) Protected Areas, (ii) Forestland, (iii) Civil Reservation and (iv) A & D (**Section 3.3.2**). This land classification is reviewed according to the NIPAS policy in this M/P. Rules and regulations stipulated in the Act on the establishment of Protected Areas are applied throughout the Study Area to attain a sustainable form of future land use. Therefore, the areas that are categorized under the NIPAS policy has been clearly identified (**Figure 4.6.2, Vol. I**), and the present land classification with Protected Areas and Forestland has been largely modified in this M/P. On the other hand, the current classification described in **Section 3.3.2** remains consistent with the Civil Reservation and A & D. It was found that the areas under the NIPAS policy make an aggregated area of 347,701 ha in total, which is approximately four times larger than that of the present size (89,067 ha). The following section describes the delineation of the proposed Protected Areas.

(2) Delineation of the Proposed Protected Areas

Further to the areas under the NIPAS policy described in the previous section (**Figure 4.6.2, Vol. I**), the areas have been consolidated and the borders have also been clearly delineated for future land protection as Protected Areas (**Figure 8.1.1, Vol. I**). It would not be practical if scattered and isolated virgin forests are to be managed with rules and regulations stipulated in the NIPAS Act, because PAMB needs to be established for the management of those forests.

Overall process of developing the proposed patterns of land classification is illustrated in the following chart. Present size of Civil Reservation and A & D remain the current condition. The present coverage by the Protected Areas will be enlarged for about four times. On the other hand, the size of Forestland is to be reduced by 45%.

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)

Delineation of the proposed Protected Areas was performed using GIS with a cell size of 900 × 900 m (1 cell = 81 ha) excluding a sequenced block less than a total size of 405 ha (5 consecutive cells). Scattered and isolated patches of areas under the NIPAS policy less than about 400 ha in total have been excluded from the proposed Protected Areas in this analysis. Therefore, relatively larger patches of vegetation and areas under the NIPAS policy have been consolidated and that those areas can be managed effectively and efficiently.

(3) Land Use and Vegetation with the Proposed Protected Areas

The following table shows present land use and vegetation patterns of the proposed Protected Areas with different slope categories within the Study Area. New land use patterns are proposed in the subsequent section of this report.

Land Use and Vegetation Type of the Proposed Protected Areas within the Study Area

Category	< 18%	18 – 30%	30 – 50%	> 50%	Total
1. Old Growth Forest	11,464	22,677	44,659	46,850	125,650
2. Mossy Forest	369	743	1,921	4,127	7,160
3. Residual Forest	10,497	21,066	43,986	53,172	128,721

Category	< 18%	18 – 30%	30 – 50%	> 50%	Total
4. Sub-marginal Forest	561	1,121	2,906	3,981	8,569
5. Pine Forest	24	51	153	310	538
6. Reproduction Brush	3,806	6,671	12,962	16,120	39,559
7. Other Plantation	133	231	372	300	1,036
8. Grass Land	2,449	3,659	6,869	9,014	21,991
9. Agricultural Land	1,743	2,378	4,252	5,231	13,604
10. Bare/Rocky Land	528	366	532	525	1,951
11. Built-up Area	0	0	0	1	1
12. Waterbody	28	12	16	19	75
13. Unidentified	11	37	49	60	157
Total	31,613	59,012	118,677	139,710	349,012

Source: JICA Study Team

(4) Land Use and Vegetation with the Proposed Forestland

Forestland in this M/P covers the area besides the above proposed Protected Areas, Civil Reservation and A & D, which promotes sustainable use of natural resources (**Figure, 8.1.1, Vol. I**). However, some patches of old growth and mossy forest that fall into the protection under the NIPAS policy are scattered in the Forestland and that those forests should be managed properly. It is, therefore, proposed that those forests be devolved and protected mainly by appropriate local governments (LGU). This management framework is further discussed in **Section 6.2.4**.

Land Use and Vegetation Type of the Proposed Forestland within the Study Area

Category	< 18%	18 – 30%	30 – 50%	> 50%	Total
1. Old Growth Forest	3,946	6,314	8,903	3,144	22,307
2. Mossy Forest	10	9	18	23	60
3. Residual Forest	18,375	27,065	33,126	9,642	88,208
4. Sub-marginal Forest	3,367	4,217	5,141	1,967	14,692
5. Pine Forest	28	25	35	15	103
6. Reproduction Brush	11,032	13,586	15,294	4,496	44,408
7. Other Plantation	3,016	2,923	2,383	437	8,759
8. Grass Land	28,812	22,241	23,880	8,025	82,958
9. Agricultural Land	17,003	10,212	9,559	3,399	40,173
10. Bare/Rocky Land	4,871	2,348	1,940	562	9,721
11. Built-up Area	0	0	2	1	3
12. Waterbody	105	27	23	13	168
13. Unidentified	0	0	1	0	1
Total	90,567	88,967	100,304	31,723	311,561

Source: JICA Study Team

Buffer Zone should also be established for a width of 100 m into the Forestland along the border of the proposed Protected Areas. This zone is to provide extra layer of protection adjacent to the Protected Areas while also to provide livelihood opportunities based on sustainable resource utilization.

(5) Proposed Land Use and Vegetation with the M/P

New land use pattern is proposed in this M/P with the concept of watershed management. Within the Protected Areas, conservation of the land is focused, and sustainable use of natural resources is the main concern in the Forestland. The following tables show

conversions of present and proposed land use patterns with slope gradients for the Protected Areas and Forestland. Proposed land use pattern is illustrated in **Figure 8.1.2, Vol. I**.

Proposed Land Use and Vegetation of the Proposed Protected Areas

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

Source: JICA Study Team (size of area is rounded for the third digit number)

Proposed Land Use and Vegetation of the Proposed Forestland

Present Land Use & Vegetation	Slope (%)	Proposed Land Use & Vegetation	Size (ha)
1. Old Growth Forest	All	Old Growth Forest	22,300
2. Mossy Forest	All	Mossy Forest	100
3. Residual Forest	All	Residual Forest	88,200
4. Sub-marginal Forest	All	Sub-marginal Forest	14,700
5. Pine Forest	All	Pine Forest	100
6. Reproduction Brush	> 50	Man Made Forest	4,500
	30 – 50	Man Made Forest	15,300
	18 – 30	Agroforestry	136,00
	< 18	Silvopastoral	11,000
7. Other Plantation	All	Other Plantation	8,800
8. Grass Land	> 50	Man Made Forest	8,000
	30 – 50	Silvopastoral	23,900
	18 – 30	Silvopastoral	22,200
	< 18	Agricultural Land	28,800
9. Agricultural Land	> 50	Man Made Forest	3,400
	30 – 50	Agroforestry	9,600
	18 – 30	Agricultural Land	10,200
	< 18	Agricultural Land	17,000

Source: JICA Study Team (size of area is rounded for the third digit number)

The following table summarizes proposed land use patterns in the Study Area, which is also shown in **Figure 8.1.3, Vol. I**. A total size of area for agricultural use is 66,300 ha,

and silvopastoral area secures 57,100 ha for the use of grazing. These figures fulfill the given criteria (**Section 6.1.1**) for the land use planning.

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
1. Old Growth Forest	125,700	22,300
2. Mossy Forest	7,200	100
3. Residual Forest	128,700	88,200
4. Sub-marginal Forest	8,600	14,700
5. Pine Forest	500	100
6. Reproduction Brush	8,000	0
7. Other Plantation	1,000	8,800
8. Agricultural Land	10,300	56,000
9. Man Made Forest	46,400	31,200
10. Agroforestry	10,500	23,200
11. Silvopastoral	0	57,100

Source: JICA Study Team (size of area is rounded for the third digit number)

6.2 Management Options in the Proposed Protected Area and Forestland

6.2.1 Overall Management Plan

(1) Main Approach

Main approach of the overall management plan in this M/P is to maintain an adequate balance between conservation and the use of natural resources in the watershed. Overall land management practice that is proposed in the M/P is based on the following principles.

- Existing virgin forests have significant conservation values,
- The main function of the forest is to conserve water resources and reduce a level of soil erosion,
- To maintain/restore the above forest functions, ecological condition of the degraded residual forests and grass land should be rehabilitated with vegetative measures including reforestation/agroforestry practice,
- Making a contribution to stabilize livelihood of local inhabitants with appropriate forestry related activities.

The following section describes possible management activities for different land categories with various slope gradients in the proposed Protected Area and proposed Forestland.

(2) Management Activities in the Proposed Protected Area

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

Virgin forests such as old growth and mossy forest should be strictly protected in the proposed Protected Area. Therefore, there is no harvesting activities or vegetative measures to be applied, and the main management activity in these forests is patrolling to prevent from illegal logging and fires.

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

2) Residual forest

Similar to the above category, residual forest plays ecologically important roles so that it should be protected. In case this type of forest is degraded to some extent, Forest Stand Improvement (FSI) including enrichment planting and supplementary planting with native species of trees are the management options. This technique is to rehabilitate natural condition of the forest and not to produce timber products.

3) Reproduction brush

Rehabilitation should be focused as a management activity in this area. Reforestation should be employed in the steeper portion (more than 30%) of this area. Assisted Natural Regeneration (ANR) should also be applied for the reproduction brush with over 50% slope in the Protected Area with a purpose of minimizing human intervention while it is not suggested in the reproduction brush of the Forestland. The areas with less than 30% slope should be vegetated with trees mainly with increasing water holding capacity and reduction of erosion by means of agroforestry.

4) Grass land

Management activities for the grass land are similar to those for the reproduction brush. There is a choice of agroforestry and agriculture between the slope of 18 to 30%. This is largely dependent upon a type of crop for demand.

5) Agricultural land

Agricultural lands exist even in many parts of the currently proclaimed Protected Areas at present time. These areas should be reforested according to the NIPAS Act, and those areas on steep slopes (more than 30%) should be reforested. However, agricultural lands located on the slopes less than 30% can be maintained. It is proposed that agricultural lands within the Protected Area be classified as multiple-use zones of the Park and not to be enlarged. Application of soil and water conservation measures is also encouraged.

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

Management option in the proposed Protected Areas is summarized with different slope gradients in the following table.

Summary of Management Options in the Proposed Protected Areas with Different Slope Gradients

Land Use & Vegetation	Slope < 18%	18% < Slope < 30%	30% < Slope < 50%	Slope > 50%
1. Old Growth Forest	- Nat. Regeneration - No harvesting - Patrolling	- Nat. Regeneration - No harvesting - Patrolling	- Nat. Regeneration - No harvesting - Patrolling	- Nat. Regeneration - No harvesting - Patrolling
2. Mossy Forest	- Nat. Regeneration - No harvesting - Patrolling	- Nat. Regeneration - No harvesting - Patrolling	- Nat. Regeneration - No harvesting - Patrolling	- Nat. Regeneration - No harvesting - Patrolling
3. Residual Forest	- FSI ¹⁾ - Controlled NTFP ²⁾ with CBFM	- FSI - Controlled NTFP with CBFM	- FSI - No harvesting	- Nat. Regeneration - No harvesting - Patrolling
4. Sub-marginal Forest	- Nat. Regeneration - No harvesting	- Nat. Regeneration - No harvesting	- Nat. Regeneration - No harvesting	- Nat. Regeneration - No harvesting
5. Reproduction on Brush	- Agroforestry	- Agroforestry	- Reforestation - Controlled extraction with CBFM	- Reforestation - ANR ³⁾ - Controlled extraction with CBFM
6. Grass Land	- Agriculture	- Agriculture	- Reforestation - Controlled extraction with CBFM	- Reforestation - Controlled extraction with CBFM
7. Agricultural Land	- Maintain present activities	- Maintain present activities	- Reforestation - Controlled extraction with CBFM	- Reforestation - Controlled extraction with CBFM

1) FSI: Forest Stand Improvement

2) NTFP: Non Timber Forest Product including rattan, honey and vine

3) ANR: Assisted Natural Regeneration

Source: JICA Study Team

(3) Management Activities in the Proposed Forestland

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

Virgin forests such as old growth and mossy forest located outside the Protected Areas are rather isolated and scattered in the Forestland. Management options for these forests are basically consistent with those of Protected Areas. The virgin forests should be strictly protected even located in the Forestland, but Non Timber Forest Product (NTFP) is permitted under CBFM except the areas over 50% in slope. Sub-marginal forest is treated as a natural forest so that this type of forest should also be protected accordingly.

2) Residual forest

Forests fall into this category should be rehabilitated with the application of Timber Stand Improvement (TSI). This technique is to assist the growth of valuable trees for production. Controlled forest extraction should be permitted in this type of forest.

3) Reproduction brush

Reforestation should be applied in the areas with more than 50% slope within this category, but ANR is not applied unlike the reproduction brush in the Protected Area. The areas less than 50% slope should be vegetated with trees by means of agroforestry.

4) Grass land

Grass land in the proposed Forestland can be used for multiple purposes with different slope gradients. Upper portion of the area with more than 50% slope should be reforested, but the area with a slope between 30 to 50% can be used for agroforestry and/or silvopastoral purposes. Similarly, the area below 18% slope may be used for silvopastoral and/or agricultural purposes. Choice of management options largely depends on management goals.

5) Agricultural land

Similar to the agricultural lands in the Protected Area, agriculture on the areas with a slope less than 30% will be maintained and other areas should be reforested. Conservation measures should be introduced into the agricultural activities.

6) Summary of the management options in the Forestland

Management option in the proposed Forestland is summarized with different slope gradients in the following table.

Summary of Management Options in the Proposed Forestland with Different Slope Gradients

Land Use & Vegetation	Slope < 18%	18% < Slope < 30%	30% < Slope < 50%	Slope > 50%
1. Old Growth Forest	- Nat. Regeneration - Controlled NTFP ¹⁾ - Patrolling	- Nat. Regeneration - Controlled NTFP - Patrolling	- Nat. Regeneration - Controlled NTFP - Patrolling	- Nat. Regeneration - No harvesting - Patrolling
2. Mossy Forest	- Nat. Regeneration - Controlled NTFP - Patrolling	- Nat. Regeneration - Controlled NTFP - Patrolling	- Nat. Regeneration - Controlled NTFP - Patrolling	- Nat. Regeneration - No harvesting - Patrolling
3. Residual Forest	- TSI ²⁾ - Controlled extraction	- TSI - Controlled extraction	- TSI - Controlled extraction	- Nat. Regeneration - Controlled extraction - Patrolling
4. Sub-marginal Forest	- Nat. Regeneration - Controlled NTFP	- Nat. Regeneration - Controlled NTFP	- Nat. Regeneration - Controlled NTFP	- Nat. Regeneration - Controlled NTFP
5. Reproduction Brush	- Silvopastoral	- Agroforestry	- Reforestation - Controlled extraction	- Reforestation - Controlled extraction
6. Grass Land	- Agriculture	- Silvopastoral	- Silvopastoral	- Reforestation - Controlled extraction
7. Agricultural Land	- Maintain present activities	- Maintain present activities	- Agroforestry	- Reforestation - Controlled extraction

1) NTFP: Non Timber Forest Product

2) TSI: Timber Stand Improvement

Source: JICA Study Team

6.2.2 Rehabilitation and Restoration Plan

(1) Applicable Measures

Rehabilitation and restoration plan as forest management 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
- Silvopastoral: ecologically compatible silvi-pasture, 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

Rehabilitation and restoration plan is applicable for the residual forest (less than 50% slope), reproduction brush, grass land and agricultural land (more than 30% slope). Management activity for the old growth, mossy forest and residual forest with more than 50% slope is natural regeneration while current agricultural activities are to be maintained in the agricultural lands with less than 30% slope. Therefore, these areas are not included in rehabilitation and restoration planning. The following table shows an applicable area for each management action with different slope gradients in the proposed Protected Areas.

Area for Rehabilitation in the Proposed Protected Areas

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

1) ANR: Assisted Natural Regeneration, 3% of the total area of ANR is applicable.

Source: JICA Study Team

Main part of the rehabilitation plan in the Protected Area is reforestation. Steeper areas of the reproduction brush, grass land and agricultural land should be reforested. However, ecological approach should be taken in this area and that 50% of the reproduction brush with more than 50% slope should be regenerated with ANR. Some native trees often disperse and regenerate naturally especially in that part of the Protected Area. Therefore, regenerating young trees should be treated with a minimum human care in a given ecosystem so that part of the reproduction brush can be altered with natural process.

(3) Rehabilitation Activities in the Proposed Forestland

Similar to the management activities in the proposed Protected Area, 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). Old growth, mossy forest and residual forest with more than 50% slope are to be reforested by means of natural regeneration while current agricultural activities can be maintained in the agricultural lands with less than 30% slope. The following table shows an applicable area for each management activity with different slope gradients in the proposed Forestland.

Area for Rehabilitation in the Proposed Forestland

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

1) ANR: Assisted Natural Regeneration, 3% of the total area of ANR is applicable.

Source: JICA Study Team

Dominant activity in the rehabilitation plan for the proposed Forestland is silvopastoral practice followed by reforestation and agroforestry. Rehabilitation activities that can also support local livelihood are encouraged in the Forestland. Therefore, the size of area for agroforestry is also much larger than that of the Protected Area.

