

*The Study on Comprehensive Disaster Prevention
around Mayon Volcano*

SUPPORTING REPORT (1)

(Part I: Master Plan)

XII : Socio-economy

SUPPORTING REPORT (1) - XII
SOCIO-ECONOMY

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SUPPORTING REPORT (1) - XII
SOCIO-ECONOMY

1. MACRO SOCIO-ECONOMY

1.1 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. Although the Philippines has managed to weather the latest economic storm or crisis and has fared better than many of its neighbors, its effects are not insignificant. 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 (see the following table).

Outlook of Recent Macro-economic Indicators, 1996-1998

% Change in Growth	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: * estimate, ** forecast, ***actual

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

Declining revenues have driven the authorities to seek external public and private sources of funding, particularly to maintain basic social services and to address the rising unemployment rate. The economic contraction has very real effects on the people, especially poor ones with the following realities :

- Lower real incomes of very poor households due to price increases and increasing unemployment;
- Income change for the lower middle class as regular workers are being replaced by lower-paid and less secure contract workers; and
- Reduced social services due to budget cuts.

As the path to recovery, 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.

Through these steps, it is expected that the Philippines be able to achieve its goal of restoring growth while promoting greater equity.

1.2 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.

- 1) Settlements Plan : It seeks to provide and/or improve access of the populace to socioeconomic opportunities and basic services.
- 2) 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.
- 3) 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 PPFP, 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 the above 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 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 the perlite and bentonite in Legazpi City, and 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 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 foots 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, it should cite firstly the Mayon Volcano, which 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.

1.3 Social Aspects

While the country’s population in 1995 was about 68.6 million, over 50% of the population live in the rural areas. People in productive years occupy more than half of the country’s population. However, in 1998, only 86% of the economically active population is employed, nearly 20% of which are

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

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. The annual population growth in recent years (1990-95) is 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.

2. SCIOECONOMIC CONDITIONS AND CULTURAL FEATURES

2.1 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).

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

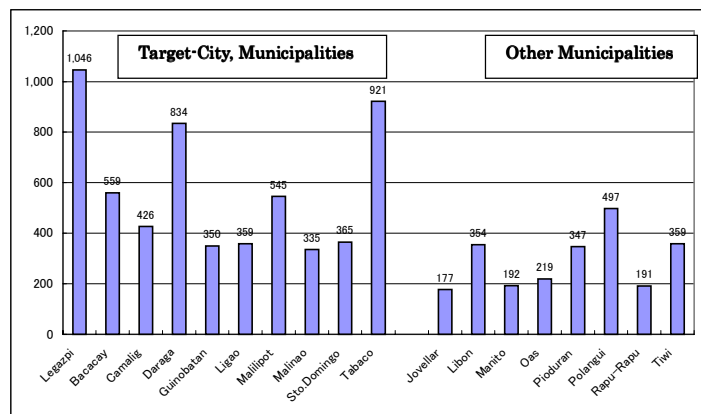
Source: Philippines Statistical Yearbook, National Statistical Coordination Board (NSCB), 1998

The population density is relatively 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 the 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 the above table shows, 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 province 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 the population density of the Albay Province is comparatively high in the Bicol Region, but also as the figure in the right shows, the population density of the target city (1) / municipalities (9) is even higher, in comparison with other municipalities in



Population Density by City/Municipality in 1999, Albay Province

Source: Based on the 1990 Population Census

Albay Province. Not only the population density, but also the same applies to the population growth. These facts concerning both population density and growth attest to the mounting population pressure on the areas around Mayon Volcano.

A total of 4,820 household members were recorded and 1,004 household heads were interviewed. Then the number of persons living in each household averaged at about 5 members. This density per household is within the range of the national level's standard estimated at 5.7 persons in 1998.

In terms of age distribution, 67% of the household members are below 20 years old, 23% between 21-40 years, and 10% above 40 years. It can be inferred, from this figure, that the population around Mayon volcano is relatively young which constitutes a potential source of labor and employment. Moreover, most of the household heads are in prime careers, since 50% of them are of age between 31 and 50 years.

