

CHAPTER 3 PRESENT CONDITIONS AND COPING CAPACITY

3.1 Physical Setting and Hazards in the Study Area

(1) Topography

1) General Setting

The Bicol Peninsula consists generally of Upper Tertiary and Pleistocene sedimentary and volcanic rocks. Mayon Volcano, nine other major stratovolcanoes, and several smaller volcanic cones form the eastern Bicol volcanic chain¹, associated with west-dipping subduction along the Philippine Trench.

2) Mountain Slope Profile and Riverbed Slope

Topographical profile of Mayon Volcano has an extraordinary symmetry. Its summit level is 2,469m above sea level and covers an area of about 254 km² which is divided on the margin of fan landform. Mountain slope has steep gradient (1/2.5) from the summit down to 500m above sea level. From 500m down to 200m above sea level, it becomes little gentle gradient (1/7.8) more than upper reaches. From 200m level down to the sea base, it has gently sloping sides (1/40.0).

Classification of Slope Gradient on Mayon Volcano

Elevational Classification by Slope Gradient (m)	Displacement of Elevation (m)	Horizontal Distance from Summit (m)	Horizontal Area (km ²)	Slope Gradient
2,469 - 1,000	1,469	2,330	17	1/1.6
1,000 - 500	500	4,000	50	1/3.3
500 - 200	300	6,330	126	1/7.8
200 - 10	490	9,000	254	1/12.3
10 - 0	10	10,300	333	1/100

3) Geomorphologic Classification

Mayon Volcano is classified as a strata volcano or composite cone. It consists of deposits formed basically by four major types of volcanoclastic material: lava flows, airfall deposition, pyroclastic flows, and lahar flows triggered by rainfall.

Volcanic lava are the dominant structural members of the Mayon edifice only from the summit to the 500m elevation near the crater, below which loose volcanoclastic debris predominates (Punongbayan and Ruelo, 1985). Airfall and pyroclastic flow deposits are composed of unconsolidated materials varying in size from ash to small boulders. These

¹ Ramos-Villarta, S.C., Corpuz, E.G., and Newhall, C.G. (1985) *Eruptive history of Mayon volcano, Philippines. Phil. J. Volcanol.*, 2-1/2, 1-35.

deposits result from the eruption of fragmented rocks and are transported down slope under the influence of gravity, explosion blast, and the prevailing wind. A large amount of rainfall during or after an eruption induces debris to flow down volcanic foot slope to form alluvial fan segment at about 300 to 200m of elevation or lower. The surface of the slope at this elevation covered by lahar material together with lava flow. These lahars are jumbled mixtures of rocks of loose sorting sizes in a matrix of sand, silt and clay. The area that is lower than 200 meters is composed of the deposited lahar.

Landform Classification of Mountains Slope

Elevation of Segment	Mean Slope Gradient	Landform	Geological Structure
From summit to 1000m	1/1.6	Volcanic dome	Volcanic rock (Mainly Andesite Rock)
From 1000m to 500m	1/3.3	Pyroclastic, Debris and Lava Plateau	- Primary and Secondary Pyroclastic and Debris Material
From 500m to 10m	1/7.8 - 1/16.7	Alluvial fan	- Secondary or Thirdly Pyroclastic and Debris Material
From 10m to 0m	More than 1/100	Alluvial plan	Sand and Silt

Submarine topographical counter map (NAMRIA. “Albay Gulf”, scale 1:10,000, 1st Edition Dec.11/1961, Revised Feb.23/1976, Reprinted Feb/1989) shows that the gradient slope near shoreline is very steep and it become a flat bottom between 50 and 100 meters depth.

(2) Geology

Pre-Mayon volcanic rocks are found in the hill located in the immediate vicinity of the volcano. Hills near Ligao, Sto.Domingo and Malilipot are found to consist of dacite and andesite with partly weathered.

Lava flows deposited on volcanic mountain slope consist of andesite and basaltic andesite lava. Riverbed material is also composed largely of hard rock (andesite, basaltic andesite) and porous rock. Pyroclastic flow deposit area is composed of ash and dark gray scoria fall deposit, primary pyroclastic flow deposit, secondary debris flow deposit in detail.

(3) Meteorology and Hydrology

According to the climatological classification in the Philippines, the eastern part of the Albay Province belongs to Type II climate and the western part belongs to Type IV. The Study Area is characterized by an indistinct dry season and a very pronounced maximum rainfall period from September to January. The long-term mean annual rainfall observed from 1961 to 1995 at Legazpi Station of PAGASA is 3,354 mm. Total number of rainy

days per year in Legazpi is measured as 221 days (60%) on average. According to the data on tropical cyclones that affected the Bicol Region during the period 1987-1996, 8.4 tropical cyclones pass over the region in a year on average. Albay Province including the Study Area has an average frequency of cyclone occurrence of one per year.

(4) Rivers around the Mayon Volcano

The following 7 river systems with 17 rivers were studied. Three major rivers, Yawa, Quinali (A), and Quinali (B), comprise several tributaries as shown below.

River Systems and Rivers Related to the Study Area

River System	River	Catchment Area (km ²)	River Length (km)
Yawa River System	Yawa	74.4	17.3
	Pawa-Burabod	7.6	11.6
	Budiao	7.5	11.8
	Anoling	9.4	10.2
Quinali (A) River System	Quirangay	9.3	9.8
	Tumpa	5.7	7.8
	Maninila	4.9	10.7
	Masarawag	10.5	12.2
	Ogsong	38.1	21.4
Quinali (B) River System	Nasisi	84.2	20.9
	Buang	4.5	8.3
	Quinali (B)	157.8	31.1
	San Vicente	9.9	13.3
Arimbay River System	Arimbay	2.6	5.3
Padang River System	Padang	7.6	9.3
Basud River System	Basud	14.0	11.0
Bulawan River System	Bulawan	15.4	11.5

(5) Eruption of Mayon Volcano and Related Hazard

Mayon Volcano is one of the active volcanoes in the Bicol volcanic chain, southeast Luzon. Pyroclastic flows were frequently discharged during historic eruptions and emplaced up to 10 km away from the summit crater. The Volcano has erupted 48 times during the period from 1616 to now. The latest eruption just recently occurred in February 2000 with a series of explosions and the state of disaster was declared in the area around it.

The past records on the occurrence frequencies of eruptive hazards indicate that most of eruptions initiate with the emission of ash falls and the eruption is not necessarily accompanied with dangerous pyroclastic flow and lava flow. The occurrence and visit of pyroclastic flow and lava flow are more frequent in the southern slope of the volcano as compared with its northern portion.

3.2 Socioeconomic Conditions

3.2.1 Socio-economy

(1) Macro Socio-economy

1) Macro-economy

According to the country brief document prepared by the World Bank, the recent economic situation of the Philippines is analyzed as outlined in this Subsection. The country's strong gains in growth and poverty reduction achieved over the last few years are being threatened by the dual impact of the regional financial crisis and El Niño as shown in the following table

Outlook of Recent Macro-economic Indicators, 1996-1998

Item	1996	1997	1998*
Gross Domestic Product (GDP)	5.7	5.2	-0.5
Private Consumption	4.6	5.0	4.4
Gross Investment	12.5	11.7	-12.0
Consumer Prices	8.4	6.0	10.0
Export Growth Rate (\$ terms)	17.8	22.8	15.0
Import Growth Rate (\$ terms)	20.8	14.0	-7.7
Employment Rate	92.6	92.1	86.7

Notes : * Preliminary estimates

Sources : Philippine Authorities, the World Bank staff estimates, and IMF.

The World Bank stresses on the importance or needs to take the following measures:

- Stabilization of the macro-economy;
- Maintaining a strong fiscal position while protecting the poor;
- Strengthening of the banking system;
- Facilitation of corporate restructuring;
- Encouragement of long-term domestic savings; and
- Continues financing for viable rural and urban enterprises.

2) Social Circumstances

While the country's population in 1995 was about 68.6 million, over 50% of the population live in the rural areas. People in their productive years occupy more than half of the country's population. However, in 1998, only 86 % of the economically active population are employed, nearly 20% of which are considered to be under employed. According to the 1997 Family Income and Expenditure Survey, 32.1% of the total families in the country were under the poverty line.

Major Social Indicators of the Philippines

Population (thousand / 1995)	68,616
Population Growth Rate (1990-95)	2.3%
Incidence of Poverty (No. of Family under Poverty Line – 1997)	32.1%
Life Expectancy (1995)	68.7 yrs.
Infant Mortality Rate (per 100 live birth 1995)	48.9
Basic Literacy Rate (1995)	95.8%
Primary School Enrolment (1995)	91.1 %
- Secondary Enrolment (1995)	61.2 %

Source: Population Census 1995, NSO, Family Income and Expenditure Survey, 1997, NSO, & Countryside in Figures, 1998, NSO

The annual population grew in recent years (1990-95) at 2.3%. The population projection, undertaken by the National Statistical Office (NSO) shows that the currently level of population growth is likely to continue, and estimated that by 2020, the country's population will expand further by about 50% of the current population.

Improved access to social services, particularly health and education services, will be the key to increase the well-being of the population. In the area of health, infant mortality rate has not improved in recent years, and recorded nearly 50 per 100 live birth in 1995. The leading causes of death are preventable: respiratory diseases, diarrhea, and measles. This stagnation has arisen out of the poor environmental sanitation and infant and child malnutrition.

Education is an important sector to equip the growing number of Filipinos to participate in the economic activities. Already, the country's literacy rate has improved in recent years, with 95.8 % in 1995. On the other hand, while total primary enrolment in formal primary education reached 91.1% in 1995, it drops sharply to 61.2% in the area of secondary education.

3) Provincial Framework Plan

The vision of Albay Province is to be the most progressive and developed province in Southern Luzon and Eastern Visayas. To achieve this vision, the Albay Province has set the following general "spatial" goals related to (a) settlements, (b) land resources management/land use, and (c) infrastructure for the period of 1993-2002.

- a. Settlements Plan: It seeks to provide and/or improve access of the populace to socioeconomic opportunities and basic services.
- b. Land Use Plan: This plan aims to ensure as a general goal the sustainable use and development of land resources and protection of critical areas and environmental values.
- c. Infrastructure Plan: This plan is to facilitate the attainment of the settlements and land use goals through improving/providing access to infrastructure and basic services.

In the “Provincial Physical Framework Plan (PPFP)”, the four alternative spatial development strategies consisting of (a) trend alternative (non-directed growth), (b) urbanization (manufacturing & services), (c) agri-industrialization and (c) eco-tourism were evaluated as to their respective probable outcomes with respect to settlements, land use and infrastructure. As the result of the above evaluation in PFPF, the Province of Albay is recommended to promote its socioeconomic development based on a mixture of strategies in view of its diverse resources and favorable economic elements.

Based on the analysis of these four spatial development strategies, the “Tri-Sectoral Development” approach was adopted to achieve a balance growth for the Province. These three sectors are : (a) Agriculture, (b) Industry and (c) Tourism.

Albay Province has high potentials in crop and livestock productions, and also rich in marine resources. Consistent with the “key agribusiness commodity system” being advocated by the government, the agri-based industries such as food processing need to be promoted so as to produce high value-added commodities.

The province is also endowed with diverse mineral resources, both the metallic and non-metallic ones. Gold, copper and silver mines are found in the island of Rapu-Rapu. As non-metallic deposits, there exist limestone, marl, siliceous materials suitable for cement manufacturing are found in Guinobatan, Pioduran, Oas, Ligao, Camalig and Jovellar. With voluminous white clay deposits, pottery is carried on in Tiwi and Legazpi (Maslog). Likewise, sand, gravel and boulders are abundant in most of the surface water bodies and these are highly preferred in the construction industry.

Utilizing these mineral resources, the province has developed to some extent the mining and manufacturing industries such as cement manufacturing, exploitation of gravel and sands, marble tile processing, and so on.

Besides, the province has big potentials and advantages with regard to the energy (electric power) & water and manpower resources necessary for industrialization. The Geo-thermal plants in Tiwi and Manito can provide electric power with relatively lower rates, and water is abundant around the foot of Mayon Volcano. As the Albay Province is

one of the educational centers in the Bicol region, the manpower, yet skilled labor is available in the Province.

In respect of tourism resources, we should first cite that, the Mayon Volcano is hailed as a natural wonder of the world for its almost perfect cone. In the province, most of tourism potentials pertain to “eco-tourism” or natural beauties like beaches and seascapes. To develop tourism and attract more tourists, it is indispensable to improve amenities in general by providing the high-grade accommodations. Such amenities might include the upgrading of accommodations and facilities such as hotels & inns, airport, ports, carrying means, access roads, entertainment as well as the quality improvement of souvenirs.

(2) Socioeconomic Circumstances of the Study Area

1) Administrative Division

Local administration body is made of four tiers – region, province, city and municipality, and barangay. There are 16 regions including the one of metropolitan Manila. The region is, however, not an administrative organ with secretariat. It is a division of the territory mostly utilized for planning. There are 78 provinces, 82 cities and 1,525 municipalities, and about 41,939 barangays in the Philippines. Local Council (Sangguniang) is organized at provincial, city and municipal and barangay levels as shown in the following table.

Number of Regions, Provinces, Cities, Municipalities and Barangay

	The Philippines	Bicol Region	Study Area
Region	13	1	N/A
Province	78	6	1
City	82	3	1
Municipality	1,525	112	9
Barangay	41,939	3,471	446

Source: The Philippine Statistical Yearbook 1998, NSCB

2) Population

According to the latest 1995 census, the population of the Philippines is 68,616,536, that of Bicol Region is 4,325,307 (constituting 6.3% of the whole country), and that of Albay Province is 1,005,315 (23.2% of the whole region). The population density is relatively

Population Growth/Density in Albay, Bicol, & Philippines

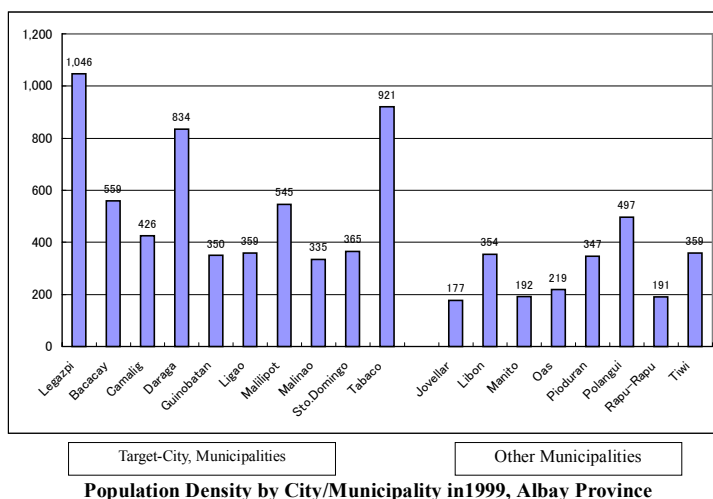
	Population Growth (%)		Population Density 1995 (person/sq. km)
	1980-90	1990-95	
Albay	1.11	2.01	393.8
Bicol	1.18	1.91	245.3
Philippines	2.35	2.32	228.7

Source: Philippines Statistical Yearbook, National Statistical Coordination Board (NSCB), 1998

high in the Albay Province (393.8 person per sq.km), compared with that of Bicol Region (245.3) or the national figure (228.7). This seems to be a reflection of the accelerated population growth that has been triggered by the implementation, during late 1980s, of the Government's "Integrated Reorganization Plan of the Philippines" which has designated Albay as the location of the Regional offices of government agencies. As shown in the above table, the population growth of the Albay Province (from 1.11% to 2.01%), as well as that of Bicol Region (from 1.18% to 1.91%), have increased, compared with the period between 1980-90 and 1990-95, while the nation-wide figure have remained consistent (from 2.35% to 2.32%).

According to the most recent available data in 1994, the total number of employed persons in Albay amounted to 433,000, of which 158,000 (36.5%) were in agriculture, 88,000 (20.3%) were in industry, and (43.2%) were in service.

Not only is the population density of the Albay Province comparatively high in the Bicol Region, but also as shown in the figure, the population density of the target city (1) and municipalities (9) is even higher, in comparison with other municipalities in Albay Province. Not only the population density, but also the same applies to the population growth. The table shows that



Source: Computed by the JICA Study Team, based on the 1990 Population Census

the target city (1)/municipalities (9) has recorded even higher population growth rate in Albay Province. These facts concerning both population density and growth attest to the mounting population pressure on the areas around Mayon Volcano.