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

A total of 181,000 ha of the Study Area is subject to rehabilitation in the M/P (see the following table). Of which, about 40% of the rehabilitation activity takes place in the proposed Protected Area and 60% of which is to 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 Area	Proposed Forestland
1. ANR ¹⁾	8,000	0
2. FSI ²⁾	2,100	0
3. TSI ³⁾	0	2,500
2. Reforestation	46,400	31,200
3. Agroforestry	10,500	23,200
4. Silvopastoral	0	57,100
Total	67,000	114,100

ANR: Assisted Natural Regeneration, FSI: Forest Stand Improvement

TSI: Tree Stand Improvement

Source: JICA Study Team

6.2.3 Technical Operations

(1) Seed Production

To implement reforestation of 77,600 ha by the year 2015 in the Study Area, it is unlikely that the current seed production at Seed Production Area (SPA) is sufficient, particularly for highly demanded species like Yemane (*Gmelina arborea*). It is inevitable that sufficient amount of good quality seeds be secured for enough supply of seedlings. Although seeds should be collected at the Seed Production Area (SPA) according to the forestry standards in the Philippines, capacity of the seed production at the SPAs in the Study Area is not sufficient currently. Therefore, the following countermeasures are proposed:

- Identify exiting plantations including good mother trees as sources of seed supply
- Monitor and provide information of above plantations
- Strengthen seed supply capacity of SPA
- Improve techniques of seed storage at SPA

(2) Seedling Production in Nursery

For effective planting with sufficient supply of seedlings, it is proposed that flying nurseries be established. This type of nursery is only for a temporary use, usually less than five years, and it should be located near planting sites and water supply.

Flying nursery required for the duration of the project was estimated at 268 flying nurseries for planting with CBFM and 120 nurseries for Non-CBFM projects (the following table). A typical small-sized nursery of 500 to 600 m², producing 100,000 seedlings has been used as a basis for this estimate. The size of area for planting each year was predicted with the number of new POs as presented in **Sections 6.3.3** and **6.3.4**.

The Number of Flying Nursery Required for CBFM and Non-CBFM Schemes

Planting Duration	CBFM			Non-CBFM		
	1 - 4	5 - 8	9 - 12	1 - 4	5 - 8	9 - 12
Area for planting (ha)	12,000	17,800	24,000	8,000	8,000	8,000
Seedlings Required	23,550,850	35,458,584	48,160,166	15,800,544	15,800,544	15,808,512
Annual Seed Requi.	5,887,713	8,864,646	12,040,041	3,950,136	3,950,136	3,952,128
No. of Nursery Requi.	59	89	120	40	40	40

Seedlings having a high survival rate after planting are produced with well-managed nursery operation with an enough nursing duration. Production process of seedlings should be monitored systematically. Extension service can also play a key role in developing an adequate management system.

(3) Choice of Tree Species and Planting Methods

As presented in **Section 4.6**, Yemane is generally accepted and most extensively planted tree species for plantation throughout the Study Area. However, socio-economic conditions such as access roads to plantation sites and marketability of the trees are also important factors to be considered in addition to the natural conditions for a tree species to grow. Tree species that are commonly planted in the Study Area is listed in **Table 4.6.1** and that most locally demanded and appropriate tree species should be selected from the list.

For the planting of trees, mixed planting is also encouraged. Mono-cultural forest is susceptible to diseases and vulnerable to other natural disasters so that mixed planting with fast-growing and slow growing species should be selected. For example, Yemane is a representative fast-growing species and Mahogany (*Swietenia macrophylla*) and Narra (*Pterocarpus indicus*) can be planted subsequently as slow-growing species. Furthermore, under-planting wildlings of endemic species such as shade-tolerant trees (i.e. Dipterocarp spp.) is also recommended.

For silvopastoral practice, it is proposed that grass species such as Centro (*Centrosema pubescens*) and Stylo (*Stylosanthes guyanensis*) be planted as pasture improvement, which are better suited as fodder for cattle compared with current vegetation such as Cogon and Themeda. Furthermore, leguminous fodder species such as Kakawate (*Gliricidea sepium*) and Ipil-ipil (*Leucaena leucocephala*) should also be planted. Contour hedgerow planting with those species particularly on steep slopes is recommended. Establishment of fodder banks by planting the fodder trees throughout a pasture area is also planned so that cut-and-carry can be practiced. Moreover, making living fences with the fodder species enclosing relatively small scale grazing areas is practical.

Mango is the major tree to be planted for agroforestry purposes. It is usually planted at 10 × 10 m spacing with other fruit trees such as papaya. Mixed plantation is encouraged, and Kakawate can also be planted as an agroforestry practice.

For planting activities in reforestation and agroforestry practice, it is planned that small-scale footpath or trail with a density of about 50 m/ha be constructed. These types of access can be utilized for maintenance and patrolling as well.

(4) Tending

Silvicultural treatment is well documented in the Philippine Forestry Standards (**Section 4.6.1**), 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 are the main treatment activities after the above intensive treatment. Pruning is to remove nuisance branches no matter dead or alive. Main objective of the thinning is to eliminate inferior trees to encourage proper growth of the economically viable trees. Thinning is usually conducted at a proper age of forest: usually 5 to 10 years for fast growing species, 20 years for medium- and slow growing species.

(5) Harvesting Methods

Trees in man made forests especially in the Forestland are to be harvested. From a viewpoint of watershed management with minimizing environmental impacts, the following harvesting methods are planned in this M/P:

- Selective cutting: This method is to cut only selected trees for particular purposes. The method includes harvesting only economically viable trees. This method involves less disturbance to a given forest ecosystem compared with clear cutting.
- Small-area harvesting: This method is to minimize environmental impact in a given forest ecosystem compared with conventional clear cutting in a relatively large area. This harvesting method is to cut trees in a small patch of area (e.g. 1 ha or less). There is a restriction that an adjacent patch of forest should not be harvested until previously harvested areas recover.

Forest Stand Improvement (FSI) and Tree Stand Improvement (TSI) involves tree extraction although these are not considered as harvesting methods. This method is to remove only inferior trees hampering natural growth so that natural regeneration is encouraged. It should be applied, particularly for the residual forests in the Protected Areas. The main difference between TSI and FSI is that FSI mainly supports natural regeneration while TSI eliminates trees hampering the growth of economically valuable trees.

(6) Fire Protection

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. As a result, forests particularly man made forest are burnt. The following management options are available at present time.

- Controlled burning: Fires should be practiced in a small scale and strictly controlled. For example, fire lines eliminating ground vegetation are to be established enclosing intended areas for burning.
- Firebreak: Vegetative barriers planting fire tolerant tree species (e.g. *Leucaena leucocephala*, *Gmelina arborea*, *Terminalia catappa*) along the mountain ridges. The width of the firebreak is generally about 10 m down to each side of the ridge.
- Fire line: Removing all vegetation for a width of 10 -15 m so that no fire can pass through this line.
- Extension service: Further to the above technical approach, promoting awareness on the importance of the fire control by the local people is critical. Therefore, extension service advertising benefit from the fire prevention should be provided to local farmers. On the other hand, consequences of the proposed status of the natural environment driven from the current farming practice with fires should also be demonstrated so that they will have a better understanding on sustainability of the land.

- Lookout tower: It is planned that a lookout tower be constructed in about every 200 ha of plantation/agroforestry area. Presence of fire should be monitored by patrolling particularly in the dry season.
- Pasture management without fire: Improve pasture condition with grass species such as centro (*Centrosema pubescens*) and stylo (*Stylosanthes guyanensis*).
- No-fire Bonus Scheme: This scheme currently exists with DENR, granting annual rate of about ₱ 150/ha to a PO that has not had a fire within a plantation throughout a whole year. This is a durable scheme and should be maintained.

6.2.4 Institutional Framework and Responsible Bodies

The Study Area has been largely classified into the proposed Protected Area and Forestland. DENR is a government agency that is responsible for the general supervision over the management of natural resources in both areas by providing technical and administrative assistance. This management framework over the Study Area should be maintained in a long run. The following table summarizes responsible bodies for different management activities. For example, technical standards of forestry have been issued and various permits for different tenurial instruments are to be granted by DENR.

**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⁾	-	-	-	-	-	

⊙: Acting/main body for management/implementation

○: Supporting body for technical and/or administrative assistance

1): DAR and DA

2): DAR

CBFM projects including reforestation and agroforestry are implemented with POs. Technical and administrative support is provided by DENR, but POs are the main decision-making body for the activities of CBFM projects.

Protected Areas are managed under the administration of DENR. However, PAMB plays a main role in the management of the Park in association with DENR (Region, PENRO and CENRO). The Protected Areas are to be divided into different zones, which need to be approved by PAMB. CBFM can be introduced only into the buffer zone and multiple-use zone of the Park, and a local PO should play a key role in the CBFM.

Some parts of the Protected Areas are overlapped with CADC areas, and NCIP prevails over DENR's jurisdiction in such areas. However, thorough discussions between the two agencies should be made to attain legislative arrangements in order to secure practical management strategies.

Virgin forests such as old growth and mossy forest should be protected as part of the Protected Areas, but some of the patches of such forest also exist in the Forestland (**Section 6.1.3**). These forests are often numerous, small in size and scattered so that a locally based management system is more relevant as oppose to be covered under the management of PAMB. Therefore, it is proposed that the virgin forests located in the Forestland be devolved to LGUs. Various kinds of forestry related activities are allowed in the Forestland (see above table), but such forests be mainly managed by LGUs with locally based conditions and needs. Preparation of a management plan for such areas by LGUs is highly recommended (i.e. Barobbob Watershed Management Plan).

CSC and TFL are implemented by individual basis with appropriate permits from DENR so that responsible people make their own decisions to plant trees. On the other hand, FLGMA and SIFMA can be implemented by individual people and/or associations (firm/company), possibly by POs as well in the case of FLGMA. Therefore, responsible bodies for those activities vary with a type of project.

DENR is an acting body in the management of mining areas. Philippine Mining Act (RA 7942) states that all mineral resources in public and private lands may be opened with mineral agreements and financial and technical assistance agreements (FTAA). There are some overlaps between areas for mineral interests with other administrative areas such as NIPAS and CADC so that DENR has to coordinate with agencies like PAMB and NCIP.

Land classification in the resettlement area (e.g. Conwat Valley) still needs to be reclassified by DENR, but 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 project that are implemented by different agencies. NIA and NAPOCOR have been running reforestation projects with an agreement with DENR.

6.2.5 Required Legislative Arrangement

Within the framework of the management by DENR over the Study Area, some legislative arrangement is necessary for a smooth operation of the watershed management as a whole. It is suggested that the following legislative arrangements be made:

- Devolution to LGU on the management of the virgin forests (old growth and mossy forest) located in the Forestland
- Streamlining legislation on land title or land tenure that have been already granted by other government agencies (i.e. CLOA by DAR, CADC/CALC of NCIP)

- Administrative and legislative arrangement for mining interest areas, NIPAS areas and CADC.

Legislative arrangement is necessary for the process of CBFM as well. At PENRO and CENRO level, additional staff is necessary to manage CBFM projects. However, it is difficult to employ new staff so that personnel from different sections should be transferred and trained for the purpose of the management of CBFM projects.

In addition to strengthening DENR by allocating more staff to CBFM section, administrative process of CRMF, AWP and RUP should also be streamlined. The whole process should be accelerated for a smooth implementation of the CBFM projects.

CHAPTER 7 RECOMMENDATIONS

7.1 Technical Recommendations

Technical recommendations made in this M/P are summarized as follows:

(1) Land Use

- Current land use patterns should be reclassified using the criteria such as (i) NIPAS Policy, (ii) slope category, (iii) Present land classification, (iv) minimum size of agricultural land required to support future population and (v) minimum size of grazing land stipulated in the Regional Physical Framework Plan.
- Reclassification of the land for the proposed Protected Area of 349,010 ha and proposed Forestland of 311,562 ha.
- Virgin forests including old growth, mossy forest, residual forest and sub-marginal forest should be protected.
- Reproduction brush should be rehabilitated with reforestation, ANR and agroforestry practice in the Protected Area.
- Reproduction brush should be rehabilitated with reforestation, agroforestry and silvopastoral practices in the Forestland.
- Grass land should be rehabilitated with reforestation in the Protected Area.
- Grass land should be rehabilitated with reforestation and silvopastoral practice in the Forestland.
- Agricultural land on steep slopes should be turned into man made forest.

(2) Forest Management

- Seed supply with SPA is limited so that additional good mother trees should be identified and supplementary seeds should be collected.
- Improve techniques of seed storage at SPA.
- Establishment of flying nurseries near planting sites and water supply.
- Mixed planting with Yemane (*Gmelina arborea*), Mahogany (*Swietenia macrophylla*) and Narra (*Pterocarpus indicus*) is suggested.
- For silvopastoral practice, planting leguminous fodder species such as Kakauate (*Gliricidea sepium*) and Giant ipil-ipil (*Leucaena leucocephala*) is suggested.
- Selective cutting and small scale harvesting are suggested as tree harvesting methods.
- Forest fires should be prevented with the introduction of controlled burning (i.e. *kaingin*), firebreaks and monitoring fires with the establishment of lookout towers.
- Extension services should be strengthened.

7.2 Administrative Recommendations

Administrative recommendations made in this M/P are summarized as follows:

(1) Administrative Framework

- In terms of the Protected Area and Forestland management, DENR should play an overall management body giving technical assistance and granting various tenurial permits (CSC, TFL, FLGMA, SIFMA and IFMA).
- For CBFM projects, technical and administrative support is provided by DENR, but POs are the main decision-making body for the activities of CBFM.
- PAMB should play a main role in the management of the Protected Area, and should formulate a durable management plan.
- For the areas where the Park and CADC are overlapped, NCIP prevails over DENR's jurisdiction (PAMB) and close cooperation is required between the two agencies.

(2) Legislative Arrangement

- The management of virgin forests (old growth and mossy forest) in the Forestland should be devolved to LGUs.
- Streamlining legislation on land title or land tenure that have been already granted by other government agencies (i.e. CLOA by DAR, CADC/CALC of NCIP).
- DENR should be strengthened by allocating more staff to CBFM Section.
- Administrative process of CRMRF, AWP and RUP should be streamlined so that the whole CBFM process could be accelerated for a smooth implementation.

Tables

Table 2.1.1 Rainfall Stations in the Study Area

Station	Total Rainfall/Year	R Factor
1 Ilagan	2048.6	1018.5
2 Banga-An	2196.6	1048.3
3 Bntoc	2141.7	1068.8
4 Barlig	3197.5	1532.0
5 Bauko	2128.5	1010.5
6 Mt. Polis, Banague	4135.0	2032.3
7 Mt. Data, Benguet	3276.0	1716.9
8 Lagawe	3050.5	1437.5
9 Nayon, Lamut	1908.4	912.2
10 Echague	1645.8	811.2
11 Barat, Bambang	2008.3	951.6
12 Consuelo, Sta. Fe	2282.7	1166.9
13 Gabong	1727.5	850.8
14 Dakgan	1622.2	884.9
15 Casiguran	3434.6	1801.7
16 Hapid, Lamut	1594.0	762.3
17 Baretbet (Dumayup)	1784.1	852.6
18 Baligatan	1742.8	794.1
19 Poblacion Lagawe	2044.6	984.8
20 Sto. Domingo	1464.8	708.6

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

Table 3.2.1 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 3.2.2 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 3.2.3 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 4.1.1 Protected Areas under NIPAS in the Study Area

Name	Remark
1. Bangan Hill National Park	<p>Background: This park is designed as a protected landscape for its cultural significance, unique features and diversity of resources and land use. This area was proclaimed as a protected area under the category of “Protected Landscape.”</p> <p>General Feature: Thirty six households occupy lands within the Protected Area. Apart from the provincial government and Non-Government Organizations effort in restoring the vegetation of Bangan Hill, the Nueva Vizcaya State Institute of Technology (NVSIT) also undertakes and implements research and projects within the protected area. Most of the work is geared toward Bamboo and Gmelina plantation establishment, Grow a Tree Project of Forestry Students, Dipterocarp Clonal Plantation, Agroforestry Demonstration Farm including an already established plantation of Mulberry (<i>Morus alba</i>) that supports the Institute’s sericulture project.</p> <p>Wildlife Species: Dominant species of vegetation is a grass species (<i>Imperata cylindrica</i>). There is a record of 43 plant species within the aream, and Gmelina (<i>G. arborea</i>), Teak (<i>Tectona grandis</i>) and Narra (<i>P. indicus</i>) are commonly planted. Butterflies are common, but mammalian species are relatively rare.</p> <p>Management: Key management issues and the management objectives are to be accomplished mainly with the following tow interrelated components of the management plan.</p> <p>1. Proposed: Bangan Hill Information System (BHIS) This component consolidates and update characteristics of protected area. These include data on flora and fauna, land use dynamics, physiographic profiles of the communities and different stakeholders within the area. The BHIS is to include Geographic Information System (GIS) which aims to develop an automated computer-based information system for cartographic and attribute data using spatial analysis. Multi-thematic maps is to digitize and integrated into a resource database system to answer queries regarding spatial and non-spatial entities in the database.</p> <p>2. Proposed: Bangan Hill Area Development (BHAD) This component aims to develop a holistic and comprehensive management plan using a multi and interdisciplinary approach. This component shall involve a series of consultation with different sectors that are affected by any kind of development in the area.</p> <p>Current Condition: Before the proclamation of NIPAS, the area was repeatedly burned but regeneration of vegetation is underway after the proclamation. Vegetative cover is quickly recovering with protection, and local residence is planting mainly fruit trees.</p>
2. Casecnan Protected Landscape	<p>Background: Approximately 43,818 ha (51.4 %) of the total area of 85,219 ha (88,846.8 ha based on the proclamation) is forest land, and the area still holds diversity of wild fauna and flora. It has been identified that the area holding important values as a source of water for agriculture and other purposes.</p> <p>General Feature: Annual rainfall ranges from 1,400 to 2,400 mm. Forest of the reserve is dominated by dipterocarp species such as white lauan, red lauan, mayapis under the Philippine Mahogany, Guijo and Apitong groups.</p>