2.2 Agriculture

(1) Major Crops

Major Crops in Albay Province

No.	Crops	Major Producing Area (Municipality)	Area (ha)	Ave. Production per	No. of Farmers
1	Coconut	Ligao, Guinobatan, Camalig, Libon, Oas	95,794.01	0.375 (Copra)	45,264.00
2	Rice	Ligao, Malinao, Oas, Libon, Polangi	28,704.76	3.1 (Palay)	28,732.00
3	Corn	Ligao, Tabaco, Oas, Polangui, Libon	14,685.44	2.4	11,323.00
4	Abaca	Tabaco, Malinao, Sto. Domingo, Malilipot, Tiwi	5,063.03	0.2 (Fiber)	2,786.00
5	Banana	Ligao, Sto. Domingo, Manito, Tiwi, Oas	3,384.50	5.13	7,212.00
6	Rootcrops	Ligao, Sto. Domingo, Tiwi, Manito, Pioduran	3,086.5	7.00	3,892
7	Vegetables 1) Ampalaya & Eggplant 2) Cabage & Pole sitao 3) Squash 3) Tomato	Ligao, Guinobatan, Camalig, Oas, Tiwi Polangui Guinobatan Pioduran Camalig	1,947.9	3.90	5,308
8	Industrial Crops 1) Mango & Pili 2) Cacao and Coffee	Ligao, Sto. Domingo, Guinobatan, Tiwi, Ligao Guinobatan	1,444.6	3.80	3,726
9	Other Crops 1) Sugarcane & Watermelo 2) Bamboo & Anahaw 3) Nipa 4) Tiger Grass 5) Papaya & Pineapple 6) Caragumoy 7) Legumes (Mongo)	Bacacay, Ligao, Sto. Domingo, Polangui, Polangui Pioduran Bacacay, Malinao Manito Guinobatan, Polangui Bacacay, Malilipot, Tiwi Ligao	3,424.0 763.9	- 1.80	4,409 1,312
10	Cutflower	Daraga, Legazpi City, Camalig, Guinobatan, Polangui	12.9	-	208
Total			158,311.6	-	114,172

Source: 1996 Provincial Agricultural Profile, Agricultural Management Information and Planning Services of Albay

The Province of Albay is predominantly an agricultural area, with such major crops as coconut, rice, corn, abaca, vegetables. 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 from these crops where most of the populace depends from their main sources of livelihood.

2) 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

Livestock Production Support Facilities, Albay

Livestock Production and Support Facilities	Location
Artificial Insemination Centres	Cabangan, Camalig, Poblacion, Rapu-Rapu
Livestock and Poultry Production Station and Training Centre	Parapoto, Malinao
Albay Dairy Plant	Cabangan, Camalig
Albay Breeding Station	Cabangan, Camalig
Reginal Animal Diseaseases Diagnostic Laboratory	Cabangan, Camalig

Source: Albay Development Master Plan 1996-2006

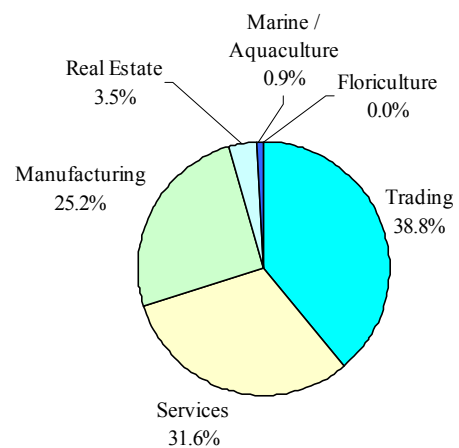
Provincial Government, in formulating Albay Development Master Plan (1996-2006), Albay produces only 26% of its required quantity of poultry, 78% of that of pork, 9% of that of cara, and 72% of that of beef. Accordingly, in support to the livestock and poultry industry, livestock production support facilities are operating in the province, as shown in the following table.

(3) Fishery

Albay lies on the fishery belt of the Pacific Ocean covering a total coastline of 354km 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 (1,567.9ha.) of all the fish ponds in Bicol Region (3,042ha.) are located in Albay.