The size of the households is shown in the right table. The table indicates that, while the average household size in Bicol Region is slightly lower than the national figure, the areas around Mayon Volcano has a larger size of households.

Household Size around Mayon Volcano, Bicol, and Philippines

	Number of Household	Average Household Size
Sample Areas around Mayon *	1,000	5.5
Bicol Region **	817,998	5.28
Philippines **	11,407,262	6.02

Source: * Survey on Disaster Awareness and Preparedness incl/Evacuation
 ** 1995 Population Census, National Statistical Office

3) Agriculture

a. Major Crops

The Province of Albay is predominantly an agricultural area, with such major crops as coconut, rice, corn, abaca, vegetables and others. In terms of the size of the cultivated areas, coconut is most dominant (occupying 95,794 hectares, 60% of the total cultivated area in the province), followed by rice (28,704 hectares, 18%), and corn (14,685 hectares, 9%). It is with these crops that most of the populace make their living.

b. Livestock

It has been the aspiration of Albay Province to increase livestock production to ensure adequate supply in animal protein foods. According to the supply-demand analysis undertaken by the Provincial Government, in formulating Albay Development Master Plan (1996-2006), Albay produces only 26% of its required quantity of poultry, 78% of that of pork, 9% of that of cara, and 72% of that of beef. Accordingly, in support to the livestock and poultry industry, livestock production support facilities are operating in the province.

c. Fishery

Albay lies on the fishery belt of the Pacific Ocean covering a total coastline of 354 km. and 162 coastal barangays. Albay has several fishing grounds, including Lagonoy Gulf, Tabaco Bay, Albay Gulf, Panganiran Bay, and Burias Pass all of which target areas. Moreover, the Province has a total of 1,715.7 hectares of fish ponds, 826.8 hectares (48%) of, which are located in the target City (1) and Municipalities (9). More than a half the size (1,567.9 ha) of all the fish ponds in Bicol Region (3,042 ha) are located in Albay.

4) Industry & Trade

Albay has the largest share of non-agricultural economic activities, among all the provinces in the Bicol Region. This is manifested by the presence of various trade and industrial activities. The trading sector occupies the largest share (38.8%) in terms of amount of investments generated in 1994, followed by services (31.6%), and manufacturing (25.2%). In terms of number of registered establishments, the trading sector has the largest share (1,800 enterprises), followed by the public and private services (1,220), and manufacturing (980).

Most of the establishments are located within the Study Area. This implies that these establishments are to be protected by taking same disaster coping measures.

a. Agri-business

The government's emphasis is mostly placed upon agri-industrial development. That is the development of an agriculture that will not only meet basic and subsistence needs, but agriculture that will lay the foundation for industrialization. The major potentials are coconut industry, grains industry, cutflower production, pili production, and abaca industry.

b. Mining

Albay Province is endowed with diverse mineral resources, especially non-metallic such as perlite, bentonite, earthfill, boulder, pebble, sand and gravel. The Province also has potentials of mineral reserves which need further exploration and development. It is believed that the province has metallic resources of 9,421,000 metric tons which include gold, copper, iron and mercury.

c. Trade

Major business activities in Albay Province, under the trading sector, are stores like sari-sari stores/groceries, general merchandising, and office supply, drugstore/pharmacies, agricultural supplies, dry goods, hardware/electrical/auto supplies. The trading sector remains the major contributors to the Province's economy, not only in terms of employment, but also in the generation of investments as well. Trading sector occupies the largest share (38.8%) in terms of amount of investments generated.

5) Tourism

The tourism is also another potentiality in Albay Province, which together with Camarines Norte, stands out on tourist arrivals in the Bicol Region. In 1997, Albay received 25% (62,903 visitors) of all the tourists visiting the Bicol Region (250,285). The Province's tourist attractions are renowned land marks which are historical, religious, and natural attractions. The Province is also famous for its resorts which are haven not only for tourists but also for nature lovers. However, in order to further increase the number of visitors, there is a need to improve the quality of tourism service industries, and to develop infrastructure such as telecommunications and transportation utilities.

6) Income/Poverty

Two most important sources of income are derived from farm and/or selling agricultural products, and salaries and/or wages received. Of the respondents who have ranked these two sources as the most important, 44% accounted for farm and selling agricultural

products, while 35% reported salaries and wages received. The other sources include remittances from relatives abroad and earnings from private businesses.

The people residing around Mayon volcano are usually subject to lower levels of livelihood, which is clearly indicated by the level of incomes. The poverty incidence in Bicol Region has dropped by 5.0% between 1994 (55.1%) and 1997 (50.1%), which still is much higher than the national average, ranking 2nd among the Regions in terms of the incidence of poor families. It is to be noted that there exists wide disparity in the incidence of poor families between the urban and rural areas in Bicol. While the number of poor families in urban area decrease, it continues to grow in rural areas.

7) GRDP

There is no available statistics with regard to the GRDP of Albay Province, then the JICA Study Team estimated on the basis of GRDP of Bicol Region and provincial socio-economic statistics in the Region. According to the estimates, the GRDP of Albay Province increased from PHP 18,845 million to PHP 21,439 million in 1999 prices by 4.39% per annum during the period from 1995 to 1998. Its per capita GRDP grew from PHP 18,819 to PHP 19,947 in 1999 prices by 1.96% per annum during the same period.

On the other hand, the per capita GDP of the Philippines is PHP 39,569 in 1998. Then it must be recognized as the obvious reality that the per capita GRDP of Albay Province is approximately only a half level of the per capita GDP of the Philippines.

3.2.2 Infrastructure

(1) Transportation

1) Land transport (roads and railways)

Different modes of transportation are available in the province. They consist mainly of road, sea and air modes of transport, and interconnect the growth centers, municipalities and barangays.

Road is the primary mode of transportation and categorized into national, provincial, municipal, or city roads (no detailed data on barangay road). The Philippine-Japan Highway serves as the main arterial (national) road traversing the entire province leading to other parts of Luzon and Visayas. As of 1995, Albay Province has a total road length of 976.2 km or road density of 0.383 km/km². Among the road sections, the length of national roads totals to 331.9 km. Road condition is classified into concrete, asphalt, gravel, and earth, as shown below.

Classification of Roads in Albay Province, 1995

(Unit : km & %)

Categorization of roads	Concrete	Asphalt	Gravel	Earth	Total
National Road (%)	173.7 (52.3)	35.5 (10.7)	122.7 (37.0)	0.0 (0.0)	331.9 (100.0)
Provincial Road (%)	58.5 (13.5)	96.0 (22.2)	206.5 (47.7)	72.0 (16.6)	433.0 (100.0)
Municipal Road (%)	78.6 (37.2)	31.7 (15.0)	26.4 (12.5)	74.6 (35.3)	211.3 (100.0)
Total (%)	310.8 (31.8)	163.2 (16.7)	355.6 (36.4)	146.6 (15.0)	976.2 (100.0)

Source: Socio-Economic Profile, Calendar Year 1996, September 1996, Province of Albay

The national roads (63%) are already paved with concrete or asphalt, but the remaining 122.7 km (37%) is only covered with gravel. The traffic on this portion is often hampered due to rough condition and even impassable during wet season. The concern and trend for development of roads require for the concreting of national and provincial roads as well as its maintenance and rehabilitation of damaged road sections.

As for the Philippine National Railways (PNR) between Metro Manila to Legazpi City, the portion connecting Iriga City and Albay was damaged during the occurrence of strong typhoon and out of operation for more than 20 years. It was rehabilitated and became operational in June 1998, but it was shutdown again due to derailment of the portion between Guinobatan-Legazpi City by heavy rains.

After the above twists and turns, it resumed on February 1st, 1999. The PNR has two trips per day and its trip takes about 13.5 hours from Legazpi City to Metro Manila. At present, PNR is undertaking the renovation of old coaches and improvement of tracks to accommodate more passengers and to give them a comfortable trip.

2) Sea transport

The ports serve as the crossroad for shipping between Manila and the Visayas and also as the embarkation and disembarkation points for passengers and cargo for both foreign and domestic sea vessels. In the Province, there exist one (1) port of entry/international port (Tabaco Port), one (1) sub-port of entry/national port (Legazpi Port), six (6) municipal ports, four (4) barangay ports. The structures of the two major ports in Albay Province are described in the following table.

Main Structures of the Primary Two Ports in Albay Province

Name of Ports	Location	Classification	Main Structures
1. Tabaco Port	Tabaco, Albay	Port of Entry, International Port	- Total port area = 25,400 sq.m - Pier length = 300m - Pier width = 12m - Area of warehouse = 7,334 sq.m - Open storage area = 12,000 sq.m - Control depth of water = 15m - Causeway length = 228
2. Legazpi Port (Baseport)	Legazpi City	Sub-port of Entry, National Port	- Total port area = 4,943 sq.m - Pier length = 329m - Pier width = 12m - Open storage area = 1,738 sq.m - Control depth of water = 4.5 m

Source : Socio-Economic Profile, CY-1996, Province of Albay.

The activities and roles of these two major ports in Albay develop a tendency to increase steadily, as shown below.

Data on Shipcalls, Cargo Volumes and Passengers at Two Major Ports in Albay Province, 1996 & 1997

1. Tabaco Port (Terminal Port)			
1.1 Shipcall (no.)	<i>Foreign</i>	<i>Domestic</i>	<i>Total</i>
1996	22	1,000	1,022
1997	24	1,207	1,231
1.2 Cargo Throughput (MT)	<i>Foreign</i>	<i>Domestic</i>	<i>Total</i>
1996	74,953	164,458	239,411
1997	81,517	196,528	278,045
1.3 Passenger Traffic	<i>Disembarked</i>	<i>Embarked</i>	<i>Total</i>
1996	127,312	98,876	226,188
1997	143,995	134,914	278,909
2. Legazpi Port (Baseport)			
2.1 Shipcall (no.)	<i>Foreign</i>	<i>Domestic</i>	<i>Total</i>
1996	17	515	532
1997	23	565	588
2.2 Cargo Throughput (MT)	<i>Foreign</i>	<i>Domestic</i>	<i>Total</i>
1996	37,430	517,928	555,358
1997	78,742	503,538	582,280
2.3 Passenger Traffic	<i>Disembarked</i>	<i>Embarked</i>	<i>Total</i>
1996	30,029	0	30,029
1997	2,340	2,188	4,528*

Note: * Sharp decrease is due to the deficient facilities of the port.

Source: Albay in Figures (A Factbook), DTI, 1998 and Annual Statistical Summary Reports, PMO.

The ports have a vital role in the province's trade and commerce, and as one of the growth center in the region, both ports need to be maintained and improved to provide better facilities and wider spaces for docking vessels.

3) Air transport

Legazpi Airport is the only airport in the province. As a provincial trunkline airport, it has a runway with total length of 1,974 m and width of 36 m, which can only accommodate domestic flights for B737 class. It serves inter-provincial flights to Catanduanes and Masbate and has daily flights to Cebu and Manila.

This airport needs to maintain/upgrade the existing domestic airport facilities and expand the existing runway so as to meet its increasing number of passengers and cargo volumes as shown below.

Air Transport Passengers and Cargo Volumes at Legazpi Airport, 1993-1995

Year	Passenger Traffic (no.)			Cargo Volume (tons)		
	Out-going	In-coming	Total	Out-going	In-coming	Total
1993	57,575	59,243	116,818	450,280	258,251	708,531
1994	57,306	56,574	113,880	356,265	322,121	678,386
1995	81,614	80,363	161,977	437,685	655,972	1,093,657
1996	84,712	83,929	168,641	517,320	734,533	1,251,853
1997	86,782	90,096	176,878	358,485*	512,649*	871,134*
Annual Average Growth Rate (%)	(10.8)	(11.0)	(10.9)	(-5.5)	(18.7)	(5.3)

Note: * Remarkable drop in cargo volume is on account of impacts of the latest economic crisis started in 1997 and also due to the shifting trend of cargo transportation from air to land, since the Legazpi Airport lacks in container equipment for cargo transportation.

Source: Region V (Bicol) - 1998 Regional Social and Economic Trends, NSCB.

(2) Power Supply

Power generation and supply is indispensable for regional development. The Province of Albay is rich in geothermal resources, and in 1970, the Presidential Proclamation No.739 authorized the National Power Corporation (NPC) and Philippine National Oil Company (PNOC) to exploit and develop the geothermal power plant projects in the “reservation areas” of Tiwi-Malinao and Manito, respectively. The Tiwi Geothermal Plant has a generating capacity of 330 megawatts and the Bacon-Manito Geothermal Power Plant with an estimated potential (or planned) capacity of 210 megawatts. These geothermal plants supply the electricity to the Luzon Grid, but they are often damaged by the natural disasters because of their location in typhoon belt.

Household electrification is provided by Albay Electric Cooperative (ALECO) that covers Legazpi City, the poblacion area and other barangays of the seventeen (17) municipalities. ALECO supplies 154,480 households in Albay Province accounting for 82.3% of the provincial total. Presently, out of the 446 barangays covered in the Study Area, 347 barangays (77.8%) are energized and 99 barangays (22.2%) are still out of service. As of 1997, the power rate of ALECO for residential users is 4.11 pesos per

kWh. Power rate for commercial users is set relatively higher at 4.19 pesos, while that for industrial consumers is 4.11 pesos per kWh.

(3) Water Supply

1) Present Water Supply Facilities

Water in the province is presently supplied by level 3 gravity-fed water supply, level 3 pressure-pumped water supply, reservoir and water supply trunk lines. Level 3 water supply system is defined as an individual household faucet system under the supervision of LWUA (Local Water Utility Agency) in the area. The existing water supply in the province is summarized below:

Existing Level 3 Water Supply System in the Province of Albay

Municipality	Type of Water Supply	Responsible Agency	No. of Serving Household
Bacacay	Gravity-fed	Bacacay Water District (BWAD)	782
Camalig	Gravity-fed	Camalig Water District (CWAD)	781
Daraga	Gravity-fed	Daraga Water District (DWAD)	2,124
Legazpi	Gravity-fed	Legazpi City Water District (LCWD)	3,845
Ligao-Oas	Pressure Pumped	Ligao-Oas Water District (LWAD)	2,444
Tabaco	Gravity-fed	Tabaco Water District (TWAD)	4,039

Source: PPDO/PLUC-TWG, 1996.

Note: Year for no. of serving household is not known.

The coverage of Level 3 water supply system in the province is estimated to be about 39 percent of the total municipalities, which seems to be inadequate.

2) Sources of Water

Groundwater and springs are major sources of water supply system in the province. In the case of LCWD, existing water sources are briefed below:

Sources of Water for LCWD in 1998

Type of Water Sources	Location	Name of Barangay
Springs	Kapungolan	Buyuan
	7 Springs	Buyuan
	Ayala	Buyuan
	Aperin	Buyuan
Deepwells	6 at Bonga	Bonga
	4 at Mabinit	Mabini

Source: LCWD, Legazpi

The locations of the water sources for the LCWD and DWAD are mostly concentrated at the radius of about 8 km from the crater of the Mayon Volcano. Primary treatment is undertaken by chlorination for bacteriological treatment. Total service connection in Legazpi is 9,531 in December 1998. About 90 % of total service connection is for domestic and government use, and 10 % for commercial and industrial.

3) Rehabilitation and Expansion Plan

To increase the services and the number of population being served, several water supply plans were proposed by local water supply agency in the area. The proposed facilities for water supply are intended to attain increased coverage of Level 3 water systems in urban centers of municipalities and in areas expected to have special economic roles as in Legazpi City.

In Legazpi City, a rehabilitation and expansion plan is proposed by the Legazpi City Water District (LCWD) to upgrade the present water supply facilities and to expand the system (including additional 21 deep-wells) up to 82 - 90% coverage level in the city. A Feasibility Study was completed in 1998. And its implementation program (by BOT) is under consideration by LCMD. The project, comprising Phase 1 for rehabilitation and Phase 2 for expansion, will take about 25 years.