Name	Remark
	<p>Wildlife Species: (Flora) Tree: Almaciga, anabuiong, ipil, kabuyaw, pine tree, red lauan, balite, rambutan, bagtican, bignai, pugo, molave, narra, kalantas, malabayabas, ilang-ilang, guiyo, kamagong, tanguile, tuai, palosapis, takip-asim, bulong-eta, white lauan, yakal. Herbs: amorseco, runo, tiger grass, kiling, giant fern, napier, bikal, cogon, ganglad, fern, bulo, Tsaang gubat, Orchids: tiger, vanda, markey trail, kuarto kantos, pitcher, pak-pak lawin. Vines: liana, lugo Palm: rattan, buri, anahaw, sabutan, pugahan, betel nut. Medicinal Plants: pandan, tsaang-gubat, sabuta (Fauna) Mammals: monkey, deer, wild cat, rats, wild pig, bats Birds: Philippine eagle, tariktik, bolajo, falcon, maya, balilising, kilgawen, kingfisher, wild chicken, balog Reptiles: snakes, turtle, alligator Fishes: bunog, dalag, tilapia, mud fish</p> <p>Management: Proposal of the DENR particularly CENRO Dupax is to include FLMA, CBFM and Grow A Tree of Legacy was awarded to qualified program beneficiaries for the rehabilitation of degraded forest land with reforestation. Introduction and establishment of Sloping Agricultural Land Technology (SALT) contour planting and multiple-use cropping will soon be introduced to the local residents. However, different management zone such as multiple use, strict protection, restoration, buffer and cultural zones still needs to be established. Public protection monitoring and networking with the Protected Area needs to be undertaken with the participation of LGU and tribal leaders, preservation of remaining virgin/old growth forest shall be jointly undertaken by the DENR and the PAMB. However, PAMB has not been formed yet. Public consultation hearing and symposium to the different Barangay affected regarding NIPAS Act of 1992 and its implementing rules and regulations including the prepared Protected Area Management Plan shall also be undertaken to ensure sound management and to know the pleasure/opinion of the concerned parties.</p> <p>Current Condition: This protected area is heavily overlapped with CADC and rattern extraction permits. There is partially overlapped with resettlement area proclaimed by DAR. Good administrative coordination should be established once PAMB is formed. It is also an issue to maintain indigenous peoples' land use in a manner, which is based on sustainable natural resources. Fire control seems to be one of the most important management options in this area.</p>
3. Mt. Pulag National Park	<p>Background: Mount Pulag was established as a National Park in 1987 due to preserve and protect the remaining natural resources and restore its degraded environmental condition. It is a home to some rare and endangered Philippine wildlife species.</p> <p>General Feature: One of the main objectives of this area is to conserve wildlife. Being a vast watershed, the park serves as headwater of several rivers such as Elet, Buguias, Cadaclan and Catnaan Rivers. There are 4 types of vegetation observed in the park. These are summit grassland, the mossy forest, the pine region and the lowland grass-covered slopes. So far as it is known, Mt Pulag is the only mountain in the Philippines that presents the mossy forest at a well-defined natural grassland summit. Above an altitude varying from 2,500-2,900 m, practically the entire top of the mountain is a grass-covered meadow with an approximate area of 124 ha.</p> <p>Wildlife Species:</p>

Name	Remark
	<p>Flora found in the area includes dwarf bamboo (<i>Arundinaria nitakamensis</i>), oak trees (<i>Querames</i> sp.), Iguem (<i>Decarycarpus comingii</i>), and orchids (<i>Orchidaceae</i> sp.). It is also a habitat to threatened/endangered wildlife like Koch Pitta (<i>Pitta kochi</i>), northern giant cloud rat, long-haired fruit bat, Philippine brown deer and wild pigs. There is a record of 76 bird species inhabit the park, of which 9 species are endemic to Luzon and 30 species are endemic to the Philippines.</p> <p>Management: Forest protection is to be implemented and intensified through the deployment of Forest Rangers to ensure the area from unwarranted illegal entry and other forms of activities prohibited by the National Park Law, the NIPAS Law of 1992 and PD 705. They should include in their information drive the provisions of these existing laws and the benefits of biological diversity for sustainable development. The park is managed by Ecosystem Management Specialist I with 5 forest rangers under the supervision of CENRO and Ecosystem Management Specialist II. Monitoring should be conducted by EMPAS and Forest Sector of CENRO.</p> <p>Current Condition: The park holds rich biological diversity in plants and animals. However, encroachment of the park by agricultural activities including cultivation by indigenous people, timber poaching and wildlife hunting is becoming a serious issue. In addition, unregulated tourism seems to be accelerating the degradation of the park. Therefore, the park management system needs to be strengthened and refined to pursuit conservation of natural ecosystems within the park.</p>
4. Salinas Natural Monument	<p>Background: Salinas Natural Monument was formerly known as Salinas Forest Reserve. Diversity of plants and animals including endemic species exist but have been under human pressure. In 1994, Salinas Forest Reserve was recommended as one of the components of Integrated Protected Area System (IPAS) pursuant to Republic Act 7586 (NIPAS) Act and it was proclaimed as Salinas Natural Monument pursuant to Proclamation No. 275 designating the area as protected area.</p> <p>General Feature: This protected area is characterized with approximately 4,025 ha of brushland/grassland of which 1,236 ha are established plantations and 203 ha are cultivated area/<i>kaingin</i>. Dominant species are Teak (<i>Testona grandis</i>) Mahogany (<i>Swietenia macrophylla</i>), Pine (<i>Pinus kesiya</i>) and some dipterocarp species such as white lauan (<i>Pantacme concorta</i>). Grass cover of the area is dominated by cogon and samon, hagonoy. Also lagundi occurs in the grassland.</p> <p>Wildlife Species: Philippine bulbul and nutmeg mannequin dominates in the forestland and grassland respectively. These species are favored by their natural habitat and feeding characteristics. Presence of common tailorbird, Philippine caucal, Philippine flycatcher and fruit dove is significant. Other species inhabit in this area are quail, tree sparrow and crested mynah.</p> <p>Management: The area is directly managed by the Officer-in-charge of NIPAS in coordination with the deployed forest rangers under the supervision of CENRO with the forest specialist, and the chief of Protected Area and Wildlife System. The monitoring activity is a responsibility of the environment Sector and Forest Sector of the CENRO.</p> <p>Current Condition: There was a salt spring in the area but was dried out about a few decades ago. The reason for this seemed that the condition of vegetation in the upper portion of the spring was severely degraded due to timber harvest and cultivation. While these areas still remain degraded and the spring has not been recovered, plantations with a reforestation project in other areas have been successful. Mainly mahogany and teak were planted in the 1930s, and condition of those tree stands show remarkable growth.</p>

Table 4.5.1 Forest Land Management Project (FLMP)

Name (FLMA holder)	Province	Area (ha)	Remarks			
			Date	Plantation Dev't.		Others
				Species Planted	No. of Trees	
Del Pilar Tree Planters Association	Quirino	70	1998	Gmelina	140,000	Former contract reforestation project and had atleast 80 % survival of planted Gmelina trees before it was issued with a FLMA.
Spirit wood Corporation	Quirino	120	1999	Gmelina	240,000	Former contract reforestation project and had atleast 80 % survival of planted Gmelina trees before it was issued with a FLMA.
Marchers Wood Incorporated	Quirino	50	1999	Gmelina	100,000	Former contract reforestation project and had atleast 80 % survival of planted Gmelina trees before it was issued with a FLMA.
Gabriela Multi-purpose Cooperative Inc.	Quirino	40	1994	Gmelina	80,000	Former contract reforestation project and had atleast 80 % survival of planted Gmelina trees before it was issued with a FLMA.
Coallition Tribes Farmer Association	Quirino	34	1997	Gmelina	68,000	Former contract reforestation project and had atleast 80 % survival of planted Gmelina trees before it was issued with a FLMA.
Total		314				

Source: Records of PENROs and CENROs

Table 4.5.2 Socialized Industrial Forest Management Project (SIFMP) (1/6)

Name of SIFMA Holder	Municipality/ Province	Area (ha)	Remarks		
			Starting Date	Species Planted	Other Info.
1. Sps. Raul C. Sison/Imelda S. Sison	San Francisco, San Guillermo, Isabela	10	26-Sep-97	Gmelina	SIFMA # 02-0007-Cyn-010
2. Sps. Godofredo V. Pascual / Luz F. Pascua	San Francisco, San Guillermo, Isabela	10	25-Nov-97	Gmelina	SIFMA # 02-0007-Cyn-011
3. Sps. Frotoso P Sanchez /Marilou Sanchez	San Francisco, San Guillermo, Isabela	10	25-Nov-97	Gmelina	SIFMA # 02-0007-Cyn-012
4. Deogracias R. Lucas III	San Francisco, San Guillermo, Isabela	10	25-Nov-97	Gmelina	SIFMA # 02-0007-Cyn-013
5. David K. Tomas	San Francisco, San Guillermo, Isabela	10	25-Nov-97	Gmelina	SIFMA # 02-0007-Cyn-014
6. Arnel M. Ambrocio	San Francisco, San Guillermo, Isabela	10	25-Nov-97	Gmelina	SIFMA # 02-0007-Cyn-015
7. Sps. Orlando Marayag / Marilyn	San Francisco, San Guillermo, Isabela	10	25-Nov-97	Gmelina	SIFMA # 02-0007-Cyn-016
8. Cynthia Constantino	San Francisco, San Guillermo, Isabela	10	25-Nov-97	Gmelina	SIFMA # 02-Cyn-017
9. Felix Reyes	San Francisco, San Guillermo, Isabela	10	28-Jun-98	Gmelina	SIFMA # 02-0007-0018
10. Emilio Marzan Jr.	San Francisco, del Sur, San Guillermo, Isabela	10	13-Jul-98	Gmelina	SIFMA # 02-0007-0019
11. Florencio Marzan	San Francisco, del Sur, San Guillermo, Isabela	10	13-Jul-98	Gmelina	SIFMA # 02-0007-0021
12. Maria lea Mina	Surong, Dalao, Cordon, Isabela	5	10-Nov-97	Gmelina	SIFMA # 02-0008-0004
13. Nestor Bartolome and Emerciana Bartolome	Surong, Dalao, Cordon, Isabela	4	10-Nov-97	Gmelina	SIFMA # 02-0008-0005
14. Loreto Delina / Marilou Delina	Surong, Dalao, Cordon, Isabela	3	10-Nov-97	Gmelina	SIFMA # 02-0008-0006
15. Arnel Elegado	Surong, Dalao, Cordon, Isabela	3	10-Nov-97	Gmelina	SIFMA # 02-0008-0007
16. Arnel Diaz	Surong, Dalao, Cordon, Isabela	10	10-Nov-97	Gmelina	SIFMA # 02-0008-0008
17. Nemesio Diaz Jr.	Surong, Dalao, Cordon, Isabela	5	10-Nov-97	Gmelina	SIFMA # 02-0008-0009
18. Ricardo M. Tapino	Surong, Dalao, Cordon, Isabela	5	10-Nov-97	Gmelina	SIFMA # 02-0008-0010
19. Bryan A. Mina	Surong, Dalao, Cordon, Isabela	5	10-Nov-97	Gmelina	SIFMA # 02-0008-0011
20. Camilo Mejia / Leticia Mejia	Surong, Dalao, Cordon, Isabela	3	10-Nov-97	Gmelina	SIFMA # 02-0008-0012
21. Jose Tapionio	Surong, Dalao, Cordon, Isabela	7	10-Nov-97	Gmelina	SIFMA # 02-0008-0013

Table 4.5.2 Socialized Industrial Forest Management Project (SIFMP) (2/6)

Name of SIFMA Holder	Municipality/ Province	Area (ha)	Remarks		
			Starting Date	Species Planted	Other Info.
22. Valeriano B. Dasig / Jose Dasig	Surong, Dalao, Cordon, Isabela	5	10-Nov-97	Gmelina	SIFMA # 02-0008-0014
23. Larry Ann Dacanay	Surong, Dalao, Cordon, Isabela	2	10-Nov-97	Gmelina	SIFMA # 02-0008-0015
24. Evelyn Diaz / Nemesio Diaz	Surong, Dalao, Cordon, Isabela	5	10-Nov-97	Gmelina	SIFMA # 02-0008-0016
25. Rodelinson Emmanuel / Maulit	Surong, Dalao, Cordon, Isabela	5	10-Nov-97	Gmelina	SIFMA # 02-0008-0017
26. Boniver R. Reguindind	Surong, Dalao, Cordon, Isabela	5	10-Nov-97	Gmelina	SIFMA # 02-0008-0018
27. Roosevelt R. Samiling	Surong, Dalao, Cordon, Isabela	5	10-Nov-97	Gmelina	SIFMA # 02-0008-0019
28. Edina L Tan	Dalao, Cordon, Isabela	10	30-Nov-98	no record	SIFMA # 02-0008-0021
29. Marina dela Cruz	Dalao, Cordon, Isabela	10	30-Nov-98	no record	SIFMA # 02-0008-0022
30. Roberto Ancheta	Dalao, Cordon, Isabela	10	30-Nov-98	no record	SIFMA # 02-0008-0023
31. Maria Victoria Mendoza	Dalao, Cordon, Isabela	10	30-Nov-98	no record	SIFMA # 02-0008-0024
32. Mila Ancheta	Dalao, Cordon, Isabela	10	30-Nov-98	no record	SIFMA # 02-0008-0025
33. Jessica Tosonio	Dalao, Cordon, Isabela	10	30-Nov-98	no record	SIFMA # 02-0009
34. George P Santos	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-022
35. Joselina S. Agtarap	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-023
36. John D. Bolhayon	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-024
37. Joel P. De Castro	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-025
38. Reynaldo A. De Leon	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-026
39. Roberto R. Severo, Sr.	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-027
40. Villamor R. Agtarap	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-028
41. Edna C. Santos	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-029
42. Jeffrey Santos	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-030
43. Nelson Agtarap	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-031

Table 4.5.2 Socialized Industrial Forest Management Project (SIFMP) (3/6)

Name of SIFMA Holder	Municipality/ Province	Area (ha)	Remarks		
			Starting Date	Species Planted	Other Info.
44. Jerry P. Severo	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-032
45. Feliciano B. Cruz	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-033
46 Reynaldo B. Cruz	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-034
47. Eloisa C. Cruz	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-035
48. Jessie P. Severo	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-036
49. Frederick Agtarap	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-037
50. Bienvenido Santos	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-038
56. Jade C. Santos	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-039
57. Harold Agtarap	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-040
58. Ernesto B Cruz	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-041
59. Virgilio B. Cruz	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-042
60. Susan M. Castro	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-043
61. Lucena M. Marzan	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-044
62. Nida Hernandez	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-045
63. Judy Ann C. Santos	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-046
64. Rufina P. Santos	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-047
65 Plilita C. Ison	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-048
66 Samuel Alegre	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-049

Table 4.5.2 Socialized Industrial Forest Management Project (SIFMP) (4/6)

Name of SIFMA Holder	Municipality/ Province	Area (ha)	Remarks		
			Starting Date	Species Planted	Other Info.
67. Lolita M. Tabag	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-050
68. Emerlindo G. Tabag	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-051
69. Gloria M. Mina	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-052
70. Marivic Ison	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-053
71. Nanelito Balbona	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-054
72. Felicidad C. Maulit	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-055
73. Marianne Ison	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-056
74. Alfredo R. Mina	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-057
75. Francisco M. Domingo	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-058
76. Encarnacion Domingo	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-059
77. Epifanio Bautista	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-060
78. Angeline C. Ison	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-061
79. Myrna S. Espiritu	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-062
80. Cristeto V. Ancheta	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-063
81. Fidel Aquino	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-064
82. Arnel Santiago	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-065
83. Elmer L. Lopez	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-066
84. Sofronio Alino Jr.	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-067

Table 4.5.2 Socialized Industrial Forest Management Project (SIFMP) (5/6)

Name of SIFMA Holder	Municipality/ Province	Area (ha)	Remarks		
			Starting Date	Species Planted	Other Info.
85. Elvira P. Marzan	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-068
86. Rodolfo Florentino	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-069
87. Amorsolo Acosta	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-070
88. Eleazar Gamboa	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-071
89 Joan Gamboa	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-072
90. Sherilyn Sison	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-073
91. Raul Sison	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-074
92. Editha Gamboa	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-075
93. Dencio Pagbilao	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-076
94. Perlita Ancheta	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-077
95. Leopoldo Narciso	San Francisco. Sur, San Guillermo, Isabela	10	1-Mar-99	Gmelina	SIFMA # 02-0007-078
Sub-total		816			
96 Jerry Pagbilao	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
97 Emilio Marzan Jr.	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
98 Condrado Catcho	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
99. Elvira Marzan	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
100. Lina Pablo	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
101. Samuel Alegre	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
102. Luzviminda Cayetano	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
103. Emilio Marzan Sr.	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
104 Lucera Marzan	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009

Table 4.5.2 Socialized Industrial Forest Management Project (SIFMP) (6/6)

Name of SIFMA Holder	Municipality/ Province	Area (ha)	Remarks		
			Starting Date	Species Planted	Other Info.
105. Maribeth Bautista	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
106. Alfredo Mina	Magsaysay, Diffun, Quirino	3	15-Sep-97	Gmelina	SIFMA # 02-0009
107. Jun Mina	Magsaysay, Diffun, Quirino	3	15-Sep-97	Gmelina	SIFMA # 02-0009
108. Gloria Mina	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
109. Florencio Marzan	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
110. Encarnacio Doming	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
111. Francisco Domingo	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
112. Nida Alegria	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
113. Danilo Larona	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
114. Lolita Tabag	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
115. Emerlino Tabag	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
116. Perlita Catutuya	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
117. Efipanio Bautista	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
118. Renato Pablo	Magsaysay, Diffun, Quirino	2	15-Sep-97	Gmelina	SIFMA # 02-0009
119. Spilit wood coporation	Magsaysay, Diffun, Quirino	48	1998	Gmerina	
Sub-total		95			
Total		911			