2.3 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 figure in the right shows 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).



Investment Funds Generated by Sector, 1994

Source: Albay Provincial Profile, 1996, National Statistics Office

Table XII 2.1 shows the industrial and service sector establishments inside the target city (1) and municipalities (9). The table shows that most of the establishments are located within the target areas of this Study, which attests to the importance of protecting these establishments through disaster management around Mayon Volcano.

(1) 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.

(2) Mining

Albay Province is endowed with diverse mineral resources, especially non-metallics 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.

(3) 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 remain the major contributors to the province's economy, not only in terms of employment, but also in the generation of investments as well. As already shown before, trading sector occupies the largest share (38.8%) in terms of amount of investments generated.

2.4 Tourism

As described in the following Subsection 2.5, 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.

2.5 Employment

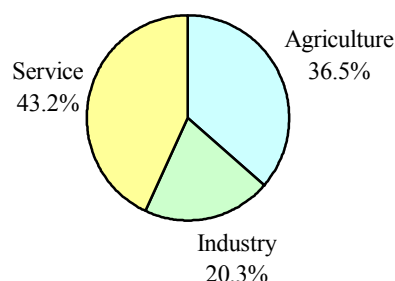
As the table in the right shows, the employment/unemployment rate of Albay Province is almost equal to the National as well as the Bicol Regional figures. Albay Province is ranked in the middle tier of the provinces in the Bicol Region. However, the employment figure should be treated with caution, since it contains those who are underemployed. As far as the under employed is concerned, although the provincial-level data are not available, according to the 1998 Philippine Statistical Yearbook, those underemployed constitutes 18.5% of all those in the “employed” category in the Bicol Region.

Employment/Unemployment Rate in Albay/Other Provinces, Bicol Region, and Philippines

	Employment Rate (%)	Unemployment Rate (%)
Albay	86.59	13.41
Camarines Norte	83.60	16.40
Camarines Sur	90.21	9.79
Catanduanes	89.81	10.19
Masbate	89.46	10.54
Sorsogon	82.79	17.1
Bicol Region	87.67	12.33
Philippines	86.69	13.31

Source: Countryside in Figures, National Statistical Coordination Board, 1998

As the figure in the right shows, the service sector is the largest source of employment (43.5%), followed by the agricultural (36.5%), and the industrial (20.3%) sectors. In the target city (1) and municipalities (9), while “Farmers” still constitutes the most important livelihood (26%), while the portion of the “Others” category (i.e., the lowest income group) in the target localities more than triples that province-wide figure. This indicates there are larger portion of low-income people residing around Mayon volcano.



Employment by Sector in Albay Province, 1994

Source: Albay Provincial Profile, 1996, National Statistics Office

2.6 Income/Poverty

According to the table in the right, 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.

Income Sources by Order of Importance

	Order of importance					Total
	1	2	3	4	5	
Farm/selling agri. prod. (%)	432 (43.6)	114 (29.6)	20 (34.5)	1 (16.7)	1 (50.0)	568 (39.4)
Salary and Wages (%)	348 (35.2)	65 (16.9)	3 (5.2)	1 (16.7)	0 0.0	417 (28.9)
Remittance from family member (%)	85 (8.6)	119 (30.9)	18 (31.0)	0 0.0	1 (50.0)	223 (15.5)
Private business (%)	69 (7.0)	64 (16.6)	9 (15.5)	3 (50.0)	0 0.0	145 (10.1)
Others (%)	56 (5.7)	23 (6.0)	8 (13.8)	1 (16.7)	0 0.0	88 (6.1)
All sources (%)	990 (100.0)	385 (100.0)	58 (100.0)	6 (100.0)	2 (100.0)	1441 (100.0)

Source : Survey on Disaster Awareness and Preparedness incl. Evacuaton, 1999

The people residing around Mayon volcano are usually subject to lower levels of livelihood, which is clearly indicated by the level of incomes. This is clearly indicated by the table in the right. According to a comparison with the Albay figure in 1994, while those families below P20,000 comprised only 6.1% in Albay, it amount as much as to 32.6% of the target families around the volcano. In Albay, as a whole, families with more than P100,000 make up for 14.1%, it consists only 4.5% of the target families.