(4) Telecommunications

As “public communication” systems in Albay Province, there are four kinds of facilities or services, (a) telegraph, (b) postal, (c) media, and (d) telephone. In relation to disaster management, the media (radio & television) and telephone play an important role, especially in preparedness (warning) and response (evacuation) phases.

Radio stations in the province are operated by commercial, civic, and private organizations. There are eight AM stations which broadcast mainly in Bicol, while ten FM stations are usually played in English. News updates including weather information are broadcast every hour. As for major local and region-wide television programs, there are three channels in operation: Channel 4 (ABC-CBN), Channel 12 (GMA-7), and Channel 6 (ABC) .

Regarding the telephone exchange, there are several companies now operating in the province, like MATELCO (Mayon Telephone Corporation), Bicol Telegraph & Telephone, Inc, Bayantel, SOTELCO (Southern Telephone Company), PLDT and the latest started to operate is the DIGITEL. They are supported by Public Calling Offices (PCOs) like the PT&T and RCPI. Bayantel, a private telephone company operates the telephone system in the whole province, while SOTELCO and DIGITEL operate the telephone system in Tabaco, Guinobatan, Ligao, Oas, Polangui and Legazpi. Cellular phones by SMART and MOBILE are also in operation.

A major issue of the communication system in Albay Province is its inefficient facilities and poor operations. As all the above communication systems are operated using electric power, it is quite important to secure “power” especially in times (prior to and after) of disaster occurrence, and secure information channels to communicate accurate and timely disaster-related information.

Apart from mass media and telephone, there is also a communication system in Albay Province. PDCC maintains the “Albay Provincial Radio Communication System (APRCS)”. Operators work on a 24 hours basis at PDMO. There are 17 UHF Porta units, 2 base units, 2 repeater sets, and several VHF handy radios. In some municipalities in the Study Area, there are several VHF hand held radios though only Tabaco municipality has a radio communication facility operating 24 hours.

In addition to the public radio communication system, there exist radio communication groups organized by local amateur volunteers. One of them is “Kabalikat Civicom” which is established as a nationwide organization. There are also two Kabalikat Civicom in Albay: one is based in Legazpi and the other in Tabaco. Kabalikat Civicom is a member of Albay PDCC. Their members have VHF radio and work voluntarily to help the disaster stricken communities and people. They used to render services to them in assuring not only communication but also transportation of victims.

3.2.3 Land Use

(1) Natural Feature

The Albay Province, referring to the Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan – Province of Albay 1993-2002, has a total land area of 255,257 hectares (ha), or 2,552.6 km². The Study Area is 1,442.3 km², which is 51.6 % to the Albay Province. The province has a total coast length of 354 km.

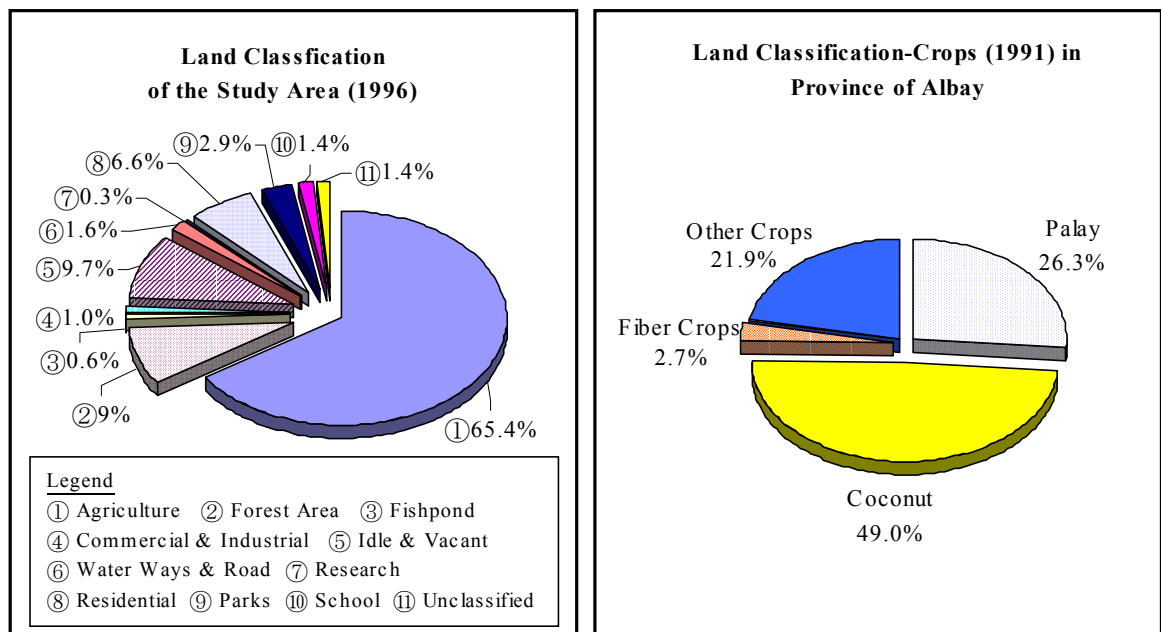
The Albay Province is defined by mountainous terrain and rolling plains and valleys with elevation changing from 500 to 1,000 m. Its interior plains are dissected by rivers of the Yawa, Quinali, Talisay, Cabiogan and Nasisi, as the major ones. Several springs and creeks also abound in the area and they can provide sources for irrigation. The tropical grass and wood and brushwood occupy the area of 6km from the crater of Mayon Volcano. Coconut fields circle over the hillside and skirts area between 6km and 10km around Mayon volcano, which is considerably fertile. Palay field surrounds that coconut area and the west part of it is stretching toward the Lake Bato, where has the lowest elevation and flat in this area, average 8% slope and 100m elevation. Another coconut belt surrounds the palay field in the south area of the province, where shapes another hilly land forms toward the south. These areas have elevations from 100 to 500 meters with a slope limit of 18%. Almost half of Albay are hilly lands.

The volcanic ashes and mudflows from Mayon Volcano, enrich the soil, and its type varies from clay to sandy roam and silt loam, have enriched the soil.

(2) Current Land Use

According to the Provincial Profile-Province of Albay 1996 and the Census of Agriculture 1991- National Statistics Office, agricultural land use is the dominant in the Study Area, which is 65.4% of the total area of Province of Albay, followed by 9.7% of idle & vacant, 9.0% of forest area and 6.6% of residential (see Table 3.2.1).

The agricultural land in the Study Area is 65.4% out of the total area. Coconut, palay, and abaca are the major products in Albay. These three crops area occupies 78.1% of the total agricultural land, which is 55.3% of the total land of Albay.



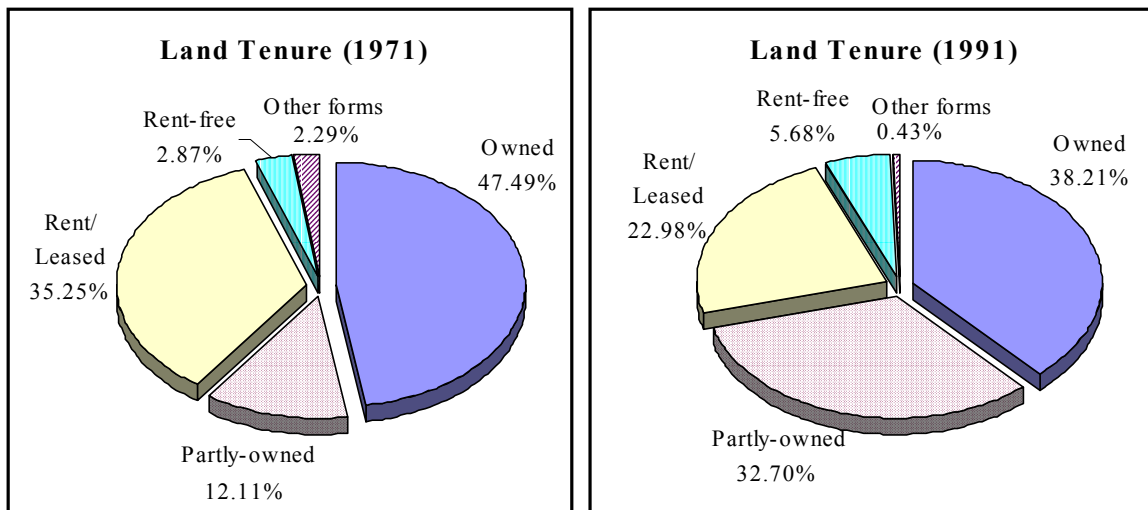
Sources: Provincial Profile-Province of Albay 1996 and The Census of Agriculture 1991 – National Statistics Office.

The most area of 6km from the crater of Mayon Volcano is occupied by tropical grass, wood and brushwood. In the Study Area, forest area has the share of 9.0%. The share of residential area is 6.6%, spreading as the major cities in the municipalities around Mayon Volcano being connected by the main highway, which is the lifeline in this area. Fishpond area and commercial & industrial land have the small share, which is 0.6% and 1.0%.

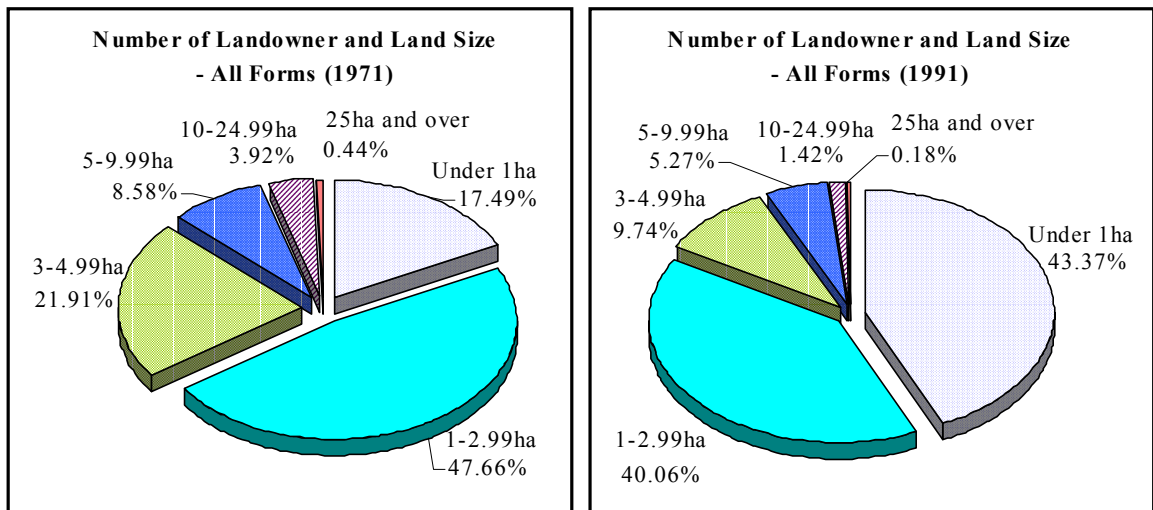
(3) Land Tenure

The condition of tenure of farmland has changed significantly in the last 20 years according to the Census of Agriculture 1991 – National Statistics Office. At present, more than 70% of the total farmland is owned or partly-owned, compared to 59.60% in 1971. The owned shows a significant decrease, 47.49% to 38.21% from 1971. On the other hand the partly-owned has been dramatically increased, 12.11% to 32.70%.

According to the Census of Agriculture 1991 – National Statistics Office, the farms partly-owned refer to farms operated under more than one form of tenure. In this situation, the rent/leased notably decreased, 32.25% to 22.98%. The concept of rent-free is, according to Department of Agriculture, for most cases, the illegally owned land, and for the rest, the rent/leased from relatives without any charge. It is assumed that most of the illegally owned lands are situated in the danger zone (DZ) and the national park, which used to be the originally owned land and has become illegal by setting up the DZ and the NIPAS.



The size of the farmland occupied by each farmer in this area is relatively small in general. This tendency has not been changed for these 20 years. The number of the farm lands less than 3ha occupies 82.90% in 1991, which used to be 69.66% in 1971. In 1971 the farm land which size is 1-2.99ha was dominant, which is 49.67%, and the under 1ha had 19.99% share, and the 3-4.99ha as a 19.24% share. Through the 1980s and 1990s, however, the portion of these figures have been changed, under 1ha becomes dominant, 43.26% which is 23.27% increase, and 1-2.99ha 39.63%, and 3-4.99ha showed a significant decrease, 9.85%.



Most of these changes and tendencies are assumed to be the influence of the Agrarian Reform and the trends in land size and tenure are expected to continue at least until 2004 which is the target year of the accomplishment of the Agrarian Reform. The total target area size to be accomplished until 2004 is 37,005ha, which is 27.49% of the total agricultural land in Albay.

(4) Present Land Management

1) Present Land Use Plan by Province

Province of Albay has prepared a Land Use Plan, which is the Provincial Physical Framework Plan (PPFP)/Comprehensive Provincial Land Use Plan 1993-2002 by Provincial Development Council.

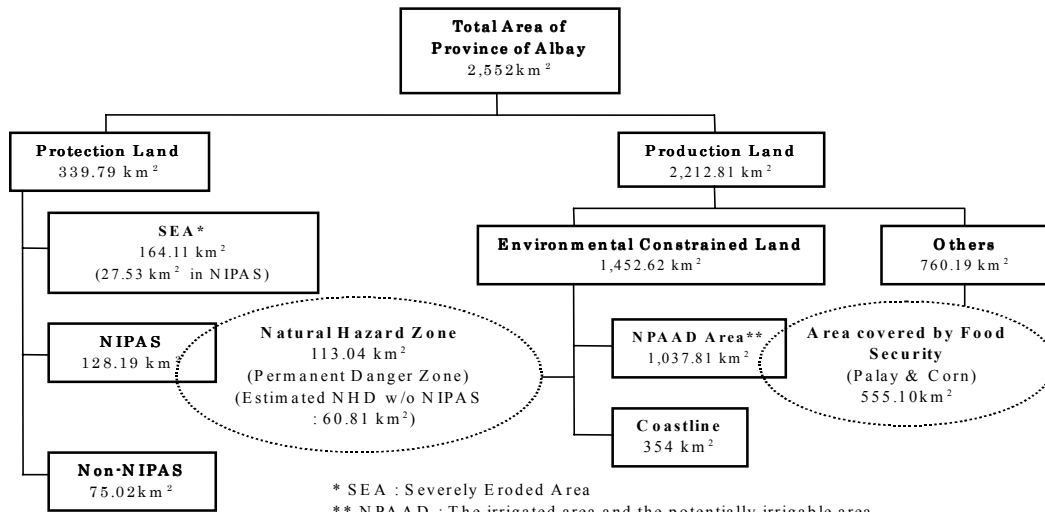
PPFP has set general spatial goals, which are:

- to ensure sustainable use and development of land resources and protection of critical areas/environmental values.