Table 4.5.3 List of Projects under CBFMA within the study area

	Name of PO	Responsible		Barangay	PO	CBFMA	Agreement	Project	Other Tenurial Instruments				
		CENRO	Municipality						registration	signed(3)	NO.	Area (ha)(1)	ISA(CSC)
									Yes(1)	Yr	Yes(1)	Year	Yes(1)
	CBFMA								No(0)		No(0)		No(0)
	Nueva Vizcaya												
1	Gadagad Vegetable and Fruit Tree Growers Association	Aritao	Santa Fe	Baliling		10/31/00	20119014	70.00	0				
2	Bakir Pagbiagan ti Pagilian CBFM Association	Aritao	Quezon	Runruno		12/4/00	20119015	222.00	0				
3	Latar Ilocano Minority Farmers Association Inc.	Aritao	Aritao	Latar		12/10/99	20019007	437.50	0				
4	Buyasyas Iwak Tribal Council	Aritao	Kayapa	Buyasyas		11/23/00	20219013	1,021.00	0				
5	Yaway Farmers Multi-Purpose Cooperative Inc.	Aritao	Aritao	Yaway		2/1/95	20219012	1,341.50	1				
6	Association of Upland Farmers of Singian Nueva Vizcaya Inc.	Bayombong	Bagabag	Pogonsino		8/25/00	20119010	64.00	0				
7	Singian Agro-Forest Association	Bayombong	Bagabag	Tuao South		10/17/00	20119011	84.82	0				
8	Socio-Economic and Environmental Development Cooperative Inc.	Bayombong	Quezon	Dagupan		12/9/99	20019008	2,200.00	1				
9	Federation of Vista Hills, Kakongkong and Kakilingan Upland Farmers	Bayombong	Bayombong	Buena Vista		3/29/99	20019005	3,000.00	1				
10	Mabasa Tree Planters and Growers Association, Inc.	Dupax	Dupax del Norte	Mabasa		1/27/98	20019001	20.00	0				
11	Banila Community-Based Association Inc.	Dupax	Dupax del Sur	Banila		7/12/99	20019006	225.00	1				
12	Bitnong Guijo Greeners Association Inc.	Dupax	Dupax del Norte	Bitnong		3/23/99	20019004	328.00	1				
							Sub-total	9,013.82					
	Quirino												
1	San Manuel-Victoria Forest Developers Cooperative	Aglipay	Aglipay	San Manuel, Victoria	6/19/96	11/21/96	20218301	3,176.00	1				
2	Allicia Sustainable Resource Development (ASREDECO)	Aglipay	Aglipay	Alicia	9/17/97	10/17/97	20218305	1,844.14	1	-			
3	Balligui Community Forestry and Development Cooperative Inc	Aglipay	Maddela	Balligui, Jose Ancheta	1/23/96	6/24/97	20218302	4,400.00	1				
4	Gomez Farmers Multi-Purpose Cooperative, Inc	Naptipunan	Cabarroguis	Gomez		9/3/00	-	620.00	1				
5	Ilongot Livelihood Association Inc (ILAI)	Nagtipunan	Nagtipunan	Landingan	1/28/92	12/16/95	20218304	1,752.00	0		1	1993	1
6	Nuh-uh-uhhaan Inc	Nagtipunan	Nagtipunan	Asaklat	3/8/94	6/15/95	20218307	2,600.00	1		1	1989	0
7	Kadikitan Association for Community Development (KAFCDI)	Nagtipunan	Nagtipunan	Kadikitan, Landingan	12/14/93	12/16/94	20218303	4,958.00	0		1	1997	1
8	Anak Intercultural Organizatioin	Nagtipunan	Nagtipunan	Anak	4/30/96	6/15/96	20219960	5,315.00	1		1	1993	0
9	Wasid Ilongot Tribe Association Inc (WITAI)	Nagtipunan	Nagtipunan	Wasid	6/17/94	9/23/95	20219953	6,420.00	0		1	1993	1
10	Sangbay Anak Integrated Farmers Association Inc.	Naptipunan	Nagtipunan	Sangbay		8/27/97	20218309	134.00	1				
11	Villa Ventura Multi-Purpose Cooperative Inc.	Penro Quirino	Aglipay	Victoria	10/23/95	9/15/00	20218313	776.00	0				
12	Rafael Palma Multi-Purpose Cooperative, Inc.	Penro Quirino	Diffun	Rafael Palma		9/1/00	20218311	148.83	1				
13	Ifugao Village Aphochan Multi-Purpose Cooperative (IVAMCO)	Penro Quirino	Diffun	Ifugao Village		6/7/00	20218310	1,000.00	0				
14	Baguio Village Intercultural Association	Penro Quirino	Diffun	Baguio Village	4/4/94	8/29/95	20218308	1,990.00	1	1984	1	1990	
15	Don Mariano Perez Farmers Multi-Purpose Cooperative	Penro Quirino	Diffun	Don Mariano Perez	3/24/94	6/15/95	20218306	3,100.00	0				
16	Salinong T. Campamento Association Inc.	Penro Quirino	Diffun	Campamento		-	20218314	415.50	0				
							Sub-total	38,649.47					
	Ifugao												
1	Bannao Community Organization Inc.	Lamut	Banaue	Bannao		-	-	200.00	0				
2	Fed of Responsive Assosn for Magat Ecology, Inc	Lamut	Lamut	Binpal, Jolowon, Nayon		on process	on process	3,027.00	0				
3	Dalligan Multipurpose Development Association	Lamut	Kiangan	Dalligan		11/19/99	5037	274.26	0				
4	Hapid Agro-forestry Developers Association Inc.	Lamut	Lamut	Hapid		12/24/00	5054	101.15	0				
5	Lingay Farmers Association	Lamut	Kiangan	Lingay		11/19/99	5036	106.77	0				
6	Mayoyao Environment Development Association Inc.	Alfonso Lista	Mayoyao	Mayoyao		-	5025	2,000.00	0				
7	Nunhabatan Greeners Livelihood Association Inc.	Lamut	Lamut	Hapid		3/29/99	5023	241.00	1				
							Sub-total	5,950.18					
	Isabela												
1	Rizal Integrated Development Multi-Purpose Cooperative Inc.	Cauayan	San Guillermo	Rizal & Burgos		5/1/97	-	5,000.00	1				
2	Ayangan Dappig Agro-Forestry Development Association	San Isidro	San Agustin	Dappig		-	-	487.50	0				
3	Taleb Upland Farmers Multi-Purpose Coop. Inc.	San Isidro	Cordon	Taleb, Dallao		12/22/98	20216660	203.00	0				
							Sub-total	5,690.50					
	Total						Total	59,303.97					

Table 4.5.4 Funding sources of CBFMA projects within the study area

	Name of PO	CBFM Area (ha)	DENR funded area	%	Foreign agencies	Foreign- funded area	%	Assit Perd.	On- going	Currenty forgn funded	%
Nueva Vizcaya											
1	Gadagad Vegetable and Fruit Tree Growers Ass.	70.00	70.00		-				0		
2	Bakir Pagbiagan ti Pagilian CBFM Association	222.00	222.00		-				0		
3	Latar Ilocano Minority Farmers Ass.	437.50	437.50		-				0		
4	Buyasayas Iwak Tribal Council	1,021.00			CASCADE, SECAR	1,021.00			1	1,021.00	
5	Yaway Farmers Multi-Purpose Cooperative Inc.	1,341.50	1,341.50		-				0		
6	Association of Upland Farmers of Singian	64.00	64.00		-				0		
7	Singian Agro-Forest Association	84.82	84.82		-				0		
8	S.E.E.D.Coop. Inc.	2,200.00			ADB	2,200.00			0		
9	Federation of Vista Hills Upland Farmers Inc.	3,000.00			ITTO	3,000.00		98-01	0	3,000.00	
10	Mabasa Tree Planters and Growers Ass.	20.00			ADB	20.00		91-93	0		
11	Banila Community-Based Association Inc.	225.00			ADB	225.00			0		
12	Bitnong Guijo Greeners Association Inc.	328.00			ADB	328.00		91-93	0		
12	Sub-total	9,013.82	2,219.82	24.63%		6,794.00	75.37%			4,021.00	44.61%
Quirino											
1	San Manuel-Victoria Forest Developers Coop	3,176.00			ADB II	3,176.00		93-00	0		
2	Alicia Sustainable Resource Development	1,844.14			USAID	1,844.00		95-02	1	1,844.00	
3	Balligui Community For. Dev. Coop Inc	4,400.00			RP-Ger.	4,400.00		97-01	1	4,400.00	
4	Gomez Farmers Muti-Purpose Cooperative, Inc	620.00	620.00		-						
5	Ilongot Livelihood Association Inc (ILAI)	1,752.00			WB	1,752.00		92-99			
6	Nuh-uh-uhhaan Inc	2,600.00			RP-Ger.	2,600.00		97-01	1	2,600.00	
7	Kadikilan Association for Com Dev	4,958.00			ADB II	4,958.00		93-00	0		
8	Anak Intercultural Organizatioin	5,315.00			RP-Ger.	5,315.00		97-01	1	5,315.00	
9	Wasid Ilongot Tribe Association Inc (WITAI)	6,420.00			USAID	6,420.00		95-02	1	6,420.00	
10	Sangbay Anak Integrated Farmers Ass	134.00			ADB II	134.00		93-00	0		
11	Villa Ventura Multi-Purpose Cooperative Inc.	776.00	776.00		OECF-CARP	776.00			0		
12	Rafael Palma Multi-Purpose Coop	148.83			-				0		
13	Ifugao Village Multi-Purpose Coop	1,000.00			RP-Ger.	1,000.00		97-01	1	1,000.00	
14	Baguio Village Intercultural Association	1,990.00			RP-Ger.	1,990.00		97-01	1	1,990.00	
15	Don Mariano Perez Farmers MP Coop	3,100.00			RP-Ger.	3,100.00		97-01	1	3,100.00	
16	Salinong T. Campamento Association Inc.	415.50	415.50		-						
16	Sub-total	38,649.47	1,811.50	4.69%		37,465.00	96.94%			26,669.00	69.00%
Ifugao											
1	Bannao Community Organization Inc.	200.00			ADB	200.00		91-93	0		
2	Fed of Responsive Assosn for Magat Ecology, Inc	3,027.00			JBIC	3,027.00		95-03	0	3,027.00	
3	Dalligan Multipurpose Development Ass	274.26			WB	274.26		92-99	0		
4	Hapid Agro-forestry Developers Ass.	101.15			ADB	101.15		91-93	0		
5	Lingay Farmers Association	106.77			WB	106.77		92-99	0		
6	Mayoyao Environment Development Ass.	2,000.00			JBIC	2,000.00		95-03	0	2,000.00	
7	Nunhabatan Greeners Livelihood Ass	241.00			ADB	241.00		91-93	0		
7	Sub-total	5,950.18	0.00	0.00%		5,950.18	100.00%			5,027.00	84.48%
Isabela											
1	Rizal Integrated Development MP Coop	5,000.00			WB	5,000.00		92-99	0		
2	Ayangan Dappig Agro-Forestry Dev Ass	487.50	487.50		-				0		
3	Taleb Upland Farmers Multi-Purpose Coop. Inc.	203.00							0		
3	Sub-total	5,690.50	487.50	8.57%		5,000.00	87.87%			0.00	0.00%
38	Total	59,303.97	4,518.82	7.62%		55,209.18	93.10%		9	35,717.00	60.23%

Sources:

(1) DENR internal document. PROFILE CBFM PROJECTS CY 2001. (2) DENR internal document. List of CBFM Project in Region 02, As of July 2000

(3) Date data taken from original CBFMA document. (4) Date Established, data taken from PROFILE CBFM PROJECTS CY 2001

Table 4.5.5 (a) List of Certificate of Stewardship Contracts(CSCs) issued in Nueva Vizcaya and Integration into CBFMA Projects (1/2)

PENRO	CENRO	Municipality	Barangay	Sitio	No. of CSC	Area (ha)	Data	Within/Outside Study Area	Incorporated CBFMA project		
									PO Name	Area (ha)	Date
N. Vizcaya	Aritao	Aritao	Abian		35	80.39	1992/11/9	Within			
N. Vizcaya	Aritao	Aritao	Anayo		10	39.36	1984/12/27	Within			
N. Vizcaya	Aritao	Aritao	Anayo		9	47.16	1987/12/4	Within			
N. Vizcaya	Aritao	Aritao	Anayo		7	34.70	10/27-12/14/88	Within			
N. Vizcaya	Aritao	Aritao	Berber	Buyot	2	4.96	1984/12/18	Within			
N. Vizcaya	Aritao	Aritao	Berber		3	15.91	1985/6/28	Within			
N. Vizcaya	Aritao	Aritao	Beti		9	13.02	1993/11/23	Within			
N. Vizcaya	Aritao	Aritao	Beti		15	20.22	1994/10/5	Within			
N. Vizcaya	Aritao	Aritao	Beti		12	18.98	1996/2/5	Within			
N. Vizcaya	Aritao	Aritao	Bone North		19	16.09	1993/9/23	Within			
N. Vizcaya	Aritao	Aritao	Bone South	Masinab	16	14.56	1988/10/6	Within			
N. Vizcaya	Aritao	Aritao	Bone South	Tui	15	19.96	10/6-12/6/88	Within			
N. Vizcaya	Aritao	Aritao	Bone South	Butao	63	72.19	1989/10/13	Within			
N. Vizcaya	Aritao	Aritao	Bone South		6	4.87	1990/12/20	Within			
N. Vizcaya	Aritao	Aritao	Bone South		58	86.56	1992/11/5	Within			
N. Vizcaya	Aritao	Aritao	Calititan		2	2.12	1988/3/22	Within			
N. Vizcaya	Aritao	Aritao	Calititan	Bagumbuaya	46	46.27	1989/4/24	Within			
N. Vizcaya	Aritao	Aritao	Calititan	Pogumbuaya	2	0.60	1990/11/28	Within			
N. Vizcaya	Aritao	Aritao	Calititan		19	29.41	1995	Within			
N. Vizcaya	Aritao	Aritao	Canarem	Lanka	43	107.19	1992/11/3	Within			
N. Vizcaya	Aritao	Aritao	Comon	Kabiscara	10	7.46	1984/12/26	Within			
N. Vizcaya	Aritao	Aritao	Comon	Kabakistan	26	20.09	1986/11/20	Within			
N. Vizcaya	Aritao	Aritao	Comon	Parirr	14	26.86	10/13-12/4/86	Within			
N. Vizcaya	Aritao	Aritao	Comon		27	22.17	1987/6/20	Within			
N. Vizcaya	Aritao	Aritao	Comon	Parirr	13	15.07	1987/6/5	Within			
N. Vizcaya	Aritao	Aritao	Comon	Parirr	22	34.79	8/5-12/22/88	Within			
N. Vizcaya	Aritao	Aritao	Comon	Gasajas	18	17.44	1989/11/28	Within			
N. Vizcaya	Aritao	Aritao	Comon		2	4.97	1993/9/23	Within			
N. Vizcaya	Aritao	Aritao	Consuelo		3	3.40	1994/10/5	Within			
N. Vizcaya	Aritao	Aritao	Dullao	Manaing	30	16.44	1995	Within			
N. Vizcaya	Aritao	Aritao	Kirang	Sta. Ignacia	8	39.52	1986/2/11	Within			
N. Vizcaya	Aritao	Aritao	Kirang		5	5.77	7/4-12/6/88	Within			
N. Vizcaya	Aritao	Aritao	Kirang		1	3.82	1991/12/9	Within			
N. Vizcaya	Aritao	Aritao	Nagcuartelan		4	2.92	1984/12/26	Within			
N. Vizcaya	Aritao	Aritao	Sta. Clara	Anayo	5	22.52	1985/12/18	Within			
N. Vizcaya	Aritao	Aritao	Sta. Clara		53	55.33	1994/10/5	Within			
N. Vizcaya	Aritao	Aritao	Tabueng	Nok-nok	19	48.68	1986/10/13	Within			
N. Vizcaya	Aritao	Aritao	Tabueng		23	75.79	1987/3/23	Within			
N. Vizcaya	Aritao	Aritao	Tabueng	Nok-nok	45	145.70	10/10-12/6/88	Within			
N. Vizcaya	Aritao	Aritao	Yaway	Tupa	18	39.60	1984/12/18	Within			
N. Vizcaya	Aritao	Aritao	Yaway		13	46.71	1985/6/28	Within			
N. Vizcaya	Aritao	Aritao	Yaway		2	4.78	1994/10/5	Within			
N. Vizcaya	Aritao	Bambang	Abian	Villaluz	18	50.19	1988/10/10	Within			
N. Vizcaya	Aritao	Bambang	Abian	Namalican	15	34.82	1989/11/28	Within			
N. Vizcaya	Aritao	Bambang	Abian		11	107.26	1992/11/9	Within			
N. Vizcaya	Aritao	Bambang	Abian		4	12.41	1993/11/23	Within			
N. Vizcaya	Aritao	Bambang	Abinganan	Kabicalan	18	15.60	1989/11/28	Within			
N. Vizcaya	Aritao	Bambang	Banggot	Tabangan, Tophill	25	12.86	1986/10/30	Within			
N. Vizcaya	Aritao	Bambang	Banggot	Tabangan, Tophill	99	25.34	2/2-5/12/87	Within			
N. Vizcaya	Aritao	Bambang	Dulao	Manaing	7	35.00	1990/10/8	Within			
N. Vizcaya	Aritao	Bambang	Mabuslo	Lilil	57	28.77	1991/12/9	Within			
N. Vizcaya	Aritao	Bambang	Mabuslo		29	73.98	1995	Within			
N. Vizcaya	Aritao	Bambang	Nabusco	Lilil	45	27.33	1991/12/9	Within			
N. Vizcaya	Aritao	Bambang	Sto. Domingo	Laguerte	62	78.88	1990/11/29	Within			
N. Vizcaya	Aritao	Bambang	Sto. Domingo	Laguerta	3	8.30	1993/10/27	Within			
N. Vizcaya	Aritao	Bambang	Sto. Domingo	Laguerta	5	4.52	1990/11/29	Within			
N. Vizcaya	Aritao	Bambang	Tabueng	Tabangan, Tophill	26	6.19	7/12-12/6/88	Within			
N. Vizcaya	Aritao	Kayapa	Baan		36	37.94	1990/10/8	Within			
N. Vizcaya	Aritao	Kayapa	Cabanglasan		52	68.14	1996/5/5	Within			
N. Vizcaya	Aritao	Kayapa	Cabanglasan		22	194.09	1996/5/5	Within			
N. Vizcaya	Aritao	Kayapa	Cabanglasan		54	93.76	1996/2/5	Within			
N. Vizcaya	Aritao	Kayapa	Labang		27	93.78	1996/5/5	Within			
N. Vizcaya	Aritao	Kayapa	Pingkian		36	70.54	1989/11/23	Within			
N. Vizcaya	Aritao	Kayapa	Pingkian		19	28.70	1990/10/8	Within			
N. Vizcaya	Aritao	Kayapa	Punong Cacao	Campong	46	96.20	1992/11/10	Within			
N. Vizcaya	Aritao	Kayapa	Tidang Village		30	39.85	11/8/96	Within			
N. Vizcaya	Aritao	Kayapa	Upper Baan		24	62.69		Within			
N. Vizcaya	Aritao	Santa Fe	Balete		3	10.93	1988/12/6	Within			
N. Vizcaya	Aritao	Santa Fe	Balete		2	6.22	1989/6/4	Within			
N. Vizcaya	Aritao	Santa Fe	Balete		44	136.35	6/7-11/28/89	Within			
N. Vizcaya	Aritao	Santa Fe	Balete		4	8.83	1990/11/29	Within			
N. Vizcaya	Aritao	Santa Fe	Balete		2	9.00	1990/11/28	Within			
N. Vizcaya	Aritao	Santa Fe	Balete		4	14.01	1990/12/20	Within			
N. Vizcaya	Aritao	Santa Fe	Balihing		23	12.80	1991/4/22	Within			
N. Vizcaya	Aritao	Santa Fe	Baracbac		15	16.45	1984/12/26	Within			
N. Vizcaya	Aritao	Santa Fe	Baracbac		33	29.92	1985/1/29	Within			
N. Vizcaya	Aritao	Santa Fe	Calititan		6	11.05	1994/10/5	Within			
N. Vizcaya	Aritao	Santa Fe	Poblacion		13	11.09	1985/1/29	Within			
N. Vizcaya	Aritao	Santa Fe	Villaflores	Mancate	65	45.71	1989/11/28	Within			
N. Vizcaya	Bayombong	Ambaguio			20	40.07	1992	Within			
N. Vizcaya	Bayombong	Bagabag	Baretbet	Kinakao	6	28.00	1986/2/3	Within			
N. Vizcaya	Bayombong	Bagabag	Baretbet	Kinakao	24	22.71	1989/10/11	Within			
N. Vizcaya	Bayombong	Bagabag	Baretbet	Amballo	298	298.00	1991/10/7	Within			
N. Vizcaya	Bayombong	Bagabag	Baretbet		49	49.30	1992	Within			
N. Vizcaya	Bayombong	Bagabag	Careb		86	63.49	1990/10/8	Within			
N. Vizcaya	Bayombong	Bagabag	Sta. Lucia	Villard Salvo	11	20.58	2/18-10/10/85	Within			
N. Vizcaya	Bayombong	Bagabag	Tuao		16	80.00	1986/7/1	Within			
N. Vizcaya	Bayombong	Bagabag	Tuao	Singian Mt.	11	19.10	9/6/94	Within			
N. Vizcaya	Bayombong	Bagabag	Tuao		45	53.55	1995	Within			
N. Vizcaya	Bayombong	Bayombong	Bansing		43	95.33	1985/2/20	Within			
N. Vizcaya	Bayombong	Bayombong	Cabuaan		22	34.78	1984/6/18	Within			
N. Vizcaya	Bayombong	Bayombong	Casat		7	13.61	1985/4/16	Within			
N. Vizcaya	Bayombong	Bayombong	Casat		15	34.44	3/10-6/2/87	Within			
N. Vizcaya	Bayombong	Bayombong	Ipil Cuneg		19	96.69	1984/6/18	Within			
N. Vizcaya	Bayombong	Bayombong	Magapuy		7	34.00	1985/12/16	Within			
N. Vizcaya	Bayombong	Bayombong	Magapuy		4	20.00	1997/10/6	Within			
N. Vizcaya	Bayombong	Bayombong	Poblacion		39	176.36	6/13-12/2/89	Within			
N. Vizcaya	Bayombong	Bayombong	Vista Hills		57	111.52	1986/9/5	Within			
N. Vizcaya	Bayombong	Bayombong	Bansing	Amococan	81	120.43	8/20/96	Within			
N. Vizcaya	Bayombong	Diadi	Arwas		12	34.82	1984/12/12	Within			
N. Vizcaya	Bayombong	Diadi	Arwas		21	84.09	6/26-12/27/85	Within			
N. Vizcaya	Bayombong	Diadi	Arwas		13	42.62	1986/12/22	Within			
N. Vizcaya	Bayombong	Diadi	Arwas		19	72.92	1987/10/27	Within			
N. Vizcaya	Bayombong	Diadi	Butao		25	54.41	1984/12/12	Within			
N. Vizcaya	Bayombong	Diadi	Butao		10	28.63	6/26-12/27/85	Within			
N. Vizcaya	Bayombong	Diadi	Butao		5	7.50	1986/12/22	Within			
N. Vizcaya	Bayombong	Diadi	Butao		11	34.30	1987/10/27	Within			