Annual Family Income Distribution

	Target Area around Mayon		Albay	
Below P20,000	378	32.6%	12,205	6.1%
P20,000 to 99,000	727	62.9%	158,452	79.7%
Above P100,000	52	4.5%	28,131	14.1%
Total	1,157	100%	198,788	100%

Source : Family Income and Expenditure Survey, 1994, National Statistics Office
Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

According to the following table, 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 second 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.

Incidence of Poverty, in Albay Province and Bicol Region, 1994, 1997

	Number of Poor Families a/		Incidence of Poor Families b/	
	1994	1997	1994	1997
Albay	93,598	-	47.1	-
Region V	483,954	485,099	55.1	50.1
(urban)	108,520	94,898	40.7	36.6
(rural)	375,434	390,201	61.4	55.0
Philippines	4,531,170	4,553,387	35.5	32.1

a/ Number of families whose annual per capita income falls below the level of income required to satisfy nutritional requirements and other basic needs

b/ Proportion of poor families to the total number of families

Source: 1994/1997 Family Income and Expenditure Surveys (FIES), National Statistical Coordination Board

3. SOCIOECONOMIC CONSTRAINTS

3.1 General Situation

This section draws upon the results of the “Survey on Disaster Awareness and Preparedness including Evacuation” which the JICA Study Team undertook from November 1998 to January 1999. In the Survey, a total of 1,004 respondents were interviewed, who live in the Danger Zones in 7 affected city/municipalities. They are from Permanent Danger Zone (6 barangays in 6 Municipalities, i.e., Daraga, Camalig, Tabaco, Ligao, and Malilipot), and from High Danger Zone (25 barangays in 2 municipalities, i.e. Daraga, and Sto. Domingo, as well as in Legazpi City). Seventy percent (70%) percent of the respondents came from the Permanent Danger Zone, while the rest (30%) live in High Danger Zone.

(1) Location of House by Land Use

The table in the right shows that, in general, most of the households have their houses located near the main road and along elevated areas. About 42% of the respondents have their houses in elevated areas, while 30% have their houses located near the main highways. Most of these households have been staying in their present locations for more than three years. A few of the houses, i.e. 8–10% of the total respondents have their houses located either near riverside/creeks, in farmland areas, or along low land areas.

Households whose houses are situated along the risk or danger zone (such as near creeks and in low-lying lands) feel insecure, and evacuate their places in case of emergencies. As the table in the right shows, in times of disasters, 59% of the residents residing in low-lying areas evacuate from their places of living, and 53% in case of those residing near riverside.

	Year/s of staying			Total Response	Those Who Wish to Move Out
	Less than 1 Year	2-3 Years	More than 3 Years		
	()	()	()		
Elevated area	18 (38.3)	25 (42.4)	493 (41.9)	536 (41.8)	214 39.9%
Near the main	13 (27.7)	15 (25.4)	360 (30.6)	388 (30.2)	176 45.4%
River side or	6 (12.8)	6 (10.2)	112 (9.5)	124 (9.7)	66 53.2%
Farm land area	6 (12.8)	3 (5.1)	99 (8.4)	108 (8.4)	56 52%
Lowland area	4 (8.5)	8 (13.6)	86 (7.3)	98 (7.6)	58 59.2%
Town center	0 ---	1 (1.7)	24 (2.0)	25 (1.9)	8 32.0%
Near the seashore	0 ---	1 (1.7)	3 (0.3)	4 (0.3)	1 25.0%
All response	47 (100.0)	59 (100.0)	1177 (100.0)	1283 (100.0)	579 45.1%

Source: Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

(2) Reason for Not Moving Out

The reason why the people in the danger zone do not move out, according to the table in the right, is that they predict it difficult to secure other means of livelihood elsewhere. This attest to the fact that it will be most crucial that resettlement programs have a component for livelihood promotion, and that the “beneficiaries” are assured of the same level of, or better income-generating opportunities.