The objectives are to minimize:

- conversion of prime agricultural land for urban development
- population pressure on protection land
- population pressure on the Over-used production lands

**Structure of Land Use Classification around Mayon Volcano
of Comprehensive Provincial Land Use Plan by PPDO**



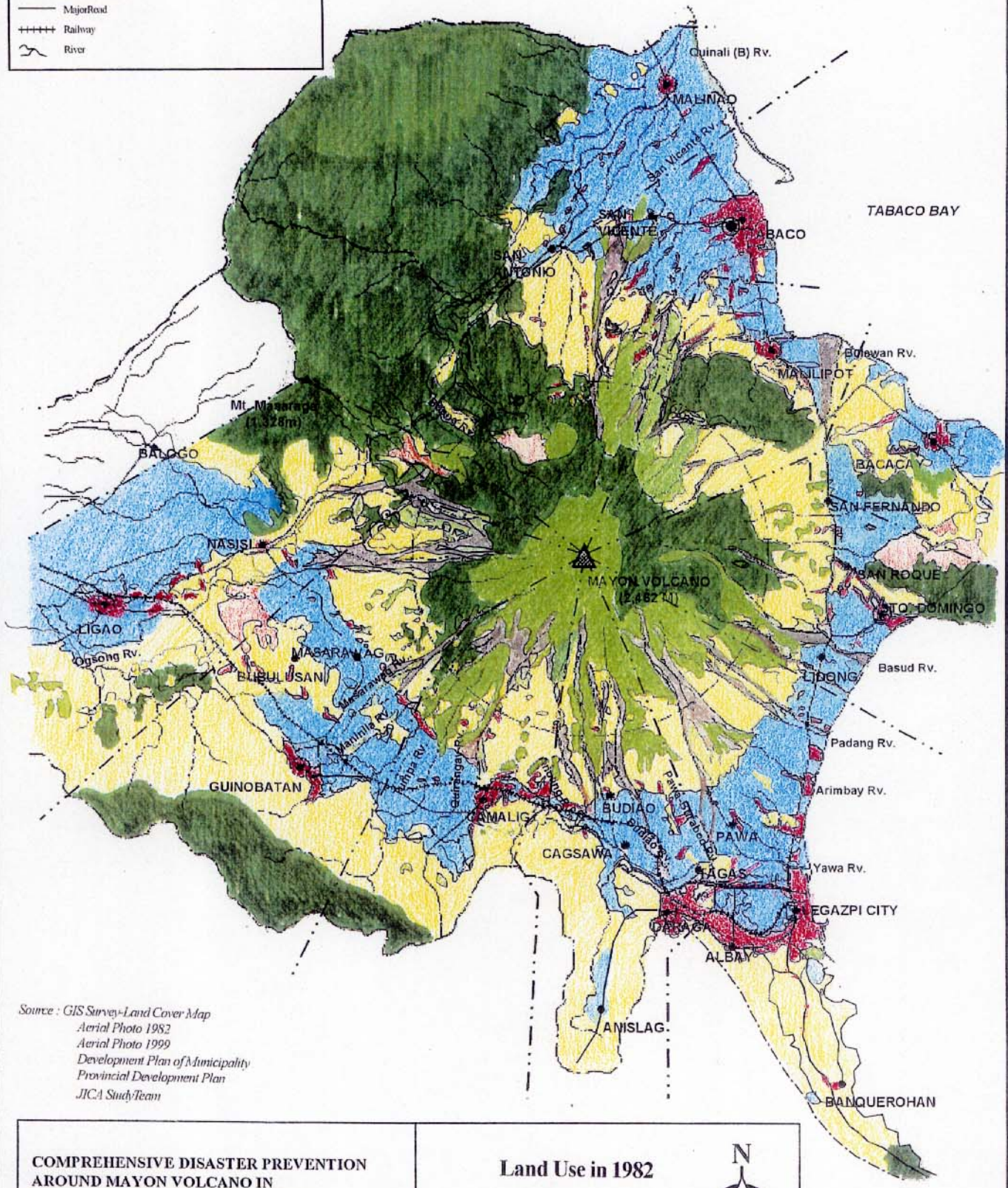
* SEA : Severely Eroded Area

** NPAAD : The irrigated area and the potentially irrigable area.

Source: Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan

LEGEND:

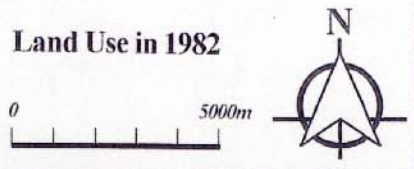
-  Urban Area : Residential, Industrial, Commercial, Institutional
-  Paddy
-  Intercropping : Coconut based
-  Intercropping : Abaca based
-  Bush and Grass
-  Forestry
-  Vacant Area : Lava flow, Sand & Gravel, Inundation Area
-  --- Boundary of Municipality
-  - - - Boundary of PDZ
-  — Major Road
-  + + + + Railway
-  ~~~~~ River



Source : GIS Survey-Land Cover Map
 Aerial Photo 1982
 Aerial Photo 1999
 Development Plan of Municipality
 Provincial Development Plan
 JICA Study Team

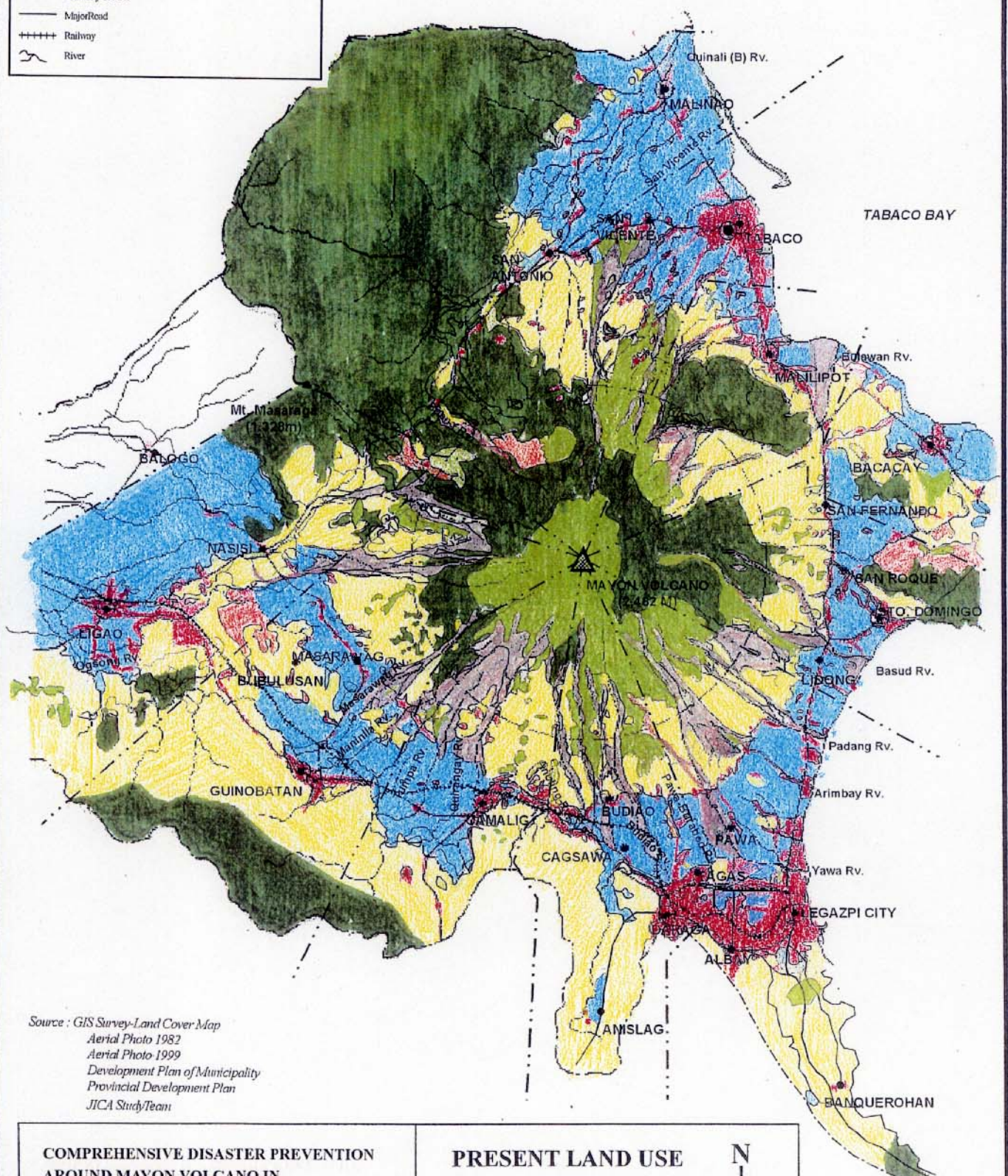
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 THE REPUBLIC OF THE PHILIPPINES**

JAPAN INTERNATIONAL COOPERATION AGENCY



LEGEND:

- Urban Area : Residential, Industrial, Commercial, Institutional
- Paddy
- Intercropping : Coconut based
- Intercropping : Abaca based
- Bush and Grass
- Forestry
- Vacant Area : Lava flow, Sand & Gravel, Inundation Area
- Boundary of Municipality
- Boundary of PDZ
- Major Road
- Railway
- River



Source : GIS Survey-Land Cover Map
 Aerial Photo 1982
 Aerial Photo 1999
 Development Plan of Municipality
 Provincial Development Plan
 JICA Study Team

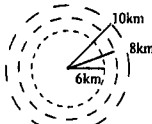
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**PRESENT LAND USE
 (1999)**

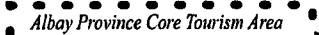

0 5000m

-  Provincewide Project & Plan
-  Area Development Plan & Project
-  Metro Legazpi (Legazpi City & Daraga)
-  Large Town
-  Medium Town
-  Small Town
-  Tourism Spot
-  Mining Spot

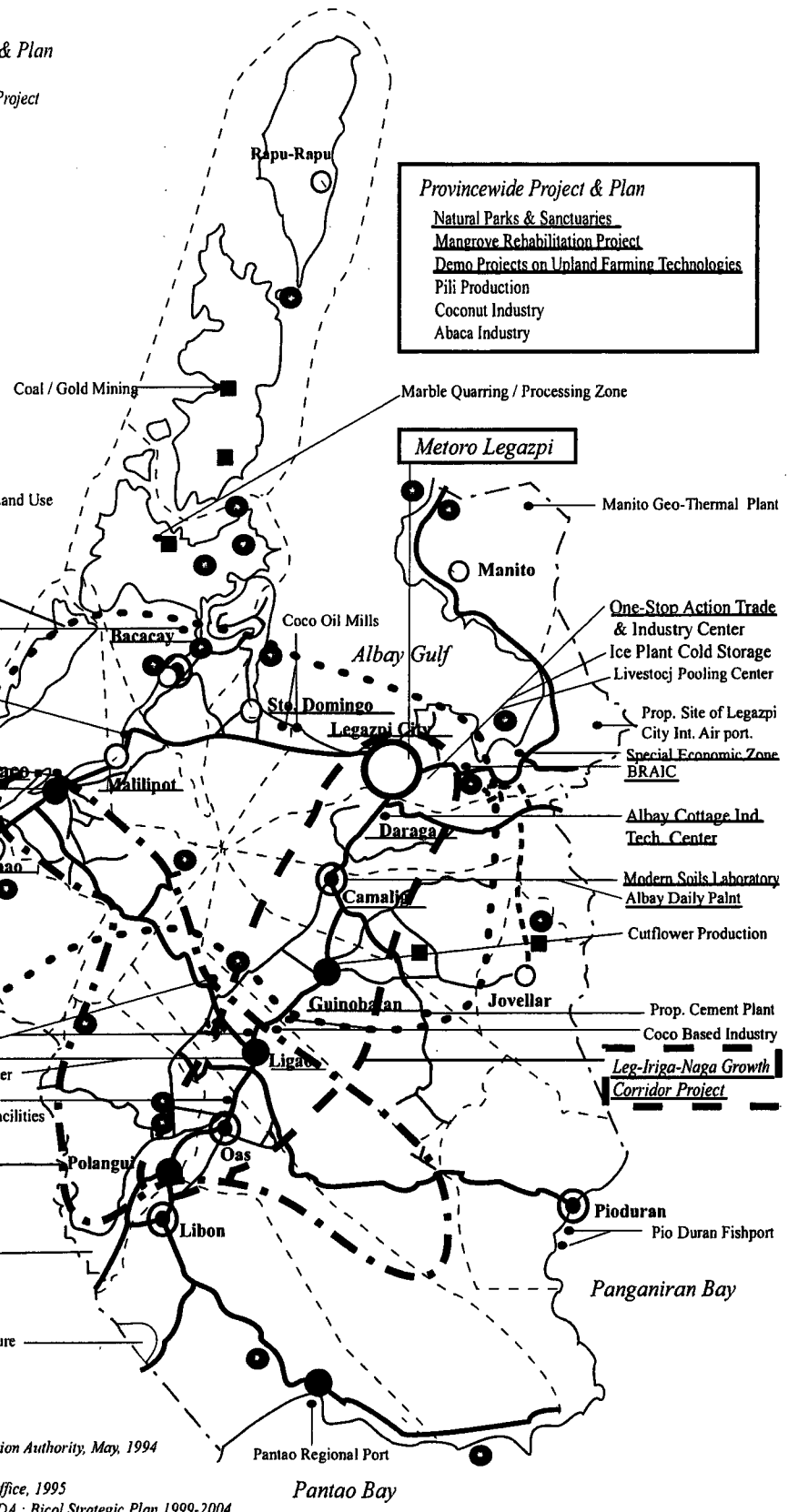


- Provincewide Project & Plan**
- Natural Parks & Sanctuaries
 - Manrove Rehabilitation Project
 - Demo Projects on Upland Farming Technologies
 - Pili Production
 - Coconut Industry
 - Abaca Industry

Name of the project & Plan : Project & Plan related to Land Use

-  Albay Province Core Tourism Area
-  Seaweed Industry

- Fish Port
- Abaca Processing Industry
- Tabaco Reclamation & Development Project
- Tabaco Int. Port
- Livestock Pooling Center
- Ice Plant Cold Storage
- Cement Processing Center
- Livestock / Poultry Production & Training Center
- Bricks & Ceramics Industry
- Tiwi Deo-thermal Plant
- Prov. Industrial Center
- Ice Plant Cold Storage
- Livestock Pooling Center
- Prime Ricelands
- Post Harvest Support Facilities
- MT. Masarawaga National Watershed Development Project
- Small Watershed Rehabilitation Project
- Agro-Industrial Estate
- Fresh Water Aqua Culture



- Coal / Gold Mining
- Marble Quarring / Processing Zone
- Manito Geo-Thermal Plant
- Coco Oil Mills
- Albay Gulf
- One-Stop Action Trade & Industry Center
- Ice Plant Cold Storage
- Livestock Pooling Center
- Prop. Site of Legazpi City Int. Air port.
- Special Economic Zone BRAIC
- Albay Cottage Ind. Tech. Center
- Modern Soils Laboratory
- Albay Daily Paint
- Cutflower Production
- Prop. Cement Plant
- Coco Based Industry
- Leg-Iriga-Naga Growth Corridor Project
- Pantao Regional Port
- Pantao Bay
- Panganiran Bay

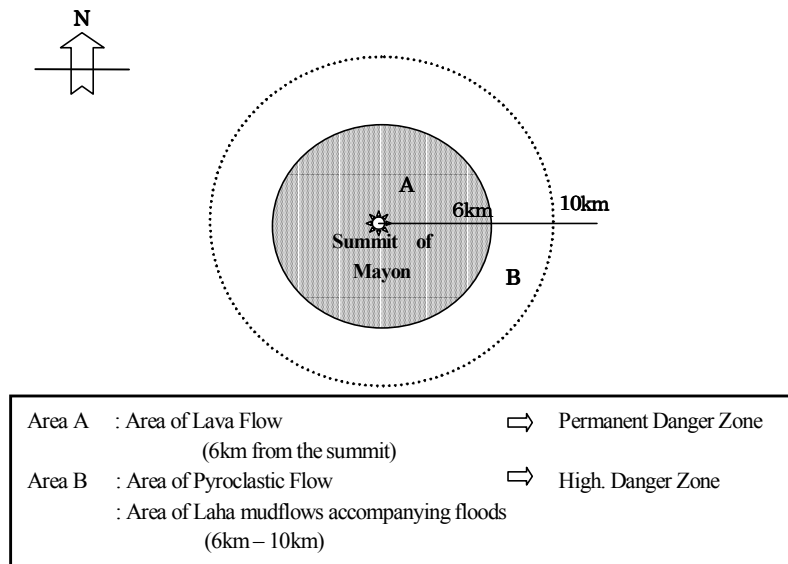
Source : National Mapping and Resource Information Authority, May, 1994
 Land Management Bureau, DENR
 Provincial Planning and Development Office, 1995
 Bicol Socio-economic Statistics 1995, NEDA ; Bicol Strategic Plan 1999-2004
 Albay in Figures (A Factbook), DTI, 1998

<p>COMPREHENSIVE DISASTER PREVENTION AROUND MAYON VOLCANO IN THE REPUBLIC OF THE PHILIPPINES</p>	<p>Present Development Plan & Projects related to Future Land Use</p>
<p>JAPAN INTERNATIONAL COOPERATION AGENCY</p>	

2) Hazard Area by PHIVOLCS

The Permanent Danger Zone (PDZ) of Mt. Mayon defined by PHIVOLCS is the area extending 6 km horizontally from the volcano’s crater, which is the hazard zone pertaining to lava flow. Also PDMO set up the High Danger Zone (HDZ), which is the area between 6 km and 10 km downward from the volcano’s crater, which is the pyroclastic hazard zone, partially in Legazpi City at about 12 km from the summit. In addition, lahar mudflows accompanying floods are expected to constitute immediate hazard as well as long-term major hazards for downstream areas located from 6 to 13 km around Mayon.

Basic Idea of Zoning around Mayon Volcano by PDMO



3) Environmental Category

In the Albay Province, there are several considerations over environmental issues, which are the protection land and the environmentally constrained land.

a. The Protection Land

The protection land is a portion of land and water set aside for its unique physical diversity, managed to enhance biological diversity and protected against human influence or impacts. The categories of protection land applicable for the province are the NIPAS (National Integrated Protected Area), Non-NIPAS, and the SEA (the area subjected to severe erosion).

According to these categories, Albay has 339.79 km² of protection lands. Also there are 23 barangays, 37,066 people and 6,751 households, sharing this biodiversity.

**National Park and Reserve Area in the Protection Land
under the NIPAS Act in Albay**

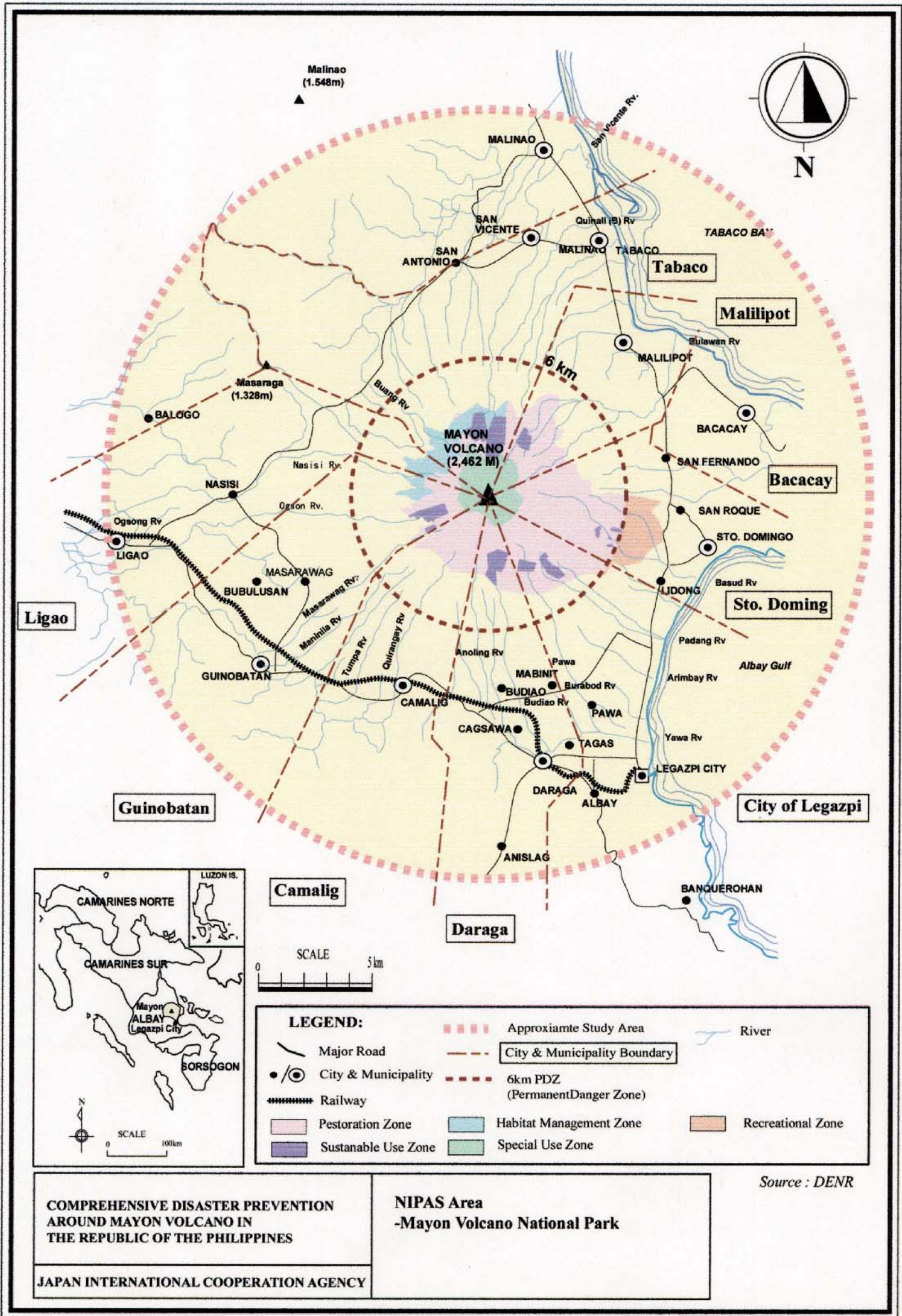
	Area	Municipalities
Mayon Volcano National Park (Proclamation No. 2992)	54.59 km ²	Tabaco, Malilipot, Sto. Domingo, Daraga, Camalig, Guinobatan, Ligao, Legazpi City
Mt. Masaaga Watershed Forest Reserve (Proclamation No. 84)	8.10 km ²	Tabaco, Ligao, Oas, Polangui
The Mangrove Forest Reserve (Proclamation No 2152)	2.36 km ²	Manito
The old growth forests in Mt. Malinao-Tiwi and Bacon-Manito Geothermal Reservations (Proclamation No 2036)	22.10 and 19.80 km ²	Malinao, Tiwi, Manito

Source: Comprehensive Provincial Land Use Plan 1993-2002, Albay Province

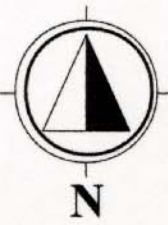
The Non-NIPAS Protection Land in Albay

	Description
Second growth forest with >50% slope and 1,000m elevation	90% forestland and 10% used for agricultural production
Buffer strips	Buffer strips in A & D (Alienable & Disposable) lands are 90% used for agriculture while buffer stripes in forestland are almost 50% intruded. The extent of misuse is, therefore, severe.
Mangrove	Most mangroves are severely degraded or cleared for fishpond operation and fuelwood gathering. Tourism development occurs within some mangrove areas.

Source: Comprehensive Provincial Land Use Plan 1993-2002, Albay Province



Malinao
(1,548m)



MAYON VOLCANO
(2,462 M)

Masaraga
(1,328m)

Ligao

Guinobatan

Camalig

Daraga

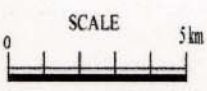
Tabaco

Malilipot

Bacacay

Sto. Domingo

City of Legazpi



LEGEND:			
	Approximate Study Area		River
	Major Road		City & Municipality Boundary
	City & Municipality		6km PDZ (Permanent Danger Zone)
	Railway		Pestoration Zone
	Sustainable Use Zone		Habitat Management Zone
			Recreational Zone
			Special Use Zone

Source : DENR

COMPREHENSIVE DISASTER PREVENTION
AROUND MAYON VOLCANO IN
THE REPUBLIC OF THE PHILIPPINES

NIPAS Area
-Mayon Volcano National Park

JAPAN INTERNATIONAL COOPERATION AGENCY

Mayon Volcano National Park

According to the Initial Protected Area Plan - The Mayon Volcano National Park (MVNP) prepared by DENR (1997), MVNP is designated as the protection area with a total area of 54.59 km². This park shares its area in the municipalities of Tabaco, Malilipot, Sto. Domingo, Daraga, Camalig, Guinobatan, Ligao and in Legazpi City.

b. The Environmentally Constrained Land

The environmentally constrained areas in Albay include the areas subject to natural hazard, the coastal zones, and the Network of Protected Areas of Agricultural Development (NPAAD).

4) Agricultural Category

a. Agrarian Reform

The target area of the Agrarian Reform is estimated at 370 km² until 2004, which is 23.37% of the total agricultural land in Albay Province. There is supposed to be no change in land distribution, except for the land tenure. The number of landowners is increasing and the area size of the one farmland is getting small over the land of 23.37% of the total agricultural land until 2004.

b. NPAAD and Food Security Plan

Although the agricultural sector is a major sector of economy in Albay, the province has a low self-sufficiency. According to the Provincial Food Security Plan 1999-2002, the self-sufficiency level of the Province of Albay is 44.60% on average. Also, more than 80% of the farm families are classified in the low 30% income bracket. Therefore, it is the one of the urgent issues for the province to at least achieve a self-sufficiency level and improve the living standard of farmers.

Self Sufficiency Level in Province of Albay in 1998

Commodity	Sufficiency Level (%)
Rice	43.65
White Corn	0.38
Root crop/Tuber	34.92
Vegetables	36.68
Fruit	32.44
Chicken Meat	11.00
Egg(Layers)	41.00
Beef	106.00
Carabeef	67.00
Pork	57.00
Fish	61.50

Source: "Provincial Food Security Plan 1999-2002",
Province of Albay

Under the Network of Protected Areas of Agricultural Development (NPAAD) and Provincial Food Security Plan (1999-2002), some agricultural lands are "protected" against any forms of irreversible development such as urban use. The main purpose of such protection is to keep and preserve the highly suitable agricultural lands of the long-term food security of the province and the nation as well. A large part of Albay, 1,037.81 km² or 40 % of its total area is suitable for NPAAD category. It consists of irrigated and potentially irrigable lands. The area for Provincial Food security is considered as the field of rice and corn, which is 555.09 km².

c. Irrigation Project

According to NIA and "Provincial Food Security Plan (1999-2002)", the province had a total potential irrigation area of 50,046ha in 1996. The existing system has a service area of 23,741ha and has a potential area of 26,305ha for development. The province assumed that increasing the irrigation service area and grain recovery, the province will attain self sufficiency and moreover experience a surplus of 48,797.48 metric tons of milled rice if the existing irrigation system will be increased by 10,926ha.

(5) Land Conversion and Expropriation

1) Land Conversion

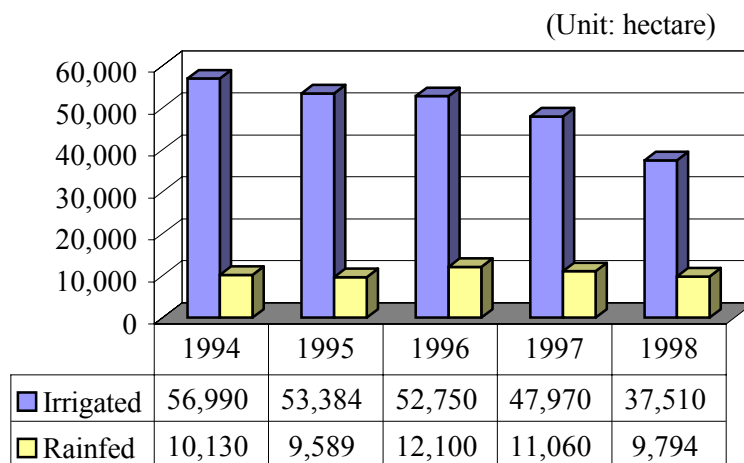
Some agricultural lands are "protected" against any forms of irreversible development such as urban use. According to the "Revised Rule and Regulations

on the Conversion of Agricultural Lands to Non-Agricultural Uses, 1999”, the criteria of the land which can be subject to the land conversion is as follows.

- a. Not the irrigated area.
- b. Not the Protected Area - NIPAS. (described in the Master Plan)
- c. Not classified as the Agricultural Land in the LGU’s land use plan.

* 500m from the National Rd. can not be classified as Agricultural Land.

Land conversion is a typical issue of the agricultural area close to urban area. According to the Provincial Food Security Plan 1999-2002, the latest official data shows that out of the province’s total agricultural land of 156,277.00ha, 0.18% or 292.31ha were already converted to other uses such as commercial, residential, and industrial areas in a month. Such percentage tends to increase with the growing population. This urbanization is invading mostly the paddy area (refer to the following figure and Land Use Map in 1982 and 1999).



Source: Province of Albay

Palay: Area Harvested by type of farm, Province of Albay

2) Procedure

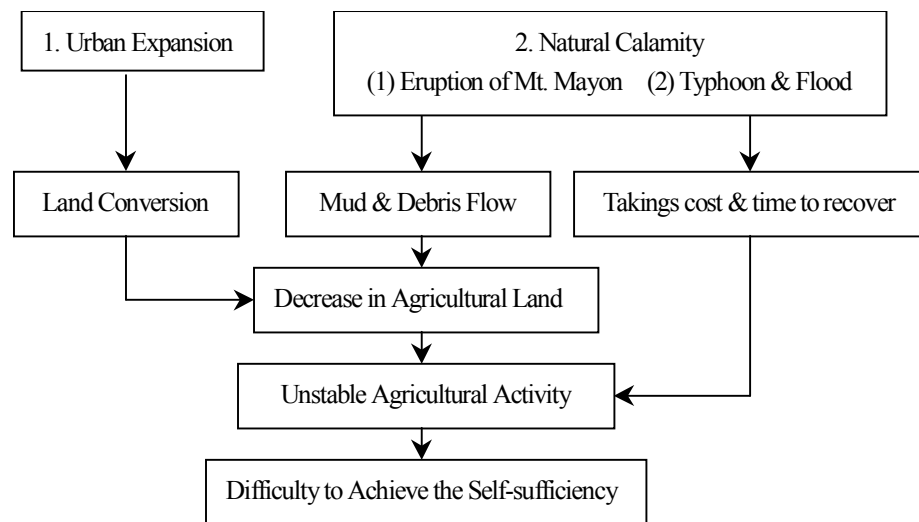
There are three measures to acquire the land.

- a. Legal procedure through the court.
- b. Agrarian Reform by DAR.
- c. Administrative procedure through DENR.
 - Free Patent
 - Homestead
 - Sales
 - Lease

Also under the administrative procedure through DENR there are five procedures.

(6) Present vulnerability and Coping Capacity

Albay Province has two major problems and issues over the land, urban expansion, and natural calamity: eruption of Mayon Volcano and typhoon and flood. The area covered by the mud & debris flow by the eruption of Mayon Volcano becomes sand & gravel area, classified as the idle & vacant area, and has not been utilized for any purpose except quarrying. This and urban expansion decrease agricultural land. These issues and frequent typhoon and flood makes agricultural activity unstable and cause the low self-sufficiency.



Problem Structure over the Land

According to DENR, municipalities, and the aerial photographs (1982, 1999), the land including agricultural area, which had once been covered by mudflow, becomes the sand & gravel area and classified as an idle and vacant land. There is no financial or physical assistance or aid for the disaster-stricken land. Each municipality has a rehabilitation plan over the eroded area, especially for coconut and abaca. However, it does not progress so much due to the financial problem.

3.2.4 Environment

(1) Objectives and Scope of Environmental Study

Being located in an Environmentally Critical Area (ECA), all projects/programs that may be identified by the Master Plan for Comprehensive Disaster Prevention

(CDP) around Mayon Volcano are required to have at least an Initial Environmental Examination (IEE). The principal objective is to identify the potential environmental effects of all activities of the projects and to determine the necessary mitigation and enhancement measures before their implementation. It also provides an opportunity for all stakeholders to be heard and be given due consideration by DENR in deciding whether to issue or deny an Environmental Compliance Certificate (ECC).

The difference between the contents of an IEE and those of the Environmental Impact Statement (EIS) are in the depth or detail of discussion and in the data requirement. IEEs are generally prepared using secondary data. The procedure for the conduct of an IEE is shown in Figure 3.2.1.

(2) Institutional Set-up for Environmental Assessment

The first formal environmental legislation in the Philippines was the Presidential Decree (PD) No.1151 issued in 1977. This law, called the “Philippine Environmental Policy”, requires all agencies and instrumentalities of the national government, including government-owned and controlled corporations, as well as private corporations, firms and entities to prepare an Environmental Impact Statement (EIS) for every action, project, or undertaking which significantly affects the quality of the environment.

The Philippine EIS system was established in 1978 by virtue of PD No.1586. This Decree identifies the National Environmental Protection Council (predecessor of Environmental Management Bureau) as the lead agency in implementing the EIS system and declares Environmentally Critical Projects (ECP) and projects within Environmentally Critical Areas (ECA) as projects requiring ECC. Presidential Proclamation 2146 identified ECPs and ECAs and Executive Order 192 tasked the Environmental Management Bureau (EMB) to recommend rules and regulations for the EIA and provide technical assistance for their implementation and monitoring. PD 984 sets the implementing rules and guidelines for PD 1586 while Department Administrative Order (DAO) No. 21 of 1992 defines the procedures of EIS system. The DENR standards are specified by DAO 14 and 14-A for air quality and by DAO 34 and 35 for water quality. Republic Act (RA) 6969 defines the rules and regulations concerning use, handling, storage and transport of toxic and hazardous substances.

In 1996, DAO 37 was issued to further streamline the EIS system superseding DAO 21. DAO 37 ensures that environmental considerations are incorporated at the earliest stage of project development; streamlines the EIA process to improve

its effectiveness as a planning, regulatory and management tool; and enhances public participation in the conduct of Environmental Impact Assessment (EIA) to validate social acceptability of the project. DAO 37 introduces new features in the EIA process such as the requirement of scoping as a first step in the EIA process, the setting a maximum time limit for the EIA review process, and the accreditation of EIA preparers.

(3) Present Environmental Conditions in the Study Area

1) Physical and Biological Environment

a. Air Quality

Being primarily engaged in agriculture, the municipalities around Mayon Volcano have very few industrial sources of air pollution. Most of these industries are coconut oil mills, abaca pulp and paper factories, and marble works. In Legazpi, the major industries are the Legazpi Oil Mill, Co Say Oil Mill, Asia Perlite Company, Induplex, Inc., Isarog Paper and Pulp Company, and the Albay Agro-Industrial Development Corporation. The mobile sources are few and traffic flow is not as congested as in Metro Manila or other big cities in the country. Furthermore, city government had passed and strictly implemented an ordinance (City Ordinance No. 96-09) prohibiting smoke belching in the city.

The Environmental Quality Division (EQD) of the DENR-EMPAS Region V is monitoring the air quality in Legazpi City. Measurements of Total Suspended Particulates (TSP) from 1991 to 1997 showed concentrations ranging from 76.2 to 567.4 micrograms per standard cubic meter($\mu\text{g}/\text{scm}$). Exceedances over the DENR ambient standard of 230 $\mu\text{g}/\text{scm}$ were usually attributed to road construction/repair activities.

The emissions of Mayon Volcano is estimated at 200 tons/day of SO_2 during quiet times (PHIVOLCS, 1998). On March 14, 1996 just before eruption, SO_2 emissions of up to 6000 tons/day was observed by PHIVOLCS using a correlation spectrometer (COSPEC).