→ Yaway Farmers Multi-Purpose Cooperative Inc | 1,341.50 | 2/1/95

Table 4.5.5 (a) List of Certificate of Stewardship Contracts(CSCs) issued in Nueva Vizcaya and Integration into CBFMA Projects (2/2)

N. Vizcaya	Bayombong	Diadi	Butao		12	43.32	9/8-12/2/88	Within				
N. Vizcaya	Bayombong	Diadi	Lurad		104	328.46	1992/6/5	Within				
N. Vizcaya	Bayombong	Diadi	Lurad		14	66.66	1992	Within				
N. Vizcaya	Bayombong	Diadi	Lurad		22	74.66	1995	Within				
N. Vizcaya	Bayombong	Diadi	Pinya		61	261.30	1988/8/16	Within				
N. Vizcaya	Bayombong	Diadi	Pinya		17	59.98	1995	Within				
N. Vizcaya	Bayombong	Diadi	Villa Aurora		97	322.00	1992	Within				
N. Vizcaya	Bayombong	Quezon	Ampakleng		38	86.46	1996/6/18	Within				
N. Vizcaya	Bayombong	Quezon	Aurora		94	151.99	1983/11/15	Within				
N. Vizcaya	Bayombong	Quezon	Aurora		4	18.00	1986/2/4	Within				
N. Vizcaya	Bayombong	Quezon	Baresbes		58	72.20	6/10/96	Within				
N. Vizcaya	Bayombong	Quezon	Bonifacio		30	83.96	1992	Within				
N. Vizcaya	Bayombong	Quezon	Caliat		10	12.91	1983/11/15	Within				
N. Vizcaya	Bayombong	Quezon	Caliat		150	102.35	9/14-10/11/89	Within				
N. Vizcaya	Bayombong	Quezon	Caliat		90	146.21	1996/6/20	Within				
N. Vizcaya	Bayombong	Quezon	Caloocan	Dumaliguia	20	96.42	1986/2/20	Within				
N. Vizcaya	Bayombong	Quezon	Caloocan	Tunato	22	51.60	7/30/93	Within				
N. Vizcaya	Bayombong	Quezon	Dagupan		26	125.90	1988/12/2	Within				
N. Vizcaya	Bayombong	Quezon	Dagupan		75	228.73	1995	Within				
N. Vizcaya	Bayombong	Quezon	Darubba	Gattae	43	103.74	3/18-8/16/85	Within				
N. Vizcaya	Bayombong	Quezon	Darubba		97	140.41	1990/9/10	Within				
N. Vizcaya	Bayombong	Quezon	Darubba	Tunato	53	207.29	7/30/93	Within				
N. Vizcaya	Bayombong	Quezon	Darubba	Dumaliguia	3	5.25	9/6/94	Within				
N. Vizcaya	Bayombong	Quezon	Dumaligui		53	92.28	1995	Within				
N. Vizcaya	Bayombong	Quezon	Madiangat		56	88.47	9/6/94	Within				
N. Vizcaya	Bayombong	Quezon	Nalubunan		64	191.12	2/12-12/1/88	Within				
N. Vizcaya	Bayombong	Quezon	Nalubunan		94	132.72	1988/10/10	Within				
N. Vizcaya	Bayombong	Quezon	Nalubunan		10	23.18	6/14-8/1/89	Within				
N. Vizcaya	Bayombong	Quezon	Ronrono	Dumaliguia	10	25.32	1985/6/3	Within				
N. Vizcaya	Bayombong	Quezon	Ronrono		33	128.60	9/1-12/7/87	Within				
N. Vizcaya	Bayombong	Quezon	Ronrono	Dumaliguia	18	45.30	6/10-10/8/96	Within				
N. Vizcaya	Bayombong	Solano	Aggub	Singian Mt.	236	246.62	1983/12/6	Within				
N. Vizcaya	Bayombong	Solano	Aggub		48	33.26	1983/12/6	Within				
N. Vizcaya	Bayombong	Solano	Aggub		4	2.43	1991/3/12	Within				
N. Vizcaya	Bayombong	Solano	Bangaan	Barasibit	14	21.96	1985/8/16	Within				
N. Vizcaya	Bayombong	Solano	Bascaran		8	33.50	6/17-10/29	Within				
N. Vizcaya	Bayombong	Solano	Bascaran		12	15.69	1988/8/1	Within				
N. Vizcaya	Bayombong	Solano	Bascaran		23	18.39	3/14-8/1/88	Within				
N. Vizcaya	Bayombong	Solano	Tucal		67	75.53	1983/12/6	Within				
N. Vizcaya	Bayombong	Solano	Wakal	Patay	10	17.66	1985/4/16	Within				
N. Vizcaya	Bayombong	Solano	Wakal		56	80.92	3/10-6/8/87	Within				
N. Vizcaya	Bayombong	Sta. Fe	Balete		18	39.50	1988/10/6	Within				
N. Vizcaya	Bayombong	Villaverde	Bulan		17	38.26	1986/1/31	Within				
N. Vizcaya	Bayombong	Villaverde	Ibung		95	69.81	1995	Within				
N. Vizcaya	Bayombong	Villaverde	Nagbitin	Ocapon	25	123.12	3/15-10/16/85	Within				
N. Vizcaya	Bayombong	Villaverde	Nagbitin		40	72.03	1995	Within				
N. Vizcaya	Bayombong	Villaverde	Ocapon		57	42.51	1996/5/15	Within				
N. Vizcaya	Bayombong	Villaverde	Sawmill		118	221.95	7/18-8/12/96	Within				
N. Vizcaya	Dupax	Alfonso Castaneda	Lublub		74	189.63	1993/7/30	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Accon	Anteng	1	3.36		Within				
N. Vizcaya	Dupax	Dupax Del Norte	Anabuan	Berber	5	11.96	1995/3/30	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Asscon		27	79.42	3/21-7/23/84	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Banila		26	86.17	1986/10/8	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Banila	Pias	1	0.88		Within				
N. Vizcaya	Dupax	Dupax Del Norte	Banila	Paa	3	6.40	1996/5/31	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Banila	Catanan	28	54.63	1996/5/31	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Banila	Paa	30	46.57	1996/6/28	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Banila	So. Mapito	51	135.20	1996/6/28	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Banila	Abuag	30	80.36	9/30-10/28/96	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Bitong		23	81.80	1983/12/22	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Bitong	Locus	57	173.70	1985/12/14	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Bitong	Keon	7	41.50	1985/12/14	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Bitong		39	176.22	1988/12/19	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Carolotan	Sinagat	15	33.65	1995/3/30	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Carolotan	Mayuminin	18	52.51	1996/10/8	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Inaban	Berber	56	122.30	1988/9/30	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Inaban		42	37.75	1989/6/16	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Munguia		51	46.19	1989/6/16	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Nantawakan	Upper Parai	20	37.98	1995/3/30	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Nantawakan	Upper Parai	1	2.00		Within				
N. Vizcaya	Dupax	Dupax Del Norte	Oyao		54	121.08	1994/9/30	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Palabutan	So. Anilo	66	157.21	1996/10/8	Within				
N. Vizcaya	Dupax	Dupax Del Norte	Palabutan	Panalingan	29	36.76	1996/10/8	Within				
N. Vizcaya	Dupax	Dupax Del Norte		Lower Parai, So. Kim	24	21.42	1996/7/29	Within				
N. Vizcaya	Dupax	Dupax Del Norte		Lower Parai, So. Piat	64	95.71	1996/10/8	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Banila	Pias	14	28.04	1986/8/24	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Banila		4	15.53	12/2-12/14/88	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Canabay		110	293.15	11/9-12/8/89	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Canabay	Cabnauan	63	122.30	1989/12/7	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Carolotan		17	66.47	1989/11/9	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Narra Banilla		5	29.21	1984/12/27	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Narra Banilla		10	56.56	1987/12/4	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Palabutan		28	98.85	1989/11/24	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Palabutan		15	15.20	1985/3/22	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Antotot	45	153.18	1989/1/10	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Antutol	90	329.38	1987/6/29	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Kong-kong	70	123.00	1992/9/21	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Kong-kong	69	188.92	1992/9/21	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Kong-kong	69	91.28	1992/9/21	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Kong-kong	12	12.28	1993/7/30	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Kong-kong	33	75.18	1993/7/30	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Macalong	37	89.49	1991/11/29	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Makalong	77	136.05	1992/6/21	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Makalong	98	124.87	1992/8/21	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Makalong	19	75.41	1992/8/21	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Makalong	40	50.97	1994/9/30	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Nantawakan	63	178.05	1986/6/2	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Nantawakan	18	25.51	1991/2/2	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Papaya	61	184.27	1990/2/15	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Papaya	5	9.98	1991/9/20	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Wat-wat	10	11.77	1993/7/30	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	Wat-wat	123	275.29	1993/7/30	Within				
N. Vizcaya	Dupax	Dupax Del Sur	Kasibu	So. Balangobong	23	32.76	1993/7/30	Within				
					7,108	14,220						

Source: Digital data printouts obtained from DENR Region 02 office

All CSCs
 Socio-Economic and Env. Dev. Coop Inc
 2,200.00 12/9/99

All CSCs
 Banila Community-Based Association Inc
 450.00 7/12/99

Part of the CSCs
 Bitong Gujo Greemers Association Inc
 328.00 3/23/99

Table 4.5.5 (b) List of Certificate of Stewardship Contracts(CSCs) issued in Quirino and Integration into CBFMA Projects (&[ページ番号]/&[総ページ数])