Reasons	Total Response
Livelihood reasons	321
No choice	81
Well adjusted to the place	44
Convenient / Accessible	10
Moved already	9
Government's decision	7
Safety reasons	3
Due to sentimental value	3
No time to find another place	1
No answer / Irrelevant answer	17
All response	496
No response	208
Total response	704

Source: Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

It is also to be noted that a high percentage of the households, about 66%, owned their land. Around 3% of he respondents either rent or illegally occupy their present land, while 30% reside their land under modality different from above. This implies that tenure security is not at all a problem, in the event of resettlement, however, relocation or acquisition of a right-of-way normally done by government, proper compensation for land acquired will have to be paid to the residents.

(3) Disaster Experiences

As the following table shows, foremost types of disaster being experience by the households are eruption of volcano and typhoon. From a scale of 1 to 10, overall 90% of them rated these two disasters under scale 1. Those who ranked eruption and typhoon under scale 1 accounted for 66% and 26%, respectively.

	Kind of Disasters																				All response %	
	Degree of disaster																					
	1	%	2	%	3	%	4	%	5	%	6	%	7	%	8	%	9	%	10	%		
Eruption	585	65.8	160	18.6	82	12.3	24	5.2	11	4.7	2	2.2	0	0.0	0	0.0	0	0.0	0	0.0	864	26.6
Typhoon	220	24.7	409	47.6	174	26.1	39	8.5	11	4.7	1	1.1	0	0.0	0	0.0	0	0.0	0	0.0	854	26.3
Floods	77	8.7	126	14.7	150	22.5	49	10.7	20	8.5	4	4.3	1	4.3	0	0.0	0	0.0	0	0.0	427	13.2
Pyroclastic	2	0.2	115	13.4	109	16.3	100	21.7	30	12.8	18	19.6	2	8.7	1	10.0	2	25.0	0	0.0	379	11.7
Earthquake	0	0.0	4	0.5	52	7.8	121	26.3	79	33.8	33	35.9	13	56.5	1	10.0	1	12.5	0	0.0	304	9.4
Debris	1	0.1	20	2.3	71	10.6	69	15.0	48	20.5	11	12.0	1	4.3	0	0.0	0	0.0	0	0.0	221	6.8
Gale	0	0.0	21	2.4	18	2.7	20	4.3	8	3.4	8	8.7	2	8.7	0	0.0	2	25.0	1	33.3	80	2.5
Landslide	1	0.1	1	0.1	4	0.6	17	3.7	15	6.4	8	8.7	1	4.3	2	20.0	0	0.0	0	0.0	49	1.5
Storm	3	0.3	3	0.3	1	0.1	15	3.3	9	3.8	4	4.3	1	4.3	0	0.0	2	25.0	0	0.0	38	1.2
Drought	0	0.0	0	0.0	1	0.1	4	0.9	1	0.4	3	3.3	1	4.3	2	20.0	0	0.0	2	66.7	14	0.4
Sunshine	0	0.0	0	0.0	0	0.0	1	0.2	1	0.4	0	0.0	1	4.3	3	30.0	1	12.5	0	0.0	7	0.2
Others	0	0.0	0	0.0	5	0.7	1	0.2	1	0.4	0	0.0	0	0.0	1	10.0	0	0.0	0	0.0	8	0.2
All response	889	100.0	859	100.0	667	100.0	460	100.0	234	100.0	92	100.0	23	100.0	10	100.0	8	100.0	3	100.0	3,245*	100.0

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

Floods and pyroclastic are rated next and appeared significantly under scale 2 and 3. Earthquakes follow and are rated most under scales ranging from 4 to 6, and the least highly rated is debris. It should be noted, however, that floods, debris, and pyroclastic are consequences of typhoon and eruption, respectively.

As shown in the following table, nearly half of the resident (530 people) mentioned they suffered from any damage when the last disaster hit their localities. For those who suffered damage, their most bitter experience was the destruction of their houses. More than 61% of the response accounted for this observation. Following next is the damage to crops and to and livestock accounting for 20%. A few experienced food shortage, lack of water supply, and loss of livelihood and lives.