On March 26, 1993 (about 1 month after the 1993 eruption), EMPAS made measurements of TSP, H_2S and SO_2 in Bigaa, Legazpi and Cabangan, Camalig. The observed concentrations in Bigaa were 1,400 $\mu\text{g}/\text{scm}$ for TSP, 0.1548 ppm for H_2S and 0.6112 ppm for SO_2 . All these values exceed the DENR standards.

b. Water Quality

The EQD of DENR-EMPAS Region V has been monitoring the water quality of three major rivers around Mayon Volcano, Tagas River in Tabaco, San Francisco River in Guinobatan, and Yawa River in Legazpi. The water quality data of these rivers are shown in the following table.

DENR Surface Water Quality Monitoring Data

Parameter	Mean Concentration/Value			
	Tagas River May/Aug 1997	San Francisco River May-Sep 1997	Yawa River Mar/May 1997	DENR Standard Class "D"
Temperature (°C)	-	28.59	28.30	-
BOD (mg/l)	2.41	-	-	15
Color	5.00	-	-	-
DO (mg/l)	5.76	7.34	7.45	3
PH	7.07	7.61	7.60	6 to 9
TDS (mg/l)	585.96	308.15	650.72	1,000
TSS (mg/l)	611.61	105.96	104.00	200
Turbidity	7.55	17.36	26.93	-
Oil & Grease (mg/l)	-	-	49.61	5

Source: EMPAS, 1997

These observed values of water quality parameters satisfy DENR ambient standards for Class D waters except for Oil and Grease in Yawa river which is about ten times the allowable value. This may be caused by rampant disposal of used oil into the storm drains.

The present sources of nitrates and phosphates are organic wastes from houses and piggeries, fertilizer from ricefields and detergents due to washing of clothes in rivers. Total hardness and chloride come from natural sources as water passes through soils and rocks. Turbidities increase due to suspended sediment loads, microorganisms and organic debris. Fertilizers also affect the pH of river water.

c. Soils

All around Mayon Volcano, the land surface is covered by black, basaltic and fundamental ejecta from the volcano. The soils are mostly black to dark gray sandy silt which is loose, non plastic and non-sticky. Soil samples collected in Camalig and Guinobatan have dry densities ranging from 2.44 to 2.91 g/cc with 47 to 58% porosities. The nitrogen content is 0.1416 to 0.2727% with organic matter of 2.8325 to 5.5131%. The calcium content is

also high with values of exchangeable Ca ranging from 2.9414 to 11.5975 me/100g. The exchangeable Mg values range from 1.4044 to 3.7888 me/100g.

The soil pH is neutral to slightly alkaline (7.0 to 7.8). This is in the upper of the usual pH values if 4.5 to 8.0 are the values for the most soils. This is indicative of good soil since minerals are more available in neutral or near neutral soils than in very acidic (below 3.5) or very alkaline soils (above 8.5).

d. Freshwater Biology

Most of the creeks in the slopes of Mayon Volcano are almost devoid of fishes and other aquatic life. This is due to heavy siltation by pyroclastic materials and the very high water temperatures during eruption of the volcano. Farther downstream, outside the 6-km PDZ, a few species of fish, plankton and benthic organisms are found.

From interview of residents (Gaia South, 1996), the fish species found in the downstream portions of the rivers around Mayon Volcano are tilapia, dalag, hito, carpa, balanak, and puyo. Golden kuhol and tabagwang (pilipit) were also observed. During the survey, the fish species caught in Tagaytay and Agiad rivers were tilapia, hito, casile, carpa, puyo, gourami, gobies, balanak and dalag. Freshwater crabs and shrimps called “buyod” were also caught.

A few species of plankton are found in the rivers surveyed in barangays Palanog, Libod, Bariw, Tagaytay, and Mauraro (Gaia South, 1996). A number of parasitic ova and insect larvae were also observed. It is noted that the swift unidirectional flow of river water does not enhance plankton growth. The river water qualities such as pH, salinity, DO, and suspended solids also affect the distribution and growth of plankton.

The species of benthic organisms found during this survey were mayfly nymph, stonefly nymph, lepidopteran, ostracod, chironomid midge, oligochaetes, *Terebra sp.*, *Tona sp.*, and an unidentified gastropod. Arthropod larvae and Beetle larvae were also found. Among these species, the chironomids and oligochaetes may be considered are indicators of poor water quality. Chironomid midge was found in most stations indicating that river water was polluted.

e. Terrestrial Ecology

Flora

The types of vegetative cover within a 8-km radius from the summit of Mayon Volcano are forestlands, grasslands, and some patches of agricultural areas. The agricultural area is predominantly planted with coconut on the eastern and southern quadrants. Abaca plantations and rice fields are also found in these quadrants but they cover only a small portion of the area. Some small clearings within the coconut plantations are planted with root crops and vegetables. In some areas root crops are interplanted in coconut and abaca plantations.

Forest lands predominantly cover the northern and eastern quadrants. The forest cover may be classified into mossy forests and mixed hardwood forests. These mossy forests are found in the upper slopes of the volcano from EL. 600 m up to 1300 m above mean sea level or from 4 km to 2 km radius from the summit. This type of forest consists of relatively dense growth of non-commercial and stunted trees, which are usually adapted to high elevation and humid areas.

The most common species in the mossy forests are *astronia spp.*, *Litsea spp.*, *Lithocarpus spp.*, and *Sarauia spp.* Associated with these types of vegetation are various species of epiphytes and underbrush, which include orchids, ferns, palms, herbs, and vines. The widest extent of mossy forest is located on the northern, western, and northeastern slopes owing to lesser disturbances from the mudflows and lava flows. Mossy forests serve as sanctuary for wildlife in the area. They also act as stabilizers of slopes and regulators of soil runoff and soil erosion aside from being the first line of defense against initial flow of volcanic debris to the low lands.

Mixed hardwood forests are found in the area from the foot of the Mayon Volcano to about EL. 600m. This type of vegetation is composed of sparsely distributed trees found in logged-over areas and in abandoned kaingins. The dominant species are *Trema spp.*, *Ficus spp.*, *Artocarpus spp.*, *Alstonia spp.*, *Erythrina Subumbrans* (Rarang), *Bischofia javanica* (Tuai), *Pterocymbium diversifolium* (Taluto), and *Macaranga bicolor* (Binunga). The dominant species that are found in lower areas vary according to the type of soil. Limited patches and almost pure growth of *Casuarina equisetifolia* (Agoho) occur along sandy to rocky mudflow gullies. *Trema spp.* and *Neonauclea sp.* occur on relatively young mudflow deposits

(about 16 years old) and *Cordia dichomata* (Anonang) are found on sandy plains bordering cultivated vegetation. Most of the mixed hardwood forests have poor structure and floristic composition because of frequent disruption of vegetation succession. Mudflows occur in these areas during and after eruption. Some disturbances are aggravated by anthropogenic activities. These include kaingin making and cutting of trees for firewood and for house construction. The species usually cut for firewood are Agoho, Anagdung, Anonang and Binunga. Trees mainly cut for house construction are Narra, Lamog and Dangkalan. These species are sparsely distributed in this area. A complete listing of tree species recorded in Mayon Volcano area is presented in the Ecological Profile of Albay (EMPAS, 1997).

Grasslands occur in patches from the base up to about 1,800-m elevation. These areas are dominated by *Miscanthus* spp., *Saccharum spontaneum* (Talahib) and *Imperata cylindrica* (Cogon). Most of the extensive clearings within the mossy forests are covered by *Miscanthus* formation. The other two species dominate grass formations along borders of cultivated areas and stream embankment in the lowlands at the lower slopes or base of the volcano. Two species of pitcher plant, which are considered threatened species and protected by forestry law (EMPAS, 1996), are found abundant Mayon National Park specifically in Lidong and Sto. Domingo.

Fauna

There were 57 species of birds recorded in Mayon Volcano National Park. These species are listed in the Wildlife Flora and Fauna Inventory of Mayon Volcano National Park (EMPAS 1996). A total of 37 species were observed to be Philippine endemics, 10 of which are Luzon endemics. Transect counts in Buang, Lidong and Masarawag showed that the most frequently observed species were *Ixos philippinus philippinus* (Philippine bulbul), *Zosterops nigrorum luzonica* (Yellow white eye), *Pycnonotus golavier golavier* (Yellow vented bulbul), *Parus elegans elegans* (Elegant titmouse), *Lalage nigra chilensis* (Pied triller), *Rhipidura cyaniceps cyaniceps* (Blue-headed fantail), *Orthotomus derbianus derbianus* (Gray-backed tailorbird), and *Nectarinia sperata sperata* (Purple-throated sunbird).

Thirty-four herpetofaunal (reptiles and amphibians) species were recorded in Mayon Volcano National Park. A listing of these species is given by EMPAS (1996). The most common species of frog collected by the EMPAS team on October 24-30, 1996 were *Platymantis dorsalis* (Common forest

ground frog), *Polypedates leucomystax* (Common pond frog), *Rana magna macrocephala* (Philippine woodland frog or bullfrog), *Occidozyga laevis laevis* (Common small-headed frog), *Paltymantis corrugas* (Corrugated frog) and *Rana signata similis* (Northern variable-backed frog). Some of the snakes collected were *Ahaetulla prasina preocularis* (Elongated-headed tree snake), *Cerberus rynchops* (Dog-faced water snake), *Rhabdophis spilogaster* (Water snake) and *Trimeresurus wagleri* (Philippine pit viper).

A total of 13 mammalian species were recorded as existing within Mt. Mayon Volcano National Park by EMPAS (1996). Seven of these species are endemic. The most common volant mammal (bat) captured during the EMPAS-RBI survey from August 19 to September 5, 1996 were *Cynopterus brachyotis*, *Ptenochirus jagori* and *Macroglossus minimus*. For non-volant mammals, the species captured were *Rattus everetti*, *Rattus tanezumi*, *Mus musculus castaneus* and *Rattus sp.*

Interview of residents inside the PDZ revealed that there are monkeys, wild pigs, and wild fowls in the area. These are considered threatened species.

Around Mayon Volcano, the area nearest the summit is bare while the lower slopes are mainly forests, grasslands, and coconut plantation. Patches of built-up areas, coconut and abaca plantations are found from 6 to 8km from summit while ricelands, coconut plantation, and most of the built-up areas are found in the 8 to 10 km radius.

Forests, grasslands, and coconut plantations occupy vast areas within the 8km radius around the volcano while abaca plantation is found mostly in Ligao and Tabaco. Most of the forest areas occur in Mallilipot and Tabaco areas while ricefields are found mostly in Sto. Domingo, Ligao and Camalig.

2) Social and Cultural Environment

a. Public Health

The leading causes of morbidity are Acute Respiratory Infection (ARI), diarrhea, pneumonia, influenza, bronchitis, and tuberculosis. For ARI, the morbidity rate is very high at 7,370 per 100,000 population. For mortality, the leading causes are pneumonia, hypertension, coronary artery disease and tuberculosis. The mortality rate for pneumonia is about 115 per 100,000 population.

b. Social Facilities

Transport Facilities

In 1996, the total number of land motor vehicles registered in Albay was 20,603. Of this total, 14,066 were for private use, 5,622 were for hire and 911 were government vehicles. Tricycles constitute 69% of the public utility vehicles while motorcycles compose about 41% of the vehicles for private use.

With regards to water transport, the total number of motorized water vehicles is 237. A large percentage of these (51%) are used as fishing vessels. Thirty-four percent are cargo ships while 10% are passenger ships, which also carry cargoes. The main seaports are located in Legazpi City and Tabaco.

The air transport into and out of Albay is serviced by two airlines, namely, the Philippine Airlines and the Air Philippines. The Philippine Airlines has three types of aircraft – the Boeing 737, Fokker 50 and YS 11. The airport is located in Legazpi City.

Health Facilities

There are 31 hospitals in the 10 municipalities/city around Mayon Volcano. The biggest private hospitals are Albay General Hospital (150 beds), AGO General Hospital (100 beds) and Tanchuling Hospital (50 beds), all in Legazpi City. The government hospitals are Cagraray District Hospital (25 beds) in Bacacay, Pio Duran Municipal Hospital (25 beds) in Ligao and Ziga Memorial District Hospital (50 beds) in Tabaco.

Garbage Disposal Sites

Municipal solid wastes are disposed by open burning in backyards, by depositing in pits, and by dumping into open spaces called dumpsites. The municipalities of Daraga, Guinobatan, Libon, Polangui, Sto. Domingo, and Tabaco have existing dumpsites. Solid wastes from residential and commercial areas are collected and disposed in these dumpsites by open dumping method. The province of Albay has a plan to improve solid waste management system by providing sanitary landfills and organic waste recycling plants. The municipalities, which have existing dumpsites, are Daraga, Guinobatan, Libon, Polangui, Sto. Domingo, and Tabaco. Among those who have no dumpsites, only Camalig, Ligao, and Oas have identified possible sanitary landfill sites.

Educational Facilities

There are 509 public elementary schools in Albay with a total of 4,955 elementary school teachers. In the school year 1997-1998, the total enrollment was 153,663 pupils. In the secondary level, the total number of high schools (general and vocational) is 71 with 1,408 high school teachers. The total enrollment for the school year 1997-1998 was 50,905 students.

Tourism and Recreational Facilities

There are 41 tourist spots in Albay excluding the 77 potential tourist spots that are not yet developed. These spots consist of natural springs, waterfalls, beautiful beaches, historical ruins and underground rivers. Some of the most attractive tourist spots are the Cagsawa Ruins in Daraga, Hoyop-hoyopan cave in Camalig, Mayon Spring Resort, Naglaus Underground River in Jovellar and the old churches of Daraga and Camalig.

c. Indigenous People

There are three ethnic groups in Albay, namely, the Agta, Agta-Cimaron, and Agta-Tabangnon tribes. However, none of these groups settle within the Study Area. Most of them are found in the barangays of Rapu-rapu and Tiwi. Ethnic settlements are located in barangays Hamorawon, Nagcalsot, Mapisay and Bilbao in the municipality of Rapu-rapu and in barangays Joroan, Misibis, Tabgon and Mayong in the municipality of Tiwi.

d. Religion

In 1990, out of 902,588 persons surveyed in Albay, the dominant religious affiliations are Roman Catholics (878,438), Iglesia ni Cristo (7,320), United Church of Christ in the Philippines (2,909), Jehovah's Witnesses (2,349), Seventh Day Adventists (2,143) and Church of Christ of the Latter Day Saints (1,152). The number of persons having Islam religion identified in the survey was 218. The survey also showed 2,882 "born again" Christians.

3.3 Institutional Aspect

3.3.1 National Disaster Prevention Policy

The Philippine Government has gradually broadened the scope of the disaster management policy and activities. The institutional arrangements on disaster prevention since the independence to present are summarized as shown below.

- 1) Independence to 1970 :
 - Centralization movement of the disaster management with establishment of the National Civil Defense Administration (NDCA)
- 2) 1970 to 1973 :
 - Establishment of local Disaster Coordinating Councils by OCD in the 12 administrative centers
- 3) 1974 to 1978 :
 - Strengthening of the Disaster Preparedness System by the disaster-related government agencies (OCD, DSWD, DOH PNRC, etc.)
- 4) 1978 :
 - Formal Creation of the National Disaster Coordinating Council (P.D. 1566)
- 5) 1990 to Present :
 - Expansion of the disaster management system scope covering preparedness, prevention, mitigation and response

3.3.2 Organization for Disaster Prevention

This Section gives an outline of functions of the Disaster Coordinating Councils (DCCs) at every level, and also reviews the roles of national (or central) government, local government and private sector/NGOs regarding disaster management.

(1) Disaster Coordinating Councils (DCCs)

Pursuant to the Presidential Decree (P.D.) No. 1566 (1978), the disaster coordinating councils are organized at national, regional, provincial, city/municipal and barangay levels. The following table shows the organization of Disaster Coordinating Councils (DCCs) as of 1996. The organization rates of DCCs at regional, provincial, city, and municipal levels are very high, while that of barangay level still remains low at 70%.

Number of DCCs and their Organization Rates as of 1996

	Number	Number of DCCs	Organization Rate (%)
Region	13	13	100
Province	77	77	100
City	67	67	100