In Quirino	CENRO	Municipality	Barangay	Sitio	No. of CSC	Area (ha)	Data	Within/Outside	Incorporated CBFMA project		
									PO Name	Area (ha)	Date
Quirino	Diffun	Aglipay	Di odol		46	98.47	1995	within			
Quirino	Diffun	Aglipay	Dumabel		90	329.55	1987/9/30	within			
Quirino	Diffun	Aglipay	Dumabel		16	53.75	1988/3/28	within			
Quirino	Diffun	Aglipay	Dumabel		3	0.80	8/30-9/30/89	within			
Quirino	Diffun	Aglipay	Dumabel		4	20.20	8/30-9/27/90	within			
Quirino	Diffun	Aglipay	Dumabel		12	26.80	1991/10/20	within			
Quirino	Diffun	Aglipay	Dumabel		10	34.42	1992/3/30	within			
Quirino	Diffun	Aglipay	Guinalbin		10	11.36	1985/1/7	within			
Quirino	Diffun	Aglipay	Kabugao		39	110.10	1988/11/21	within			
Quirino	Diffun	Aglipay	Kabugao		2	2.30	1991/12/2	within			
Quirino	Diffun	Aglipay	Ligays		2	4.50	1988/3/28	within			
Quirino	Diffun	Aglipay	San Leonardo	Kabugao	9	23.70	8/30-8/31/89	within			
Quirino	Diffun	Aglipay	San Leonardo		141	140.14	1995	within			
Quirino	Diffun	Aglipay	San Manuel		16	48.50	1991/9/30	within			
Quirino	Diffun	Aglipay	Villa Pagaduan	Magalsing	35	73.87	1990/9/27	within	San Manuel-Victoria Forest Developers Cooperative	3,176.00	10/16/94
Quirino	Diffun	Aglipay	Villa Pagaduan		10	25.95	1995	within			
Quirino	Diffun	Aglipay	Villa Pagaduan	Magalsing	35	95.30	1988/11/28	within			
Quirino	Diffun	Aglipay	Villa Pagaduan		91	140.40	1989/7/25	within			
Quirino	Diffun	Cabarroguis	Burgos	Debibi	36	58.50	1988/9/30	within			
Quirino	Diffun	Cabarroguis	Burgos		1	2.10	1989/10/29	within			
Quirino	Diffun	Cabarroguis	Calaoacan		90	266.70	1994	within			
Quirino	Diffun	Cabarroguis	Calaoacan		16	48.57	1995	within			
Quirino	Diffun	Cabarroguis	Debibi		9	18.63	3/3-11/15/898	within			
Quirino	Diffun	Cabarroguis	Debibi	Nawal	55	160.35	1992/9/16	within			
Quirino	Diffun	Cabarroguis	Debibi		26	85.23	1993/9/20	within			
Quirino	Diffun	Cabarroguis	Gomez		33	149.97	1984/6/30	within			
Quirino	Diffun	Cabarroguis	Gomez		153	440.14	3/13-6/13/85	within	Gomez Farmers Multi-Purpose Cooperative, Inc	620.00	9/3/00
Quirino	Diffun	Cabarroguis	Gomez		7	15.16	1995	within			
Quirino	Diffun	Cabarroguis	Gomez		49	113.91	5/20-10/21/96	within			
Quirino	Diffun	Cabarroguis	Villa Rose		12	23.87	1992/9/21	outside			
Quirino	Diffun	Cabarroguis	Villamor		13	18.00	1991/10/21	outside			
Quirino	Diffun	Cabarroguis	Villamor Village		2	8.22	1993/4/16	outside			
Quirino	Diffun	Cabarroguis	Villarose		35	104.01	1994	within			
Quirino	Diffun	Diffun	Aklan Village		4	10.16	1991/3/29	within			
Quirino	Diffun	Diffun	Aklan Village		49	185.27	1988/8/22	within			
Quirino	Diffun	Diffun	Aklan Village		1	2.70	1989/3/30	within			
Quirino	Diffun	Diffun	Aklan Village		24	81.82	1992/8/30	within			
Quirino	Diffun	Diffun	Aklan Village		6	16.16	1995	within			
Quirino	Diffun	Diffun	Baguio Village		12	60.13	8/26-10/18/90	within			
Quirino	Diffun	Diffun	Baguio Village	Cupianan	134	562.13	1/13-8/20/86	within			
Quirino	Diffun	Diffun	Baguio Village	Cupianan	16	59.25	1988/3/11	within			
Quirino	Diffun	Diffun	Baguio Village		11	31.61	1989/8/25	within			
Quirino	Diffun	Diffun	Baguio Village		2	6.00	1993/7/20	within			
Quirino	Diffun	Diffun	Dumanisi	Malayod	6	13.60	1988/3/11	within			
Quirino	Diffun	Diffun	Gomez		9	17.00	1992/8/10	within			
Quirino	Diffun	Diffun	Magsaysay		34	95.86	1985/4/26	within			
Quirino	Diffun	Diffun	Magsaysay		10	20.76	4/26-9/1/87	within			
Quirino	Diffun	Diffun	Magsaysay		9	25.91	4/26-11/22/93	within			
Quirino	Diffun	Diffun	Primentel		29	67.49	1993/9/20	within			
Quirino	Diffun	Diffun	Rafael Palma		2	8.76	1991/3/29	within			
Quirino	Diffun	Diffun	Rafael Palma		16	46.71	1989/3/30	within			
Quirino	Diffun	Diffun	Rafael Palma		2	8.93	1989/3/30	within			
Quirino	Diffun	Diffun	Ricarte Norte		10	17.80	1987/9/30	outside			
Quirino	Diffun	Diffun	Ricarte Sur		4	5.55	1988/3/11	within			
Quirino	Nagtipunan	Cabuaan	Manglad		142	420.24	1992/8/15	within			
Quirino	Nagtipunan	Maddela	Baliguai		58	131.56	1994/7/4	within	Baliguai Community Forestry and Dev. Coop Inc	4,400.00	6/24/97
Quirino	Nagtipunan	Maddela	Cabua-an		47	102.67	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cabua-an		42	80.97	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cabua-an		35	66.75	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cabua-an	Anipto	27	57.61	1993/9/3	within			
Quirino	Nagtipunan	Maddela	Cabua-an	Anipto	29	60.40	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cabua-an	Dihabatan	27	43.31	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cabua-an	Dihabatan	17	38.21	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cabua-an	Didungol	18	35.10	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cabua-an	Anipto	24	56.33	9/1/93-9/1/94	within			
Quirino	Nagtipunan	Maddela	Cabua-an		8	16.39	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cabua-an		16	33.57	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cabua-an		11	38.51	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Cocaville		52	148.32	7/1/83	within			
Quirino	Nagtipunan	Maddela	Cocaville		66	75.35	1988/10/10	within			
Quirino	Nagtipunan	Maddela	Cocaville		18	28.64	1989/3/16	within			
Quirino	Nagtipunan	Maddela	Dipiati	San Antonio	44	55.11	1989/9/18	within			
Quirino	Nagtipunan	Maddela	Divisoria Suir		96	149.59	7/26-9/6/88	within			
Quirino	Nagtipunan	Maddela	Dumapata		89	215.91	6/2-11/17/89	within			
Quirino	Nagtipunan	Maddela	Dumapata		9	22.12	1990/9/27	within			
Quirino	Nagtipunan	Maddela	Dumapata		11	29.84	1991/6/3	within			
Quirino	Nagtipunan	Maddela	San Dionisio		25	82.82	1995/4/17	within			
Quirino	Nagtipunan	Maddela	Sangbay	Disaguan	77	114.12	1995/8/21	within			
Quirino	Nagtipunan	Maddela	Sangbay	So. Mapopot	42	92.71	6/10-9/2/96	within			
Quirino	Nagtipunan	Maddela	Sto. Nino		119	212.81	6/2-11/89	within			
Quirino	Nagtipunan	Maddela	Sto. Nino		3	7.26	1990	within			
Quirino	Nagtipunan	Maddela	Sto. Nino		13	42.14	1995/4/17	within			
Quirino	Nagtipunan	Maddela	Villa Agullana		47	99.45	1993/9/1	within			
Quirino	Nagtipunan	Maddela	Villa Agullana		43	177.32	1994/7/4	within			
Quirino	Nagtipunan	Maddela	Villa Gracia		67	213.19	10/28/86-9/7/87	within			
Quirino	Nagtipunan	Maddela	Villa Gracia		27	82.75	5/2-6/2/88	within			
Quirino	Nagtipunan	Maddela	Villa Yllana	Dimapata	29	54.71	1993/9/1	within			
Quirino	Nagtipunan	Nagtipunan	Anak	Dehonglin	111	322.63	1992/2/25	within			
Quirino	Nagtipunan	Nagtipunan	Anak	Macabo	55	151.09	8/30-9/19/91	within			
Quirino	Nagtipunan	Nagtipunan	Anak	Macabo	10	25.45	1990/9/27	within	Anak Intercultural Organization	5,315.00	6/15/96
Quirino	Nagtipunan	Nagtipunan	Anak	Makabo	36	107.05	1989/11/20	within			
Quirino	Nagtipunan	Nagtipunan	Anak	Upper Macabo	125	238.40	1995/8/21	within			
Quirino	Nagtipunan	Nagtipunan	Dipinpin	San Antonio	62	184.34	1990/6/21	within			
Quirino	Nagtipunan	Nagtipunan	Disimungal		90	209.03	1990/7/26	within			
Quirino	Nagtipunan	Nagtipunan	Disimungal		146	430.09	1996/9/2	within			
Quirino	Nagtipunan	Nagtipunan	Sangbay		143	434.20	10/3/84	within			
Quirino	Nagtipunan	Nagtipunan	Sangbay		49	146.20	7/1/85	within			
Quirino	Nagtipunan	Nagtipunan	Sangbay		56	178.23	3/11-2/9/87	within	Sangbay Anak Integrated Farmers Association Inc.	134.00	8/27/97
Quirino	Nagtipunan	Nagtipunan	Sangbay		10	34.70	1988/6/2	within			
Quirino	Nagtipunan	Nagtipunan	Sangbay		3	5.90	1989/4/17	within			
Quirino	Nagtipunan	Nagtipunan	Sangbay		2	6.00	1990/11/29	within			
					3,774	9,334					

Source: Digital data printouts obtained from DENR Region 02 office

Table 4.5.5 (c) List of Certificate of Stewardship Contracts(CSCs) issued in Ifugao and Integration into CBFMA Projects¹⁾

PENRO	CENRO	Municipality	Barangay	Sito ²⁾	No. of CSC ³⁾	Area (ha)	Data	Within/Outside Study Area	Incorporated CBFMA project		
									PO Name	Area (ha)	Date
Ifugao	Alfonso Lista	Aguinaldo	Banguil, Ubao	Banguil, Ubao	5	10.00	-	Outside			
Ifugao	Alfonso Lista	Aguinaldo	Butac	Butac	5	41.00	-	Outside			
Ifugao	Alfonso Lista	Aguinaldo	Halag, Ubao	Halag Ubao	10	67.00	-	Outside			
Ifugao	Alfonso Lista	Aguinaldo	Mongayong	Mongayang	15	180.00	-	Outside			
Ifugao	Alfonso Lista	Aguinaldo	Monggayang	Nambasal	5	31	-	Outside			
Ifugao	Alfonso Lista	Aguinaldo	Mungayang	Manaot	10	75.00	-	Outside			
Ifugao	Alfonso Lista	Aguinaldo	Ubao	Banguil	10	68.00	-	Outside			
Ifugao	Alfonso Lista	Aguinaldo	Ubao	Lubuan	5	6	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Busilac	Busilak	5	9.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Caragasan	Bilibid	5	47.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Caragasan	Malalupa	15	126.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Caragasan	Palagtu	35	314	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Kiling	Battalion	10	82	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Kiling	Catobangan	20	219.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Kiling	Nakkedan	5	28	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Little Tadian	Little Tadian	20	194.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Little Tadian	Little Tadian	45	420.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Namillangan	Pabalay ISF	20	192	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Ngileb	Ngileb ISF	15	132	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Ngileb	Bolinaonao	5	53.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Ngileb	Mapapi	15	126.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Pinto	Bulde Pinto	25	236.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Pinto	Bulde	5	36.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Pinto	Fourteen	20	170	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	San Jose	San Jose	50	493.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	San Quintin	San Quintin	15	129.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	San Quintin	Cabulungan	5	20.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	San Quintin	Payong	10	115.00	-	Outside			
Ifugao	Alfonso Lista	Alfonso Lista	Santa Maria	Rosenda	10	89.00	-	Within			
Ifugao	Lamut	Asipulo	Amduntog	Amduntog	5	34.00	-	Within			
Ifugao	Lamut	Asipulo	Asipulo	Asipulo	74	178.51	-	Within			
Ifugao	Lamut	Asipulo	Attaban	Amduntog	5	10.00	-	Within			
Ifugao	Lamut	Kiangan	Baguinge	Ibulao	178	760.00	-	Within			
Ifugao	Lamut	Kiangan	Baguinge	Baguinge	15	180.00	-	Within			
Ifugao	Lamut	Kiangan	Bolog	Danghay & Lana	15	129.00	-	Within			
Ifugao	Lamut	Kiangan	Duit	Palao, Duit	10	81.00	-	Within			
Ifugao	Lamut	Kiangan	Nagacadan	Bayninan	5	47.00	-	Within			
Ifugao	Lamut	Lagawe	Boliwong	Boliwong	25	234.00	-	Within			
Ifugao	Lamut	Lagawe	Juchong	Juchong	45	446.00	-	Within			
Ifugao	Lamut	Lagawe	Luta	Luta	10	98.00	-	Within			
Ifugao	Lamut	Lagawe	Maitab	Maitab	5	53.00	-	Within			
Ifugao	Lamut	Lagawe	Maitab	Maitab	5	20.00	-	Within			
Ifugao	Lamut	Lamut	Ambasa	Ambasa	10	133.00	-	Within			
Ifugao	Lamut	Lamut	Lucban	Lucban	5	39.00	-	Within			
Ifugao	Lamut	Lamut	Mabatobato	Banting	5	41	-	Within			
Ifugao	Lamut	Lamut	Magulon	Regimental	35	327.00	-	Within			
Ifugao	Lamut	Lamut	Payawan	Dilan	105	881.00	-	Within			
Ifugao	Lamut	Lamut	Payawan	Pacco	10	1028.00	-	Within			
Ifugao	Lamut	Lamut	Pieza	Pieza	10	68.00	-	Within			
					997	8,496					

Source: CBFMP in Ifugao, 4/18/01

- (1) No existing CSC projects have been incorporated into CBFM projects.
- (2) Sito indicates the name of ISA projects named after the location of sitio or barangay.
- (3) The number of CSC indicates the number of ISA participating households.

Table 4.5.5 (d) List of Certificate of Stewardship Contracts(CSCs) issued in Isabela and Integration into CBFMA Projects⁽¹⁾

PENRO	CENRO	Municipality	Barangay	Sitio	No. of CSC	Area (ha)	Data	Within/Outside Study Area	Incorporated CBFMA project		
									PO Name	Area (ha)	Date
Isabela	Cauayan	Echague	Benguet		58	184.07	8/12-10/12/89	Inside			
Isabela	Cauayan	Echague	Benguet		89	345.71	3/21-10/25/90	Inside			
Isabela	Cauayan	Echague	Benguet	Diarsatan	27	68.84	9/25-11/26/91	Inside			
Isabela	Cauayan	San Guillermo	Rizal	So. Jeet	126	246.80	1993	Inside			
Isabela	Cauayan	San Guillermo	Rizal	S. Ahod	140		1993	Inside			
Isabela	Santiago	Jones	Dibuluan		57	61.06	1989/6/5	Inside			
Isabela	Santiago	Jones	Dumawing		133	287.88	1994/9/20	Inside			
Isabela	Santiago	Jones	Linomot		41	87.81	11/8-11/17/83	Inside			
Isabela	Santiago	Jones	Linomot		22	42.53	1984/5/24	Inside			
Isabela	Santiago	Jones	Papan Weste		55	68.28	1989/6/5	Inside			
Isabela	Santiago	Jones	San Sebastian		256	601.08	1993	Inside			
Isabela	Santiago	Jones	Sto. Domingo		136	452.38	1994/10/3	Inside			
					1,140	2,446					

Source: Digital data printouts obtained from DENR Region 02 office
⁽¹⁾No existing CSC projects have been incorporated into CBFMA projects.

Table 4.6.1 List of Species for Reforestation

Province	Tree Species
1. Nueva Vizcaya	<ul style="list-style-type: none"> - Alibangbang (<i>Bauhinia monandra</i>) - Mahogany (<i>Swietenia macrophylla</i>)* - Narra (<i>Pterocarpus</i> spp.)* - Palosanto (<i>Triplaris cumingiana</i>) - Talisai (<i>Terminalia catappa</i>) - Teak (<i>Tectona grandis</i>) - Yakal (<i>Hopea astylosa</i>) - Yemane (<i>Gmelina arborea</i>)*
2. Ifugao	<ul style="list-style-type: none"> - Agoho (<i>Casuarina equisetifolia</i>) - Akleng Parang (<i>Semalbizia</i> spp) - Almaciga (<i>Agathis dammara</i>) - Alnus (<i>Alunus formosana</i> or <i>japonica</i>)* - Bagras = Kamerere (<i>Eucalyptus deglupta</i>)* - Benguet Pine (<i>Pinus kesiya</i>)* - Mahogany (<i>Swietenia macrophylla</i>)* - Narra (<i>Pterocarpus indicus</i>)* - Rain tree (<i>Samanea saman</i>) - Talisai (<i>Terminalia catappa</i>) - Teak (<i>Tectona grandis</i>) - Yemane (<i>Gmelina arborea</i>)* - White Lauan (<i>Pentacme contorta</i> or <i>Shorea squamata</i>)
3. Quirino	<ul style="list-style-type: none"> - Bagras (<i>Eucalyptus deglupta</i>) - Ipil-ipil (<i>Leucanena leucocephala</i>) - Mahogany (<i>Swietenia macrophylla</i>)* - Narra (<i>Pterocarpus indicus</i>)* - Yemane (<i>Gmelina arborea</i>)*
4. Isabela	<ul style="list-style-type: none"> - Alibangbang (<i>Bauhinia monandra</i>) - Mahogany (<i>Swietenia macrophylla</i>)* - Narra (<i>Pterocarpus indicus</i>)* - Palosanto (<i>Triplaris cumingiana</i>) - Rain tree (<i>Samanea saman</i>)* - Talisai (<i>Terminalia catappa</i>) - Teak (<i>Tectona grandis</i>)* - Tindalo (<i>Pachyrrhizus rhomboidea</i>) - Yemane (<i>Gmelina arborea</i>)*

*) Popular species for planting

Table 4.6.2(1) Management Techniques for Mahogany (*Swietenia macrophylla*)

Name	Management Techniques
1. General Description	Native to Peru and Brazil in Central America, and it was introduced in the Philippines in 1914.
2. Site requirements	It can adapt to a variety of soils but has a distinct preference for well-drained, sandy clay slopes. It also grows well on rather shallow as well as deep alluvial soils. It thrives well at temperatures ranging from 11 to 32 °C. It is a lowland tree and does not grow properly at an altitude above 600 m. It thrives well at a rainfall range of 1,500 to 5,000 mm and tolerates dry season up to 7 months.
3. Propagation/ Seed Technology	<p>Seeds are available in the months of January to March; August and December. They are removed from the pod and dried under that shade for 1 to 2 weeks to reach moisture content of 5-7%. Seed count per kilogram is about 2,264 (medium size) and 2,933 (small size). Dried matured seeds usually can germinate within 8-14 days and has a germinating capacity of 80% or higher.</p> <p>Seedlings should be outplanted during rainy season. They should be free from grasses and other weeds. Full sunlight and abundant moisture supply enhance growth of seedlings. Seedlings should be transferred in plastic bags when 15 cm long which splits open when ripe.</p> <p>Seeds with MC of 5-7% can be stored in sealed plastic bag at 7-8 °C for 1 year or more. Seeds stored in the same container at room temperature (29-30 °C) lose viability after 2 to 3 months.</p>
4. Nursery practices	<ul style="list-style-type: none"> - Seedbeds must be prepared before sowing - Soil should be dug about 1 foot deep, soil dug should be thoroughly pulverized - Mix 1 part sand and 3 parts soil to make the medium friable - Dewing the seeds and now in seedbeds in drills at 8-10 cm apart with a distance from 4-5 cm between the seeds. Depth of sowing is 3-4 cm. - Full light and abundant water supply favor the rapid growth of seedling.
5. Transplanting/ Outplanting	<ul style="list-style-type: none"> - Transfer the seedlings in plastic bags when it reaches the height of 15 cm - Outplant seedlings upon reaching 12-18 inches tall - Remove grasses and other weeds and dig holes 2 × 2 m apart - Outplant only during rainy season
6. Diseases	<p>(Sclerotium Root Rot) Root and basal stem of the seedlings are invaded. Affected seedlings suddenly wilt. On the soil surface, around the wilted seedlings and on the stem, many light brown and globular sclerotial bodies are produced measuring 0.5-1.0 mm. White and thin mycelial growth is usually present.</p> <p>(Foot Rot) Root of seedlings are affected. Growth of affected seedlings is largely suppressed due to the injury of the root system. In severe cases, seedling become reddish or purplish which later wilt and die.</p> <p>(Stem Rot) Basal stem of the seedling is usually infected. If infection extends around the basal stem, seedlings consequently wilt. On the basal part of the dead seedling, several black pustule are produced.</p>
7. Pest	Leaf miner (<i>Acrocercops auricilla</i>), Leaf bug (<i>Helopittis antonii</i>), Shoot borers (<i>Hypsiphyla grandella</i>)
8. Uses	It is used in multistory systems in the Philippines, boat and ship building and pattern making. Logs are used in the manufacture of veneers and for panelling. It is also used as shade for coffee and cacao.