Experiences of the Last Disaster

	Number of Response	%
A. Suffer from the damages		
House damaged/not strongly built	325	61.3
Destroyed crops and livestock	106	20.0
Food shortages	20	3.8
No money	11	2.1
No water supply	8	1.5
Loss of source of livelihood	32	6.0
No place to go	25	4.7
Loss of life	3	0.6
All response	530	100.0
B. Not suffer the damages		
C. No Response	52	
Total Response	1,151	

Source: Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

A typical house in danger zones around Mayon volcano is built out of soft materials, i.e., nipa-made. Only a few are made of concrete. Although they usually are aware of potential risk of disasters, they consider it impossible to improve building design and foundation, to strengthen housing structures. The acute lack of information campaign about housing structure, as well as low financial capabilities, are perceived to be the cause of this indifferent attitude.

The table in the right shows that potable water, shelter, and medicines are the most valued types of assistance, in times of disasters. It is to be noted over a majority of the residents consider potable water the most critical, as by far the largest number of people (860 persons) ranked potable water as the most important emergency supplies.

Importance of Assistance

Assistance	Order of importance					Total response
	1	2	3	4	5	
Potable Water	860 (96.7)	28 (3.1)	1 (0.1)	0 -	0 -	889 (100.0)
Shelter	34 (14.2)	164 (68.6)	34 (14.2)	6 (2.5)	1 (0.4)	239 (100.0)
Medicine	3 (1.1)	137 (50.0)	76 (27.7)	24 (8.8)	34 (12.4)	274 (100.0)
Money	1 (1.1)	30 (31.6)	42 (44.2)	15 (15.8)	7 (7.4)	95 (100.0)
Job	2 (3.2)	10 (16.1)	24 (38.7)	24 (38.7)	2 (3.2)	62 (100.0)
Others	9 (10.6)	25 (29.4)	37 (43.5)	10 (11.8)	4 (4.7)	85 (100.0)

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

3.2 Disaster Preparedness and Management

(1) People's Conception

The conception that the people generally hold towards disaster management is characterized by "passivity".

Firstly, the residents usually conceive of disaster management, in the realm of reactions to disasters, such as warning, evacuation, and so on. In other words, there is acute lack of knowledge about disaster

Residents' Conception of "Disaster Mitigation"

Answers	No. of Response
Take necessary precautions	269 (27.0%)
Information dissemination	192 (19.3%)
Coordination with Barangay officials	51 (5.1%)
Relocation to safer places	61 (6.1%)
Provision of water and food supply	14 (1.4%)
Tree planting / environmental protection	83 (8.3%)
Construction of dikes	12 (1.2%)
Transportation during evacuation	44 (4.4%)
Others	44 (4.4%)
No ideas/comments	225 (22.6%)
All response	995 (100%)

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

mitigation as shown in the table above. According to the table, the idea of mitigation prior to disaster impacts is not common among residents, as attested to by the fact that only 27% of the total respondents perceive as taking the necessary precautions. On the other hand, almost identical proportion of 22% do not have ideas about the subject. Some of the answers, although in insignificant proportions about 5% each, such as relocation to safer places, building of strong houses, and plantation of trees.

Secondly, the residents usually regard disaster management as initiative coming from above. The table in the right indicates that the concept of self-prevention or community-based management does not seem to be understood well among the residents. Around 52% of the total response are associated with non-understanding of the concept, while the other 20% of the response equate with “preparation during disaster” by individuals.

Concepts of Self-prevention

	Survey Area Total	
	Number of Response	%
Don't know	523	52.1
Preparation during disaster	197	19.6
Well informed people	94	9.4
Cooperate with the bgy. Officials	48	4.8
Action to free from danger	26	2.6
Others	45	4.5
No response	71	7.1
All response	1,004	100.0

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

However, the significant portion of the residents unfamiliar with the concept should not be construed as non-receptiveness to the idea. Experiences from different projects in the Philippines show that, with continuous education, local communities would be willing to take on community-based disaster management.