Municipality	1,540	1,540	100
Barangay	41,932	29,138	70
Total	43,629	30,992	71

Source: National Disaster Coordinating Council (NDCC).

1) National Disaster Coordinating Council (NDCC)

The establishment of the NDCC is embodied in Section 2 of the Presidential Decree No.1566. The NDCC is mandated to serve as the President’s adviser or national top coordinator in formulating disaster preparedness programs and supervising all disaster management efforts. The NDCC functions as the highest policy-making body through the Office of the Civil Defense (OCD) which acts as “executive office” of the NDCC.

The NDCC member agencies and their roles are summarized below.

Roles of NDCC Member Agencies

Agencies	Major Roles
1. DA	Maintains data on agricultural crops, livestock and fisheries in disaster-prone area, undertakes surveys in disaster areas to determine the extent of damage on agricultural crops, livestock and fisheries
2. DBM	Releases the necessary funds required for disaster operations
3. DECS	Supply school buildings as evacuation center, assists in the public education campaign through integration in the school curricula of subjects relative to calamities and their causes and precautionary
4. DENR	Reforests and control of areas prone to flood, landslides, mudflows and ground subsidence
5. DOF	Issues rules and regulations for the funding by LGUs for DCCs
6. DOH	Organizes disaster management group in hospitals, coordination of medical relief service, undertakes necessary measures to prevent the occurrence of communicable diseases and epidemics
7. DOLE	Organizes disaster control groups in factories and industrial complexes in coordination with DPWH and OCD, provides emergency employment opportunities to disaster victims
8. DILG	Oversees the organization of Local DCCs in coordination with the OCD
9. DND	AFP – establishes communication linkages and makes these available for disaster operations, assists the INP in providing security coverage in disaster areas, assists in the reconstruction of damaged national and local roads, bridges, and structures of facilities

Agencies		Major Roles
10.	OCD	Makes available the Civil Defense Center for use by the Council during disaster operations, initiates the organization of Local DCCs in coordination with DILG, develops and prepares programs of disaster preparedness training of DCCs in coordination with DSWD and DILG, conducts studies on disaster management, monitors the implementation of the various provisions of PD1566
11.	DPWH	Restores destroyed public works such as flood control, waterworks, roads, bridges and other facilities, provides equipment for rescue and recovery operations, assists in providing transportation facilities to transport relief supplies, personnel and disaster victims, provides warning to the public on impending releases of water from dams under its control
12.	DSWD	Organizes relief and rehabilitation services in coordination with Local DCCs, assists in the training of DCCs in all levels in coordination with the OCD and DILG, distributes donations in accordance with relief requirements, provides assistance for the rehabilitation of victims
13.	DOT	Support for disaster management operation at hotels and restaurants
14.	DTI	Carries out measures to maintain normal level of prices of commodities during emergencies, assures the availability of commodities in calamity areas
15.	DOTC	Coordinates the organization of the emergency transport services, restores destroyed transportation and communication facilities such as railroads and makes available existing communications and transportation facilities for disaster operations
16.	DOST	PAGASA – Provides typhoon forecasting and warning, PHIVOLCS – Issues advisories on earthquake and volcanic activities
17.	NEDA	Determines and analyzes the impacts of disasters on social and economic development plans, and develops damage assessment schemes to be used by agencies surveying after-disaster damages
18.	NHA	Assesses housing requirements of displaced persons, provides emergency or temporary housing with adequate sanitary facilities, and rebuild destroyed areas
19.	PIA	Coordinates with government and private media in educating the public on disaster preparedness and operations, and provides public information service to disseminate disaster mitigation measures as well as to assist in warning the public on impending disasters
20.	PNRC	Coordinates disaster leadership training courses and assists in the training DCCs, assists in providing emergency relief assistance to victims of disasters, makes available whole blood and its derivatives in times of disasters, and interfaces its other emergency welfare services (warning, rescue, evacuation, medical/nursing, first aid, ambulance and social services) with the activities of member agencies at all levels.

Source: National Calamities and Disaster Preparedness Plan, 1988, NDCC

The NDCC does not have its own budget to disburse. It operates through its member-agencies and its local networks. Neither RDCC has its own budget. PDCC, CDCC/MDCC and BDCC disburse necessary amount from their (local) calamity fund.

2) Regional Disaster Coordinating Council (RDCC)

The RDCC is organized in each region in the Philippines and the Regional Director of Philippine National Police (PNP) chairs it. Its members are composed

of representatives of national government agencies at the respective regions. The functions of RDCC are summarized as follows:

- Establishment of the Regional Disaster Operations Center (RDOC),
- Coordination of the disaster operations activities in the region,
- Implementation of the guideline set by the NDCC within the region,
- Provision of advice to the local disaster coordinating councils on disaster management, and
- Submission of appropriate recommendations to the NDCC, as necessary.

3) Provincial Disaster Coordinating Council (PDCC)

The PDCC is organized in each province and chaired by the provincial governor. Its members consist of representatives from provincial government offices as well as national ones assigned to the province. Its functions are summarized as follows:

- Establishment of the Provincial Disaster Operations Center (PDOC),
- Coordination of the disaster-related activities among the municipalities and cities in the province,
- Implementation of the guidelines set by the RDCC,
- Advice/instructions to the City/Municipal Disaster Coordinating Councils (CDCCs/MDCCs) regarding disaster management,
- Recommendations to the RDCC as necessary, and
- Supervision of CDCCs and MDCCs during emergency period.

4) City/Municipal Disaster Coordinating Council (CDCC/MDCC)

CDCC or MDCC is organized in each city and municipality. Its members consist of representatives from national government agencies and city/municipal government offices. Its functions are summarized as follows:

- Establishment of the City/Municipal Disaster Operations Center (CDOC/MDOC),
- Coordination of the municipal disaster-related activities in the city/municipality,
- Implementation of the guidelines set by the PDCC,
- Advice/instructions to the Barangay Disaster Coordinating Councils (BDCCs) regarding disaster management, and
- Recommendations to the PDCC as necessary.

5) Barangay Disaster Coordinating Council (BDCC)

BDCC is organized at barangay level and chaired by barangay captain. Its members consist of barangay officials. The functions of BDCC include the following:

- Establishment of the Barangay Disaster Operations Center (BDOC),
- Coordination of disaster operations activities in the barangay,
- Implementation of the guidelines set by the CDCC/MDCC,
- Advice/instructions to the members of Barangay Disaster Coordinating Council (BDCC) regarding disaster management, and
- Recommendations to the CDCC/MDCC, as necessary.

(2) Roles of National and Local Governments and NGOs in Disaster Management

1) Pre-disaster Phase

a. Planning for Disaster Management

NDCC through OCD reviews and evaluates all documented plans submitted by all government entities, political subdivisions as well as private organizations, in compliance with pertinent advice/instructions and/or guidelines set forth in the National Calamities and Disaster Preparedness Plan.

b. Organizing

Through OCD, the NDCC will spearhead the organization of Disaster Coordinating Councils from the region down to the barangay levels in coordination with the Department of Interior and Local Government (DILG) that shall act as the overseer of the councils.

c. Training

In coordination with the OCD, MSWD, PNRC and other appropriate agencies, the DILG conducts training of members of local disaster coordinating councils. DECS assists in the public education campaign through integration in the school curricula. DTI trains disaster control groups and reaction teams in large buildings used for commercial purposes.

d. Stockpiling

DSWD and municipality including MSWD are responsible for stockpiling of food. DOH and municipal health office stockpile medicines and medical supplies.

e. Forecasting and Warning

The Philippine Atmospheric, Geophysical, and Astronomical Administration (PAGASA) provides weather information together with forecasting and warning about typhoons and flood, while the Philippine Institute of Volcanology and Seismology (PHIVOLCS) is responsible for monitoring the volcanic and seismic hazards. PAGASA gives to LGUs and general public the typhoon information by issuing “Public Storm Warning Signal”. PAGASA releases “Tropical Cyclone Warning” four times a day when wind speed reaches 30-60km/h. Mass media is used for informing these information to the general public.

2) Emergency Phase

Emergency activities include the following: rescue, evacuation, first aid, relief, and transportation service. Local disaster coordinating councils supervise emergency phase activities.

a. Rescue Operations

Local disaster coordinating councils supervise relief and rescue activities. Rescue and immediate relief are mainly done by the Armed Forces of the Philippines (AFP) and Philippine National Police (PNP). DPWH assists local rescue and engineering units by providing its equipment and personnel.

b. Evacuation

Local disaster coordinating councils will be responsible for evacuating disaster victims or potential victims. The regional and provincial DCCs extend assistance to their lower level councils whenever the situation has deteriorated beyond the capabilities of the latter to cope with. AFP assists in the evacuation activities. DECS makes available suitable school buildings as evacuation centers.

c. First aid and Medical Services

The DOH, PNRC and volunteer workers participate in first aid at the disaster area.

d. Disaster Relief Services

In coordination with the DSWD and PNRC, local DCCs are responsible for disaster relief activities. They undertake immediate investigations of the disaster area, provide mass feeding, emergency housing, emergency clothing and missing persons tracing services.

e. Police Auxiliary Services

Police auxiliary services are organized in order to supplement the regular forces in times of disaster.

f. Emergency Transportation Services

The DOTC and other government agencies together with the private sector arrange and provide transportation facilities for the disaster relief teams.

g. Damage Assessment

The local DCCs conduct damage assessment survey in the disaster area with a view to determining the extent of calamities to infrastructures, agriculture, aquatic resources, livestock, other properties and casualties as well. A result of the survey is sent to the next higher disaster coordinating council for transmittal to the NDCC through OCD.

3) Post Emergency Phase

a. Rehabilitation

The local DCCs determine the nature and extent of the rehabilitation efforts to be undertaken. The DCCs request assistance from government agencies, private offices, or individuals.

The DPWH restores destroyed public works such as flood control, waterworks, roads, bridges and other facilities under its control. Quick Response Fund of the National Calamity Fund is often used for immediate rehabilitation of the infrastructures. Restoration of locally managed infrastructures as provincial and municipal roads is made by the LGUs. The

DECS is responsible for restoration of the damaged school buildings. The DPWH assists the DECS in its restoration works.

Municipal and City Social Welfare and Development office issues calamity certificate which enables victims to obtain “calamity loan” from social security service. DSWD provides core shelter assistance, which enables victims to construct their own house themselves with technical assistance. In addition, LGUs assists the victims whose houses are damaged in repairing it by providing necessary materials and/or provides financial assistance.

b. Emergency labor supply

Department of Labor and Employment (DOLE) coordinates with the concerned agencies in the hiring of labor from the affected population as may be needed for the restoration, repair and construction of public buildings, roads, bridges, dams, harbors, airports, and other public infrastructure damaged by disaster.

(3) Disaster Management by Land Use Regulation and Reforestation

Operation Mayon – prepared by PHIVOLCS defines the Permanent Danger Zone (PDZ). The PDZ extends six kilometres radius from the summit. No one is allowed to settle permanently in the PDZ. Once eruption becomes imminent or during alert level II, the PDZ is declared off-limits. Though no regulatory instrument supports PHIVOLCS’ declaration of the PDZ, the idea of PDZ is well known to the community. Land in the PDZ is assessed to have no value. Thus, it is difficult to make investment in such area.

DENR is responsible for forest management and protection, reforestation, and soil conservation and watershed management. The amount appropriated for soil conservation and watershed management for Region V was 22 million pesos in 1997.

Cities and municipalities are responsible for formulating and updating their respective comprehensive land use plans, in conformity with the land use planning and zoning standards and guidelines prescribed by the Housing and Land Use Regulatory Board (HLRB). Province formulates and updates their comprehensive land use plan in accordance with the national standards. The province is required to review the land use plans of component cities and municipalities.

Local Government Code of 1991 provides that LGUs shall have a greater role in the formulation of local development plans and in the administration of service

programs such as social welfare, health, agricultural extension and housing. They will also assume regulatory functions such as reclassification of lands, the implementation of National Building Code and the enforcement of environmental laws.

(4) Organizations for Disaster Prevention in Albay Province

This section reviews the existing disaster management mechanism in the Albay Province by presenting the major activities of DCCs of various levels and NGOs.

1) Albay Province Disaster Coordinating Council (PDCC)

In Albay Province, the Albay Provincial Disaster Coordinating Council was organized pursuant to the goals and objectives of PD1566. The Albay Provincial Disaster Coordinating Council composes of the following organizations:

Organization of the Albay PDCC

No.	Organizations	No.	Organizations
1.	Philippine National Police (PNP)	14.	Composite Air Support Force (CASF)
2.	Provincial Social Welfare and Development Office (PSWDO)	15.	Naval District III SWAG/DRTG, PN(ND-III)
3.	Department of Education, Culture and Sports (DECS)	16.	Albay Legazpi Emergency Rescue Team (ALERT)
4.	Provincial Health Office (PHO)	17.	PNP Maritime Police
5.	Department of Public Works and Highways (DPWH)	18.	Office of Civil Defense (OCD)
6.	Land Transportation Office (LTO)	19.	Philippine Coast Guard
7.	Department of Trade and Industry (DTI)	20.	KABALIKAT CIVICOM (Volunteer Radio Communication Group)
8.	Department of Interior and Local Government (DILG)	21.	Department of Health (DPH)
9.	Armed Forces of the Philippines (AFP)	22.	Philippine Port Authority (PPA)
10.	Philippine Information Agency (PIA)	23.	Bureau of Fire Protection
11.	Support and Stand-by Groups	24.	Albay Electric Cooperative (ALECO)
12.	Philippine National Red Cross (PNRC)	25.	Local Amateur Radio Club
13.	Department of Environment and Natural Resources (DENR)	26.	Local Water District

2) Establishment of Provincial Disaster Management Office (PDMO)

Albay Province was chosen by the Italian Government to be the pilot province to implement the Disaster Preparedness and Response Project (1990-1992). The Provincial Disaster Operating Center was established under this project. The center served as the venue and hub of disaster management activities. In order to ensure continuity of the project, creation of the Provincial Disaster Management Office into an independent department was recommended. In June 1994, the

resolution No. 155-95 “Institutionalizing and elevating the Albay Provincial Disaster Management Office to a Department Effective 1995” was passed in the Sannggunian Panlalawigan ng Albay (Albay Provincial Council).