Source: RISE (1995) Vol. 7, No. 1 January - February

Table 4.6.2(2) Management Techniques for Narra (*Pterocarpus* spp.) (1/2)

Name	Management Techniques
1. General Description	<p>The species can be found in Cagayan, Mindoro, Palawan, Agusan and Cotaato. It is especially adopted to the Philippines temperature ranging from 22-32°C with an average annual rainfall of 2,366 mm. It prefers low damp soils but occasional trees may be found in drier slopes. It thrives best in moist, sandy loam or clay loam soil, along gullies and stream banks of low and medium elevations. It also grows up to an elevation of as high as 1,300 m.</p>
2. Propagation/ Seed Technology	<p>Collecting and handling procedure is such as follows:</p> <ul style="list-style-type: none"> - Collect seeds from superior mother trees, and viable seeds should be free from abnormalities. - When fruits or pods fall to the ground, collect them immediately to prevent contamination of microorganisms from the ground. - Collect seeds during the regular fruiting season from January-July or September-November. - Destroy insects found among the pods by spraying insecticides such as Malathion, Baythion, Silosan or Methaxylor. - Before storing, apply a small amount of inert mineral dust or chemically active dust or a mixture of the two. Calcium carbonate and magnesium oxide are examples of inert compounds. - In transporting, pack the seeds with powdered charcoal, which absorbs excess moisture. - Sundry the pods for about week to reduce the MC to 7-8% before storing at room temperature.
3. Asexual Propagation	<p>Cutting:</p> <ul style="list-style-type: none"> - Select superior mother trees as source of cuttings. - Cut off desired branches depending on the intended use. For parks and roadside planting materials, a cutting with a big diameter and length of 1 m or more is good enough. Removal of twigs and leaves and cutting the upperpoing is necessary to reduce transpiration and loss of moisture. - Large branch cutting about 10 cm in diameter and 2 m long treated with rooting hormones can produce instant trees. <p>Stump Planting:</p> <ul style="list-style-type: none"> - The stumps of the seedlings are cut one inch above the root collar and planted barefoot. - Stump planting can improve the diameter and height growth of Narra. There is also greater percentage of survival for stump planted seedlings. <p>Tissue Culture Propagation:</p> <ul style="list-style-type: none"> - Plant tissues are artificially grown in a culture medium. Tissue culture is one of the best tools in tree improvement. It enables the propagation of superior planting stocks of selected plants. - Experiment shows that stem tissues of 6 months to 2 years old Narra saplings are promising for tissue culture propagation. This technique, however, has not yet been perfected for large scale application. <p>Other Techniques:</p> <p>Grafting, Buding, Marcotting and Layering</p>

Table 4.6.2(2) Management Techniques for Narra (*Pterocarpus* spp.) (2/2)

Name	Management Techniques
4. Nursery practices	<ul style="list-style-type: none"> - Sow the seeds (usually in pods) in prepared 1 × 6 m plots with shallow drills 15 cm apart. - The pods can also be directly sown in plastic bags (5" × 6" × 0.004 mm) filled with topsoil or ordinary soil. - Water the seed beds twice a day during the dry season or water as often as necessary to keep the soil moist but avoid excessive watering. - When direct seeding is desired, clean area or spot, make hole by means of mattock. Use 2 × 2 m spacing and place 2-4 pods in 1 hole. - The seedlings of Narra are considered ready for outplanting when it reaches 50 cm in height. This ensures better survival. Outplanting is done using bareroot or potted planting materials. Bareroot planting in dry areas is not advisable. - Plotted seedlings should be raised for about 5-6 months in the nursery to attain plantable size of about 50 cm. - Nursery raised seedlings should be planted in the field during rainy season.
5. Plantation Establishment	<p>Site Preparation:</p> <ul style="list-style-type: none"> - Prepare planting site by brushing or clear brushing any existing vegetation in the plantation area. - Dig holes of about 15 cm in diameter and 15-20 cm deep for seedlings and for cuttings about 20 cm in diameter and 30 cm deep. - Use initial spacing of 1 × 1 m for plantation to increase development for longer stems. Gradual thinning may be applied later on to increase diameter growth. Individuals thinned out may be balled for transplanting in other parts of the planting area, for landscaping in parks, a 4 × 4 m to 10 × 10 m spacing may be applied. - Painting the wood portion of the proximal ends of cutting with wood paint or red lead and treating the bark portion with rootone powder will reduce the destruction of termite on cuttings and enhance earlier rooting. It also gives greater percentage of survival. <p>Fertilization: Application of fertilizer on outplanted seedlings is not encouraged since there is little effect on the survival rate of seedlings.</p> <p>Weeding: Ring weeding should be practiced from time to time to improve the survival rate of outplanted seedlings.</p>
6. Diseases/Pests	<p>Causal Organism: Associated with seed decay are species of <i>Fusarium</i>, <i>Colletotrichum</i>, <i>Penicillium</i>, <i>Aspergillus</i>, <i>Rhizopus</i>, and many other bacteria. Decay of seeds is favored by immaturity of the seeds and improper drying and storage.</p> <p>Seedling Root Rot: Seedlings of Narra growing on nursery beds when newly transplanted are susceptible to root rot.</p> <p>Damping off: This is one of the most common diseases of seeds/seedlings in the nursery. In general, damping off refers to any diseases that results in the rapid decay of young succulent seedlings or shoots just before and after emergence of young shoots.</p> <p>Leaf Spot: - Common to Narra and may infect the plant even during the seedling stage. Three different fungi have been found to be associated with the disease, namely <i>Phyllachora pterocarpi</i>, <i>Pestotia</i> sp., <i>Aldona Stella-nigra</i>, and <i>Cercospora pterocarpi</i>.</p> <p>Stem/Branch Rot: A wide variety of Basidiomycetes and a few Ascomycetes can cause the decay of living trees.</p>
7. Uses	<p>The species is well known for the use of furniture. It is excellent for making radio cabinets, table tops, piano cases and sala sets. It is good source of red dye. It also has medicinal properties because its root juice can be used for syphilitic sores. A yield of approximately 8 m³ of log can be obtained from a 30-year-old tree raised under favorable condition.</p>

Source) RISE (1995) Vol. 7, No. 1 January - February

Table 4.6.2(3) Management Techniques for Yemane (*Gmelina arborea*) (1/2)

Name	Management Techniques
1. General Description	Yamane has a remarkable growth rate that reaches a merchantable timber size of 5.8 m to 8.3 m with 10 to 15 cm diameter in 3 years. This is short-lived tree but with good soil condition, proper care and maintenance, it is capable of surviving from 30 to 40 years. Production may exceed 30 m ³ /ha every year. This is a prolific seeder even at a juvenile age of 3 - 4 years.
2. Site requirements	It thrives well on sites with elevation up to 525 m (1,750 ft) above sea level. The species can tolerate acidic, calcareous (soil containing sufficient calcium carbonate) and lateritic soil (any reddish soil developed from weathering composed mainly oxides of iron, aluminum, titanium and manganese). However, it prefers loamy, well-drained, moderately fertile soil. Vigorous growth can be obtained in under monsoonal climate with distinct dry periods. Suitable area for the species should have annual rainfall of between 750 - 4,500 mm and ambient temperature ranging from 21 - 28 °C.
3. Propagation/ Seed Technology	Seed of Yemane can be collected from the fallen fruits during March to June. After soaking the fruits in tap water for 1 week, macerate the flesh against a half-inch meshwire. Seeds should be separated by letting the macerated pulp float in tap water. Average of 1995 seeds per kg of fruits can be collected. The seeds are to be air dried for 5-7 days. They can be stored with or without fungicide dressing to attain 7 to 8% moisture content at 7 - 8 °C. Then, the seeds can be stored at room temperature remain viable for 2 to 3 months and should be soaked in tap water overnight before sowing.
4. Nursery practices	Sandy loam soil needs to be used and the seeds are sown 6 to 8 cm apart within rows and 8 to 10 cm between rows. Germination period usually takes 12 to 15 days. Then the following steps are usually taken. <ul style="list-style-type: none"> - Prepare raised germination beds about 1 m wide of desired length. Remove stones and undecomposed organic matter. Pulverize and level the clods. - Sow seeds with an interval of 6 to 8 cm along the rows and 8 to 10 cm between the rows to attain production of seedlings with large stems and more fibrous roots. Cover lightly with soil, preferably compost litter. - Water the beds twice a day using sprinkler after sowing. Shading is not necessary except for newly planted seeds. - Regulate the time of sowing in order to produce stumps not larger than 5.08 cm or 2 inches in diameter at the time of planting. Germination usually takes place to 4 weeks. - Outplant woody seedlings that have attained pencil thickness.

Table 4.6.2(3) Management Techniques for Yemane (*Gmelina arborea*) (2/2)

Name	Management Techniques
5. Establishment of Plantation	<p>Following procedure is recommended for the the establishment of Yemane plantation.</p> <ul style="list-style-type: none"> - Plant 7 to 10 months old stumps and seedlings from May to July or during the rainy season in dug holes spaced at 2 x 3m. - Wrap the root the root system of the seedlings with wet sak, banana leaves or sheath (i.e. a hundred seedlings per bundle) to avoid dissipation when transporting. - Ring weed outplanted seedlings to liberate them from shrubs, grasses, sedges and other ground cover vegetation. This is necessary for the first year only, after which the dense canopy of gmelina suppresses the weeds. The most appropriate time to weed the plantation is during the early and latter part of the rainy season. Avoid weeding during dry months. - About 30 days after outplanting, apply comlete fertilizer (14-14-14 or 15-15-15) at the rate of 100 kg/ha to improve growth and survival. Trench about 5 cm deep and 5 cm away from the vase of the seedlings. Place fertilizer in this trench and cover with soil. - Remove overlapping branches, bent and low stems in cleaning and tending operations during the first and second year. - The second fertilizer application is usually done during the first weeding/cleaning operation. This is carried out at the latter part of the rainy season or about 90 days after outplanting.
6. Diseases	<p>Sooty mold (<i>Meiola clerodendricola</i>) is common with the species. The symptom is that leaves, petioles, twigs and branches are partially or completely covered with black mycelial colonies of fungus. The leaves become grayish black and later turn to dirty brown and fefoliate. Other diseases include brown leaf spot, damping-off and <i>Lepidopterous defoliators</i> (pest).</p>

Source) RISE (1995) Vol. 7, No. 3 May - June

Table 4.6.2(4) Management Techniques for Japanese Acacia (*Acacia auriculiformis*)

Name	Management Techniques
1. General Description	This species is a resilient, vigorously growing small tree with a generally crooked trunk. It can grow up to 60 cm in diameter and can reach a maximum height of 30 meters. It looks like ayangile (<i>Acacia confusa</i>) but the former has bigger leaves. Ayangile has straight pods (10-13 cm) and small seeds with ribbon-like orange tissue (funicle) surrounding the seed at its edge.
2. Site requirements	This species can grow under humid, tropical conditions and thrives where mean annual temperature ranges from 26 to 30 °C. However, it can tolerate savannah conditions since it has thick and leathery leaves that can withstand heat and dissipation. It is suitable as a forest plantation crop at an altitude up to 600 m. It can grow in a habitat with an average annual rainfall ranges from 1,500 to 1,800 mm with a dry season of 6 months.
3. Propagation/ Seed Technology	Seeds of the species can be collected in February to May. They should be immediately soaked into newly boiled water and cool down for 24 hours. Then, the seeds can be stored in sealed plastic bags with 7 to 8% MC to maintain high viability for 2 to 3 years.
4. Establishment of Plantation	This species can be easily established by direct seeding or from nursery raised seedlings. It adapts well to cultivate plantations. The plant has taproot and can withstand root competition from nearby trees. Plantation requires no extensive site preparation other than clearing undesirable vegetation and trash and weeding during the early years.
5. Diseases	Common diseases of the species are sooty mold and powdery mildew.
6. Uses	This is well suited for fuel wood, with a relatively high specific gravity (0.6-0.75) and a calorific value of 4,800 to 4,900 kcal/kg. The wood also yields excellent charcoal.

Source) RISE (1995) Vol. 7, No. 3 May - June

Table 4.7.1 Center for People Empowerment in the Uplands

Province	Municipality	Area (Ha.)	Remarks					
			Starting year	Name of PO	No. of Families	Implementing Agency	Source of Funds	Other Information
Quirino	Aglipay	349	1992	Villa Ventura Multi-purpose Cooperative Inc.	170	DENR	Regular/CBFM-CARP Funds	The Proj.was converted as CBFMP in 2000 & now as Prov'l CBFM Model site.
Isabela	Cordon	203	1992	Taleb Upland Farmers Multi-Purpose Coop. Inc.	72	DENR	DENR & OECF	The Proj.was converted as CBFMP in 1999 & now as Prov'l CBFM Model site.
Nueva Vizcaya	Sta. Fe	240	1988	Balete Upland Farmers Multi-purpose Coop.	80	DENR	DENR	CPEU model site
Ifugao	Asipulo	187	1996	Attaban ISF Farmers Association	72	DENR	DENR	Income generating project: P50,000.00 Fishpond and fingerlings: P80,000.00 Training courses conducted
Ifugao	Lagawe	154	1991	Luta Farmers Association	105	DENR	DENR	
Total		1132						

Source: Records of PENROs and CENROs

Table 4.7.2 Reforestation by Administration (REFO-A) (1/2)

	Name of Project	Municipality/ Province	Area (ha)	Implementing Agency	Coverage area(ha) at present	Plantation Dev't.		Remarks	
						Species Planted	Other Activities	Other Info	
1	Casencan Reforestation Livelihood Project	Dupax del Norte, Dupax del Sur and Alfonso Castaneda, Nueva Vizcaya	383	DENR	383	Yemane, Pine, Mahogany	Maintenance and protection is on-going under DENR regular fund	Project was accomplished in 1998. Funding of the project comes from Casencan Multi-sectoral Task Force. Project area is within the Casencan Protected Landscape proclaimed area under NIPAS.	
2	International Tropical Timber Organization Project	Bayombong, Nueva Vizcaya	206	DENR	3000	Rain tree, Narra, Mahogany, Gmelina	Protection and maintenance of established plantation, ringweeding and application of fertilizers.	Area developed and planted is 206 hectares is now converted to Community-based Forest Management Program under CBFMA No. 020219005 favor of Federation of Vistahills, kalongkong & kakilingan Upland Farmers Incorporated	
3	Consuelo Reforestation Project	Consuelo, Santa Fe, Nueva Vizcaya	3,424	DENR	11,664	Mahogany, Gmelina, Narra, Teak	Protection and maintenance of the established plantation are being undertaken by DENR and Local Government Unit	The project was terminated in 1991. 1497 has. - covered by ISF / CBFM project 4,075.7 has. - under DENR 3,323 has. - covered by CADC 4,600 has. - was turned over to LGU (Eco-tourism Management per MOA dated September 22, 1997) Plantation was commenced by C.G on February 14, 1939 Area Planted : 3,424 hectares	
4	Salinas Reforestation Project	Bambang, Nueva Vizcaya	1,423	DENR	5,318	Teak, Narra, Alibangbang, Mahogany	Protection and maintenance were being undertaken by DENR CENRO Aritao. Area planted or plantation established is 1,432 has.	The project was terminated in 1994. The area is now proclaimed as Salinas Natural Monument pursuant to proclamation No. 275 dated April 23, 2000 designating the area as protected under NIPAS	
5	Dupax Reforestation Project	Ganao, Dupax del Sur, Nueva Vizcaya	443	DENR	443	Gmelina, Mahogany, Teak	Protection of the established plantations	The whole reforestation area is already a part of the Casencan River Watershed Forest Reserve now Casencan Protected Landscape under Proclamation No. 289 dated April 25, 2001, protected area under NIPAS	
6	Dupax Reforestation Project	Dopa, Domang and Palabutan, Dupax del Sur, Nueva Vizcaya	425	DENR	425	Mahogay, Gmelina, Narra, Teak	Maintenance and protection were being undertaken by DENR	The whole reforestation area is proclaimed as Dupax Watershed Reservation under Proclamation No. 289 dated April 25, 2000 as protected area under NIPAS.	
7	Magat Reforestation Project	Diadi and Bagabag, Nueva Vizcaya	3,036	DENR	20,050	Mahogany, Yakal, Gmelina, Teak, Narra	Protection and maintenance activities were being undertaken by the Lower Magat Management Office which composed of personnel from DENR-PENRO & LGU-ENRO.	The project is now under the Lower Magat Forest Management Office, co-management of Provincial Government on Nueva Vizcaya and DENR Memorandum dated February 25, 1998. Area planted or established plantation is 3,036 hectares.	
8	Baysovilla Reforestation Project	Bayombong, Nueva Vizcaya	7,236	DENR	7,236	Gmelina, Mahogany, Narra, Auriculiformis		Project terminated 1993. Portion of the protected area are now the ITTO project. Forest production area/ USUFRUCT of PENRO DENR employees of Nueva Vizcaya.	
		Sub-total	16,576						