(2) People's Preparedness and Knowledge

For most of the residents, evacuation sites are accessible. As shown in the table in the right, schools normally serve as the evacuation centers. The average distance of this facility from the disaster-stricken areas range from 1 to 5 kilometers. The evacuation sites are generally accessible since the mode of travelling is vehicle. However, 20% of the response indicated hiking as the mode to travel to the safe places, which is probably due to poor road conditions.

Distance of Evacuation Area

Distance (km)	Evacuation area				Total
	School	Church	Barangay	Others	
less than 1	77 (9.9)	6 (54.5)	2 (25.0)	19 (22.9)	104 (10.4)
1-2	139 (17.8)	4 (36.4)	2 (25.0)	6 (7.2)	151.0 (15.0)
3-5	124 (15.9)	0 -	1 (12.5)	16 (19.3)	141.0 (14.0)
5-7	229 (29.4)	0 -	2 (25.0)	24 (28.9)	255.0 (25.4)
7-10	132 (16.9)	1 (9.1)	1 (12.5)	12 (14.5)	146.0 (14.5)
more than 10	79 (10.1)	0 -	0 -	6 (7.2)	85.0 (8.5)
All response (Yes)	780 (100.0)	11 (100.0)	8 (100.0)	83 (100.0)	882.0 (87.8)
All response (No)					122.0 (12.2)
Total Response					1,004 (100.0)

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

Moreover, the residents generally prepare for evacuation, from danger arising from eruption of volcano, typhoon, and floods, after receiving the alert signals from Barangay Disaster Coordination Committee (BDCC). Around 58% of the total response indicated this indicator, as shown in the table in the right. Other indicators include observance of neighbors moving to safer places and alert signals issues by agencies other than BDCC.

Indicator of Evacuation

	Number of Response	%
A. In preparation for eruption		
After receiving an alert and warning from bgy.	711	58.3
After receiving alert and warning signals	247	20.3
After observing neighbors	202	16.6
Others	29	2.4
Dont prepare at all	30	2.5
All response	1219	100.0
B. In preparation for typhoon and floods		
After receiving an alert and warning from bgy.	682	58.2
After receiving alert and warning signals	206	17.6
After observing neighbors	201	17.2
Others	51	4.4
Dont prepare at all	32	2.7
All response	1172	100.0

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

More significant issue, rather than evacuation to safe sites, is lack of knowledge of key official procedures or regulations for disaster management. For example, as the table in the right shows, knowledge about “Operation Mayon Volcano”, i.e., guidelines on warning, evacuation, etc., can be recalled by only about 10% of the total respondents (i.e.,

Knowledge of the Operation Mayon Volcano (PHIVOLCS)

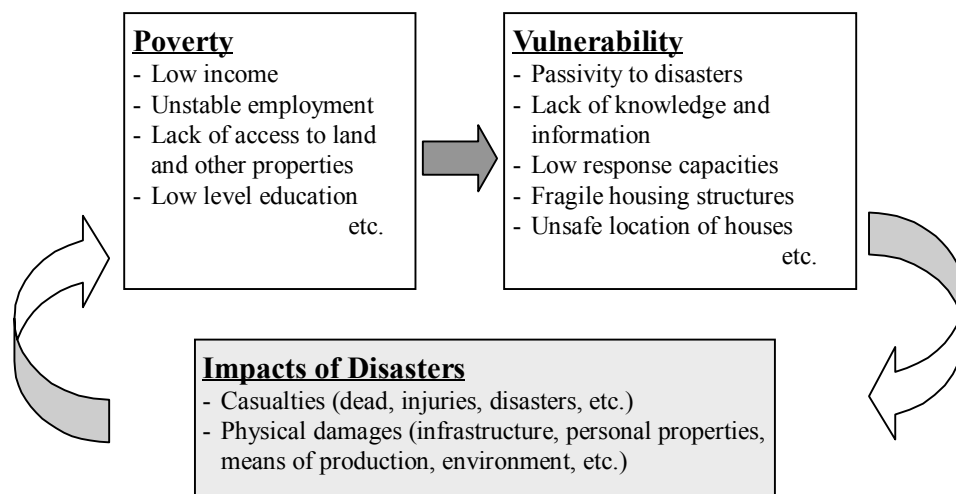
	Persons	%
Information on Mayon condition	42	4.2
Disaster preparedness	27	2.7
Relief/evacuation operation	17	1.7
Warning of PHILVOLCS	11	1.1
Monitors situation of resident	2	0.2
No idea	733	73.0
No response	172	17.1
Total response	1,004	100.0