The Provincial Disaster Management Office (PDMO) is the technical arm and Secretariat of the Provincial Disaster Coordinating Council (PDCC). It is an independent department of the provincial government. It is designed to strengthen the disaster management capability of the provincial government. In particular, the PDMO is set to establish an awareness at the community level and produce more disaster response managers and volunteers in promoting an efficient interventions on disaster preparedness and emergency response as stipulated in the National Calamities and Disaster Preparedness Plan. The Albay Provincial Disaster Management Office is the only permanent organization in the Philippines, designed to cope with disaster.

The budget of PDMO is appropriated from the Albay Provincial Government. The budget appropriated for 1998 is approximately 2.5 million pesos. This amount is allotted for personnel cost, research, training and other emergency expenses. The staff consists of 16 permanent employees and 9 casual employees. With this number of staff, they work 24-hours with or without calamity.

The PDMO drafted a “Disaster Management Operation Manual” in 1998. This manual describes the geographical setting of the province, types of hazard, and roles and functions of the agencies for disaster management operation. As to the PDMO’s tasks, they are described in the Supporting Report (1), Chapter IX by each of the three phases of disaster management operations, namely “Pre Disaster Phase, Disaster Response Phase, and Post Disaster Recovery Phase”.

The Albay Provincial Government now has a plan to establish the “Office of Public Safety”. The PDMO is planned to be placed under this Office together with the Traffic Management Division.

3) Disaster Management at Community Level

a. Organization of City/Municipal Disaster Coordinating Council

The Study Area concerns one city (Legazpi) and nine municipalities consisting of Bacacay, Camalig, Daraga, Guinobatan, Ligao, Malilipot, Malinao, Sto. Domingo and Tabaco. In each city and municipality, disaster coordinating council is organized. Most of the municipalities have disaster preparedness plan, but these plans mostly consist of organization chart and simple explanation of the roles of the C/MDCC members. Few

municipalities have disaster operation manual though most municipalities have a list of evacuation center and a list of barangay prone to hazards.

The budget of CDCC/MDCC is virtually equal to the amount of 5% calamity reserve. In other words, the DCCs are not given any appropriated budget from the municipality. Few personnel are assigned as full-time disaster management officials at City and Municipal level. The following table summarizes the disaster preparedness status of the Municipalities concerned in the Study Area.

Summary of Disaster Preparedness Status of the LGUs Concerned in the Study Area

Name of LGUs	DCC	Preparedness Plan	Operation Manual
Legazpi	Yes	Yes	Yes
Bacacay	Yes	Yes	No
Camalig	Yes	Yes	No
Daraga	Yes	Yes	Yes
Guinobatan	Yes	Yes	No
Ligao	Yes	Yes	No
Malilipot	Yes	No	No
Malinao	Yes	Yes	No
Sto. Domingo	Yes	Yes	No
Tabaco	Yes	Yes	No

Source : Interview Surveys by the JICA Study Team (as of June 1999).

b. Organization of Disaster Coordinating Council at Barangay Level

There are 446 Barangays in the 9 municipalities and in Legazpi City in total. A barangay has a population ranging from 200 to as high as 7,000 persons according to 1995 Census of Population. Barangay Disaster Coordinating Council is organized in the most barangays.

A typical BDCC has an official staff of about 10 people, which corresponds to the number of barangay council members in most cases. It is common to have only a few paid BDCC workers. Volunteers constitute the other workforce of the BDCC. They are organized as the service teams. A service team is composed of 3 to 6 persons. This service is activated in time of imminent disaster. Hence, BDCC activities are mostly reliant on higher DCCs, i.e. Municipal and City DCCs. For example, when municipal disaster coordinating council organizes evacuation drills, BDCC officials are invited to attend.

When the typhoon comes, BDCC counts on warning and other information from the municipality along with the typhoon warning communicated

through mass media. Evacuation advice from the mayor is communicated to the BDCC. The BDCC then delivers the message to the area to be evacuated. The delivery of message often becomes a problem. There are some barangays where electrification is yet to be made. Neither telecommunication is available. In this case, evacuation advice is delivered by municipal officials to the near-by barangay. Then barangay disaster officials and the service team deliver the message by house-to-house visit. Approximately 50% of barangays near the Mayon Volcano have written Barangay Disaster Preparedness Plan. Disaster operation manual however rarely exists. Barangays do not appropriate any budget for BDCC activities. Necessary amount is released from the Barangay calamity reserve.

c. Disaster Management Operation by NGOs and Volunteer Groups

Network of NGO

In the Philippines, there is a network of ten national NGOs directly or indirectly involved with disaster and disaster responses. The network is called “Inter-agency network for disaster response (IANDR).” IANDR consists of the following NGOs:

- Adventist Development and Relief Agency (ADRA);
- Catholic Relief Services (CRS);
- Citizen’s Disaster Rehabilitation Center (CDRC);
- Council for People’s Development (CPD);
- Luzon Secretariat for Social Action (LUSSA);
- National Council of Churches in the Philippines (NCCP);
- Philippine Business for Social Progress (PBSP);
- Philippine National Red Cross (PNRC);
- Philippine Rural Reconstruction Movement (PRRM);
- CARE Philippines

IANDR was established in the 1980s and responded to major disasters like July 1990 earthquake of Baguio, the Mt. Pinatubo Volcanic eruption, and a series of typhoons that struck in the 1990s.

Corporate Network for Disaster Response

Local network of NGOs and business sector was organized as “Bicol Corporate Network for Disaster Response” to develop and strengthen resource mobilization capabilities of regional NGOs in 1993. The members of the Bicol CNDR are:

- Bicol Small Business Institute Foundation, Inc. Legazpi City;
- San Miguel Corporation Beer Division, Naga City;
- Davao Union Marketing Corporation, Legazpi City;
- Simon of Cyrene Foundation, Daraga, Albay;
- Liberty Commercial Center, Legazpi City;
- Coca-Cola Bottlers Phils., Inc. Naga City;
- Philippine Jaycees, Naga City;
- Chamber of Commerce and Industry, Naga City

The activities of CNDR includes: (a) stockpiling and distribution of relief goods to the evacuation centers for those affected by the eruption of Mayon Volcano in 1993 and typhoons, and (b) Coordination of the conduct of training for social workers, DSWD and DOH officials on stress debriefing.

Philippine National Red Cross (PNRC) Albay Charter

PNRC Albay Charter is a member of Albay Provincial Disaster Coordinating Council. Its Disaster Management Services is tasked to carry out relief and developmental programs for the most vulnerable population affected by emergencies and disaster.

Other NGOs in Albay Province

There are many NGOs registered under Security and Exchange Commission. They have different objectives, services, and activities. Most non-government organizations active in disaster prevention in the province is well coordinated with the Provincial Disaster Management Office (PDMO) through the Provincial Disaster Coordinating Council (PDCC) before, during, and after disasters. Among non-government organizations in the province, only two of them have disaster management related programs with permanent secretariat - Social Action Center (SAC), and the Bicol Small Business Institute Foundation Incorporated (BSBI).

In addition to the above two NGOs with permanent secretariat, there are two volunteer groups for disaster-related operation. One is a volunteer radio communication group (KABALIKAT CIVICOM), and the other is volunteer rescue group (Albay-Legazpi Emergency Rescue Team) affiliated with the PNRC.

3.3.3 Financial System for Disaster Prevention

Many national government agencies are involved in disaster management activities. It is difficult to aggregate the amount disbursed for disaster related activities by these agencies. According to the NDCC, the total amount of damages² by major disasters amounted to PHP24, 967million in 1998 as shown below.

Damages Caused by Major Natural Disasters in the Philippines

Year	Casualties (no.)			House Damaged (no.)		Cost of Damages (million PHP)
	Dead	Injured	Missing	Total	Partially	
1996	162	146	56	2,973	18,965	3,113.8
1997	165	76	11	2,827	21,193	1,312.1
1998	499	874	105	137,316	406,434	24,967.0

Source: Philippine Statistical Yearbook 1999, 1998 and 1997, National Statistical Coordination Board (NSCB).

The increase in damage in 1998 is mostly due to the impact of Typhoon Loleng that struck the country in October 1998. Calamity Fund is the major national level budgetary sources for rehabilitation, reconstruction, and other works in connection with calamities. Aggregated amount of budget for evacuation is not readily available. Calamity Fund is managed by NDCC Secretariat and released by the approval of the President.

1) National Calamity Fund

The national government appropriates certain amount of its budget as “National Calamity Fund”. The appropriated amount is made available for relief, rehabilitation, reconstruction and other works. A release of the Fund is made directly to the implementing agencies and to the LGUs in accordance with the recommendation of the National Disaster Coordinating Council and upon approval of the President. After the approval of the President, the Department of Budget and Management transfers the fund to the implementing national government agencies and to the LGUs.

The actual amount of the National Calamity Fund released for 1996 to 1998 is summarized below.

² Damages covers crops and infrastructures

National Calamity Fund Released for the Year 1996 to 1998 by Region

(Unit: PHP)

	1996	1997	1998	Average
Philippines	907,343,349	340,703,400	968,219,977	624,023,375
Region V	293,299,343	104,450,000	144,407,200	180,718,848
Albay	48,073,610	52,200,000	18,717,200	39,663,603
Legazpi City	20,023,000	20,500,000	0	13,507,667
Camarines Norte	53,502,733	300,000	0	17,934,244
Camarines Sur	81,450,000	17,000,000	108,000,000	68,816,667
Iriga City	5,028,000	0	3,440,000	2,822,667
Naga City	6,868,000	0	0	2,289,333
Catanduanes	37,790,000	3,150,000	5,000,000	15,313,333
Masbate	6,513,000	0	0	2,171,000
Sorsogon	34,051,000	11,300,000	9,250,000	18,200,333
ARMM	250,000	5,100,000	8,916,750	4,755,583
CAR	63,760,000	64,318,000	24,200,000	50,759,333
NCR	3,200,000	2,000,000	135,300,000	46,833,333
Region I	25,790,000	15,582,900	76,917,027	39,429,976
Region II	21,914,500	24,100,000	12,300,000	19,438,167
Region III	63,124,703	39,011,500	367,379,000	156,505,068
Region IV	211,777,803	31,400,000	20,600,000	87,925,934
Region VI	169,637,000	9,391,000	2,000,000	60,342,667
Region VII	9,400,000	7,250,000	2,000,000	6,216,667
Region VIII	19,640,000	4,300,000	16,200,000	13,380,000
Region IX	9,500,000	1,100,000	4,000,000	4,866,667
Region X	4,500,000	9,000,000	5,000,000	6,166,667
Region XI	6,250,000	8,900,000	32,000,000	15,716,667
Region XII	5,300,000	14,800,000	117,000,000	45,700,000

Source: National Disaster Coordinating Council, Philippine Statistical Yearbook 1997 to 1999

2) Financial Arrangement of LGUs for Disaster Management Operation

LGUs appropriate the amount required for disaster management activities from their revenues. Local Government Code of 1991 provides that 5% of LGU's fund shall be earmarked each year as (local) calamity reserve.

In addition to the calamity fund, LGUs should set aside 20% of allocated IRA as "Development Fund". The Development Fund is used for infrastructure development project of the LGUs. It is, however, often the case that the fund is not much left for disaster related activities. Revenue, amount of IRA allocated and 5% reserve for calamity of the LGUs in the Study Area is shown in the following table.

Revenue including IRA Allocation of LGUs in the Study Area, 1998

	IRA (Thousand)	Other Revenue (Thousand)	Total Revenue (Thousand)	5% Reserve for Calamity (Thousand)	IRA/Total Revenue (%)	Population (1995)	Revenue / Population	No. of LGU Staff
Province of Albay	227,046	94,503	321,549	16,077	70.61%	1,005,315	225.85	637
City :								
1. Legazpi City	134,815	96,208	231,023	11,551	58.36%	141,657	951.70	533
Municipalities:								
1. Bacacay	18,732	6,297	25,029	1,251	74.84%	55,295	338.76	95
2. Camalig	18,869	7,292	26,161	1,308	72.13%	53,129	355.15	138
3. Daraga	27,599	24,181	51,780	2,589	53.30%	91,829	300.55	365
4. Guinobatan	22,760	19,989	42,794	2,140	53.19%	65,512	347.42	67
5. Ligao	27,076	17,366	44,442	2,222	60.92%	80,861	334.85	182
6. Malilipot	10,961	3,569	14,530	727	75.44%	26,834	408.47	69
7. Malinao	13,532	4,953	18,485	924	73.21%	33,872	399.50	73
8. Sto. Domingo	11,532	5,128	16,660	833	69.22%	25,586	450.72	75
9. Tabaco	27,766	27,388	55,154	2,758	50.34%	96,993	286.27	300
Total of the Study Area	540,688	306,874	847,607	42,380	63.79%	671,568	805.11	2,534

Source: Albay Province Budget Office

3.3.4 Government Infrastructure Program

The DPWH is the government agency responsible for flood control works. “Updated Medium-term Philippine Development Plan, 1996-1998” points out several objectives of the water resources sector. Among the objectives, the following are relevant to flood control:

- implement nonstructural measures such as floods plain management, zoning regulations, flood forecasting and warning and reforestation works; and
- carry out river improvement/revival program.

Construction and implementation of flood control and drainage projects in the 12 major river systems and in Metro Manila are stated as priority activities. Public investment achievement for Bicol Region for 1998 was PHP19.3 billion (refer to Table 3.3.1). The public investment consists of energy, power and electrification, transportation, communication, water resources and social infrastructure. The amount for disaster prevention works is included in the flood control and drainage sector. The total amount for flood control and drainage was PHP170.1 million, which is equivalent to 8.8% of the total public investment in the Region. Likewise the public investment for Albay Province amounted to PHP150.6 million while flood control and drainage, PHP38,8 million.

3.3.5 Legal and Regulatory Framework for Disaster Management

Though the government issued different laws and rules related to disaster management, Presidential Decree (PD) 1566 issued in 1978 still acts as the

framework law for disaster management in the Philippines. Legal and regulatory bases for the implementation of the Philippine's disaster management system are listed below (as to the detailed provisions of the Acts, Presidential Decree, and Regulations, refer to the Supporting Report (1), Chapter IX).

1) Presidential Decree 1566 (1978)

This Presidential Decree calls for the Philippine disaster control capability and national program on community disaster preparedness. "Rules and regulations implementing the provisions of PD1566" defines the responsibility of each agency so tasked under the Decrees.

2) Republic Act 1190 (Civil Defense Act of 1954)

This Act established the National Civil Defense Administration (NCDA). The functions of NCDA are:

- to prepare and issue civil defense instructions; and
- to furnish guidance to provinces, chartered cities in the organization, training and operation of civil defense units in the local governments.

3) Republic Act 7160 (Local Government Code of 1991)

The Local Government Code of 1991 increased the powers and responsibilities of local government in disaster prevention.

4) Republic Act 8185 (An Act Amending Section 324 (d) of R.A. 7160) 1996

This Act amends the Local Government Code which states that 5% calamity fund can only be released to the local government when the area has been declared by the President as a calamity area.

5) Presidential Decree 1067 of 1976 (Water Code)

The Water Code defined that Department of Public Works, Transportation and Communication (currently DPWH) is responsible for construction of dam, bridges and other facilities that traverse rivers and affect flow of rivers.

6) Presidential Decree 1096 of 1977 (National Building Code)

This Decree specified the minimum requirements and standards on building design and construction for building to protect against fires and natural disasters.

7) Executive Order No. 1035 of 1985

This Executive Order provides the procedures and guidelines for acquisition by the government of private real properties or rights thereon for infrastructure and other government development projects.

8) Executive Order No. 72 of 1993

This Executive Order provides for the preparation and implementation of the comprehensive land use plans of local government units pursuant to the Local Government Code and other pertinent laws.

9) NDCC Memorandum Orders

NDCC issued various memorandum orders addressed to NDCC member agencies and DCCs.

10) Standard Specification

DPWH Standard Specifications for Public Works and Highways, Volume II “Highways, Bridges and Airports” 1995