Table 4.7.2 Reforestation by Administration (REFO-A) (2/2)

	Name of Project	Municipality/ Province	Area (ha)	Implementing Agency	Coverage area(ha)	Remarks		
						Plantation Dev't. Species Planted	Other Activities	Other Info
9	Mayoyao Reforestation Project	Mayoyao, Ifugao	1,105	DENR	1,105	Benguet pine, Gmelina, Alnus, Japanese acacia		
10	Aguinaldo Reforestation Project	Aguinaldo, Ifugao	684	DENR	684	Benguet pine, Gmelina		
11	Potia Reforestation Project	Potia, Ifugao	559	DENR	559	Mahogany, Gmelina, Teak		
12	Bahawit Reforestation Project	Lagawe, Ifugao	917	DENR	917	Rattan, Gmelina, Teak, Yakal Giant Ipil-ipil, acacia		
13	Banaue Reforestation Project	Banaue, Ifugao	1,166	DENR	1,166	Benguet Pine, Gmelina, Alnus, lemon tree, raintree, mahogany,		
14	Lamut Reforestation Project	Lamut, Ifugao	371	DENR	371	Gmelina, Mahogany, Giant Ipil-ipil, Casia Aura, Teak, Ipil, yakal, fringon		
		Sub-total	3,636		3,636			
	Total		20,212					

Source: Record of PENROs and CENROs

Table 4.7.3 Reforestation by Contract (Refo-C) (1/3)

	Name of Contractor	Municipality/ Province	Area (ha)	Remarks		
				Plantation Dev't.		
				Date Started	Species Planted	Other Info.
1	Banila Community-based Association Incorporated	Dupax del Sur, Nueva Vizcaya	176	June, 1994	Gmelina Mahogany Fruit trees - mango - nanka	Project area was converted to CBFMP under CBFM No. 020019006 issued on July 12, 1999 in favor of Banila Community Based Cooperative Inc.
2	Bitnong Guijo Greeners Association Inc.	Bitnong, Dupax del Norte, NV.	134	Oct. 3, 1996	Gmelina	The area awarded for dev't. is 141 has. Fund source came from ADB Loan II. Project still ongoing under CBFMP under CBFMA No. 020019004 issued on March 23, 1999.
3	Lattar Ilocano Minority Farmers Association Inc.	Lattar, Aritao, Nueva Vizcaya	35	July, 1997	Gmelina	Developed 15 hectares for Agro-forestry project.
4	ITTO PROJECT	Buenavista Bayombong Nva. Viz.	283	1998	Rain tree Gmelina Narra Mahogany	Converted into CBFM No. 020219005 on April 12, 1999.
5	Gadaged Vegetable and Fruit Tree Growers Association	Baliling, Santa Fe, Nueva Vizcaya	50	Jan., 1996		Developed as an agro-forestry project. Converted to CBFM project.
6	Yaway Farmers Multipurpose Cooperative Inc.	Yaway, Aritao, Nueva Vizcaya	149	Nov., 1995	Gmelina	Developed 376 hectares for agro-forestry project. Converted to CBFM project.
7	Socio-Economic and Environmental Development Cooperative	Dagupan, Quezon, Nueva Vizcaya	43	1995	Gmelina	Developed 1,296 hectares for agro-forestry project. Converted to CBFM project.
8	Buyasyas Iwak Tribal Council	Buyasyas, Kayapa, Nueva Vizcaya	91	Nov., 1991	Gmelina	Developed 390 hectares for agro-forestry project. Converted to CBFM project.
9	Bakir Pagbiagan ti Pagilian CBFM Association	Dumaliguia, Rnruno, Nueva Vizcaya	56	Sept., 2000	Gmelina	Developed as an agro-forestry project. Converted to CBFM project.
10	Singian Agro-Forest Association	Tuao South, Bagabag, Nueva Vizcaya	85	1987	Gmelina	Developed as an agro-forestry project. Converted to CBFM project.
11	Association of Upland Farmers of Singian Nueva Vizcaya	Pogonsino, Bagabag, Nueva Vizcaya	64	1998	Gmelina	Developed as an agro-forestry project. Converted to CBFM project.
12	Mabasa Tree Planters and Growers Association Inc.	Mabasa, Dupax del Norte, Nueva Vizcaya	20	Nov., 1991	Gmelina	Converted to CBFM project.
	Sub-total		1,186			

Table 4.7.3 Reforestation by Contract (Refo-C) (2/3)

	Name of Contractor	Municipality/ Province	Area (ha)	Remarks		
				Plantation Dev't.		
				Date Started	Species Planted	Other Info.
13	Lingay Farmers Association	Lingay, Kiangnan, Ifugao	107	April, 1996	Gmelina	Project was already terminated & was already converted to CBFMP under CBMFA No. 0000531
14	Dalligan Multi-purpose Development Association	Daligan Kiangnan, Ifugao	274	1994	Gmelina	Project was already terminated & was already converted to CBFMP under CBMFA No. 00005037
15	Banao Community Organization Inc.	Bannao, Banaue Ifugao	45	March, 1997	Gmelina	Area was converted to CBFMP
16	Nunhabatan Greeners Livelihood Association Inc.	Nunhabatan, Lamut, Ifugao	25	April, 1997	Gmelina Mahogany	Project was converted to CBFMP under No. 00005023
17	Hapid Agro-forestry Development Association Inc.	Hapid, Lamut, Ifugao	101	1996	Gmelina	Project was converted to CBFMP under No. 00005054
18	Mayoyao Environment Development Association Inc.	Mayoyao, Ifugao	1,100	1994	Gmelina	Project was converted to CBFMP.
19	Federation of Responsive Association for Magat Ecology, Inc.	Lamut, Ifugao	570	Aug., 1997	Gmelina Mahogany	Converted to CBFM project
	Sub-total		2,222			
20	Family Approach Reforestation Program	Ramay Manok Nagtipunan Quirino	120	1969	Gmelina Mahogany	Project was converted to CBFMP and area is included in No 23.
21	Family Approach Reforestation Program	Balligui Maddela, Quirino	10	1969	Gmelina Mahogany	Converted to Forest Production area of DENR PENR, Quirino Converted to CBFM project and area is in No22
22	Balligui Community Forestry and Development Cooperative Inc.	Balligui Maddela, Quirino	28	22-Mar-98	Gmelina Mahogany	Developed 26 hectares for agro-forestry project. Converted to CBFM project.
23	Sangbay Anak Integrated Farmers Association Inc.	Sangbay, Nagtipunan, Quirino	104	26-Jun-97	Gmelina Mahogany	Project area was converted to CBFMP
24	Ifugao Village Aphochan Multi-purpose Cooperative	Ifugao, Village, Diffun Quirino	16	1998	Gmelina, Mahogany Narra	Converted to CBFM project.
26	Baguio Village Intercultural Association	Baguio Village Diffun Quirino	30	Oct., 1994	Gmelina, Mahogany	Converted to CBFM project.

Table 4.7.3 Reforestation by Contract (Refo-C) (3/3)

	Name of Contractor	Municipality/ Province	Area (ha)	Remarks		
				Plantation Dev't.		
				Date Started	Species Planted	Other Info.
27	Alicia Sustainable Resources Development	Alicia, Aglipay Quirino	50	21-Sep-97	-	Converted to CBFM project.
28	Don Mariano Perez Farmers Multi-purpose Cooperative	D. M. Perez Diffun, Quirino	31	Feb., 1992	Gmelina, Mahogany Narra	Converted to CBFM project.
29	Anak Intercultural Organization	Anak, Nagtipunan, Quirino	6	Dec., 1995	Gmelina, Mahogany Narra	Converted to CBFM project.
30	Kadikitan Association for Community Development	Kadikitan, Landing, Nagtipunan	215	1989	Gmelina, Mahogany Narra	Converted to CBFM project.
31	Salinog T Campamento Association Inc.	Diffun, Quirino	0	1998		Converted to CBFM project.
32	Wasid Ilongot Tribe Association Inc.	Wasid, Nagtipunan, Quirino	36	16-Jun-94	Gmelina, Mahogany Narra	Converted to CBFM project.
33	Ilongot Livelihood Association Inc.	Landingan, Nagtipunan, Quirino	37	Jan., 1992	Gmelina, Mahogany Narra	Developed 25 hectares for agro-forestry project. Converted to CBFM project.
34	Gomez Farmers Multi-purpose Cooperative Inc.	Gomez, Cabarrogis, Quirino	48	May, 1993	-	Converted to CBFM project.
35	Nun-uh-uhhaan Inc.	Asaklat Nagtipunan	1	1992	Gmelina	Converted to CBFM project.
36	Rafael Palma Multi-purpose Cooperative, Inc.	Rafael Palma, Diffun, Quirino	140	3-Jul-95	Gmelina, Mahogany Narra	Developed as an agro-forestry project. Converted to CBFM project.
37	San Manuel-Victoria Forest Developers Cooperative Inc.	San Manuel, Victoria, Aglipay, Quirino	704		Gmelina, Mahogany Narra	Converted to CBFM project.
38	Villa Ventura Multi-Purpose Cooperative Inc.	Victoria, Aglipay, Quirino	87		Gmelina, Mahogany Narra	Converted to CBFM project.
	Sub-total		1,664			
	Total		5,073			

Table 4.7.4 Watershed Rehabilitation Project (WRP)

	Project Name	Municipality/Province	Coverage Area (ha)	Implementing Agency	Starting Date	Remarks
1	Upper Casecanan Watershed Rehabilitation Project	Dupax del Norte and Dupax del Sur, Nueva Vizcaya	18,268	DENR	16-Apr-90	Established 126 hectares forest tree plantation. Constructed 872 cubic meters check-dam
2	Kasibu River Watershed Rehabilitation Project	Kasibu, Nueva Vizcaya	11,233	DENR DENR	16-Apr-90	Established 76 hectares forest tree plantation. Constructed 1,036 cubic meters check-dam .
3	Kirang Macro-Watershed Rehabilitation Project	Kirang, Aritao, Nva. Vizcaya	2,600	DENR	1998	Established 23 hectares forest tree plantation, 1,000 square meters wattling and 1,150 square meters benchbrush layer. Constructed 600 cubic meters checkdam Bench brush layer = 1150 sq. meter Wattling = 1100 sq. m.
	Sub-total		32,101			
4	Diadi River Sub-watershed	Villa Miemban, Cordon, Isabela	1,400	DENR	1997	Established 22 hectares forest tree plantation.
5	Dicamay River Sub-watershed Project	Rizal, San Guillermo Isabela	4,194	DENR	1997	The area is within the cancelled area of consolidated logging.
	Sub-total		5,594			
6	Tungcab Sub-watershed Project	Maddela, Quirino	2,800	DENR	1998	Established 15 hectares forest tree plantation. Constructed 200 cubic meters check-dam and bunkhouse.
7	Tangliao Sub-watershed Project	Nagtipunan, Quirino	830	DENR	1998	Established 19 hectares forest tree plantation. Constructed one bunkhouse.
	Sub-total		3,630			
8	Nunhabatan Sub-watershed Project	Lamut, Ifugao	241	DENR	1997	Established 25 hectares forest tree plantation.
9	Banao Sub-watershed Project	Banaue, Ifugao	200	DENR	1997	Established 45 hectares forest tree plantation.
10	Mayoyao Sub-watershed Project	Mayoyao, Ifugao	2,000	DENR	1997	Established 1,100 hectares forest tree plantation.
	Sub-total		9,701			
	Total		52,990			

Source : Records of PENROs

Table 4.7.5 Caraballo and Southern Cordillera Agricultul Development Program (CASCADE)

Coverage Area	Nueva Vizcaya Benguet Nueva Ecija	all 15 municipalities Kbayan, Bokod, Itogon carranglan
Objectives	CASCADE is an integrated rural development Project. Its overall objectves is to help mainly the indigeneous rural people of highland areas in promoting an agro based local economy. Its specific objective aims at initiating a sustainable development process towards technical self-reliance, financial self-reliance and managerial self-reliance.	
Establishment	1997/6/9, through a Financing Memorandum, signed between GOP and EU	
Component	<p>Agricultural Production Systems Development</p> <p>Dv't of Farming Systems : 15 irrigation systems serving 340ha as of 2000</p> <p>Agricultural Support: Technical services</p> <p>Group strengthening</p> <p>Dv't of marketing systems : Roads, bridges and trails construction</p> <p>Micro-Enterprise Development</p> <p>Vocational trainig such as food processing, bamboo and rattan handicrafts</p> <p>Micro-Enterprise training</p> <p>Product development</p> <p>Social Development</p> <p>Portable water supply program: 24potable water systems serving 1773 households as of 2000</p> <p>Nutrition Program: 323 Barangay Nutrition Scholars have been trained</p> <p>22 school -based and 17 backyard demo-gardens have been set up</p> <p>Waste Management and Snitation Program</p> <p>Community-Based Support services : 455 barangay helth workershave been trained</p> <p>Institutional Development</p> <p>Strengtening of LGU planning capacity</p> <p>Trainig support to LGUs</p> <p>Rural Finance</p> <p>Micro-Finance Program</p> <p>Cooperative Support program: 408 savings and loan groups have been established, comprising 3511mebers</p> <p>Loan approved: July 2000 by EU</p> <p>Rereased loans : total 7,779 thousand pesos</p> <p>Loan Repaymets:Total 5,945 thousand pesos</p>	

Figures

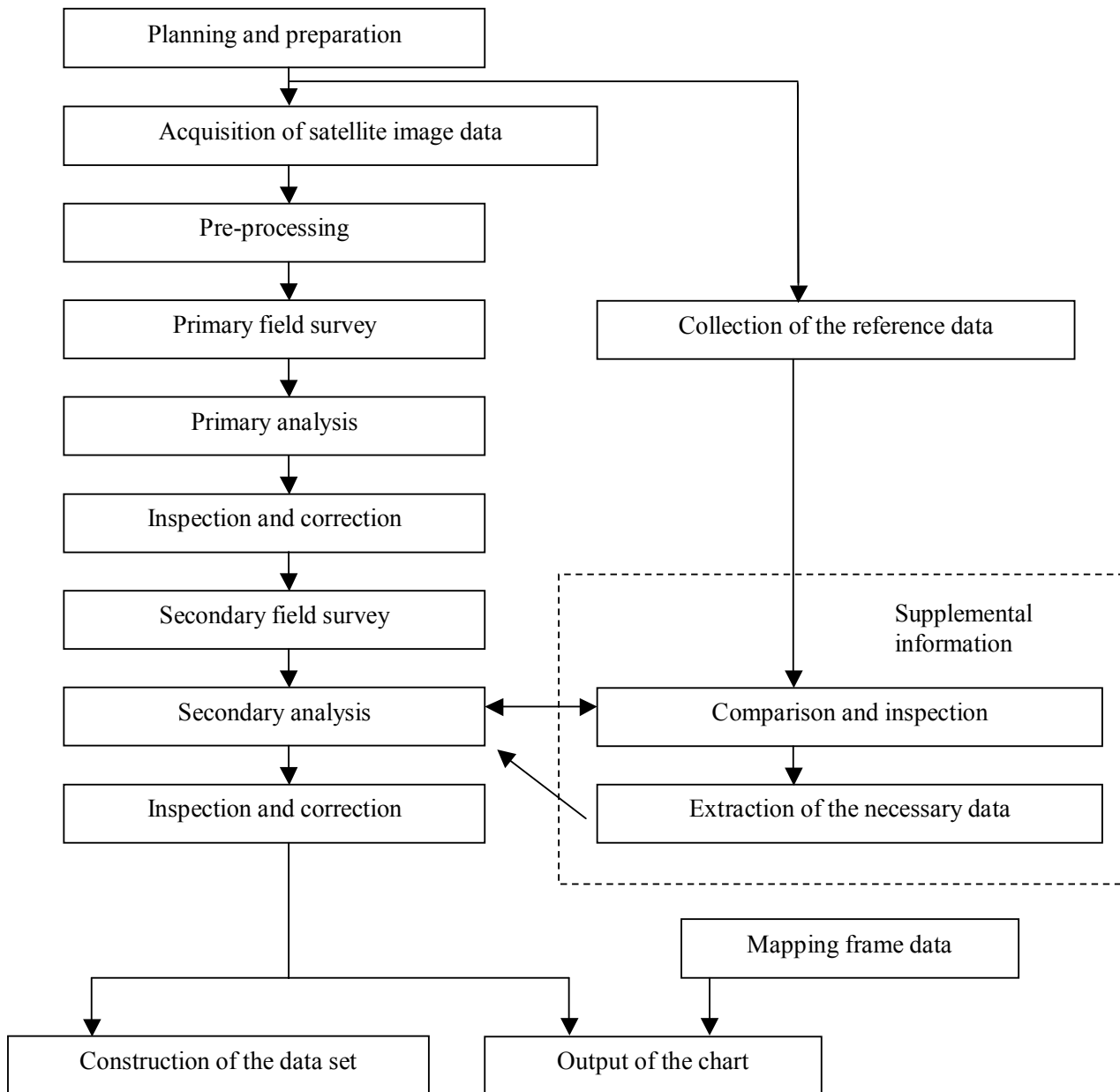


Figure 2.1.1 Work Flow of Satellite Image Analysis