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

those who responded “information on Mayon conditions”, “disaster preparedness”, “relief/evacuation operation”, “warning of PHIVOLCS”, and “monitors situation of resident”). Moreover, even among those respondents who have heard about “Operation Mayon Volcano”, the contents are not well understood. Out of those who know of “Operation Mayon Volcano”, nearly half (4.2% of the total respondents) regard them as mere information concerning Mayon volcano, not as operational guidelines for disaster preparedness.

(3) Vicious Circle

As mentioned above, it is clear that most of the residents look at disaster management in substantially reactive terms. They are considered to be trapped in the ‘vicious circle’ as depicted in the following figure. Together with structural and other physical support to the local residents, there is a need also to assist the affected populace to socially become more motivated and willing to sever the “vicious circle” themselves. Otherwise the “vicious circle” will continue to exist, in which disasters will press hard on the livelihoods of the residents around Mayon Volcano. The populace will continue to be deprived of opportunities to seek better livelihoods.



Vicious Circle of Socioeconomic/Cultural Vulnerabilities and Hazards

At the same time, this does not mean that it is impossible to ameliorate this situation. On the contrary, there are several sources of hope that local communities are empowered to take a more proactive stance towards coping with disasters.

In most of the localities around Mayon Volcano, there exists a tradition of ‘Bayanihan’, which denotes mutual help commonly observed in the neighborhoods. This ‘Bayanihan’ is already practiced in disaster “response” and “recovery”. For example, when roads are disconnected due to debris flows, local residents will collaborate to remove boulders. There are many other types of similar collective actions drawing upon ‘bayanihan’.

The organizational basis to expand the ‘bayanihan’ tradition into community-based disaster management is the existing barangay structures. Fortunately, the role of barangay captain and officials in disaster management is widely accepted

among the residents around Mayon Volcano. According to the following table, the respondents mostly believe that barangay captains/officials be vested organic structure in the management of community-based disaster prevention, as shown in the above table. Around 15% of them considered other Governmental and LGU officials. When the barangay officials are also equipped to facilitate communities to become more proactive to disasters, in addition to their current role to merely give instructions to residents in times of disasters, the existing BDCC structure will be a useful instrument in forging community-based disaster management.

Appropriate Structure for Community-based Disaster Management

	Number of Response	%
Barangay captain/officials	615	61.3
Govt./LGU officials	158	15.7
All are responsible	106	10.6
PAGASA	2	0.2
NGOs	1	0.1
Others	4	0.4
No response	118	11.8
All response	1,004	100.0

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

Moreover, there are some indications that the local residents will be more receptive to the idea of community responsibilities, once they are provided with opportunities to learn what the residents can potentially do. For example, around 42% of the residents are willing to make some cash contributions if a community ‘calamity fund’ is to be created.

3.3 Resettlement and livelihood

Despite the Government’s declaration of “Permanent Danger Zone” and “High Danger Zone”, there continue to exist a large number of people who cannot help but living in high-risk areas. As shown in the table in the right, the reasons for their continued living in disaster-prone areas are rather negative ones (e.g., “cannot leave their own land”, and “cannot find other places to live in”), rather than positive ones (e.g., “life is easier”).

Trespassing in Danger Zone

	Number of Response	%
No other place to live in	215	48.4
Can not leave own land	181	40.8
Livelihood in place	19	4.3
Thought that it is a safe place	19	4.3
Life is easier here	10	2.3
All response (Yes)	444	100

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

The following table shows that, among those living in the danger zone, “farming” is the major source of livelihood, comprising nearly 70% of the households.

“Carpentry”, and “pawnshop/money lending” constitute 12%, and 6%, while other types of livelihood activities are insignificant.

The need to augment their present livelihood activities is apparent. The table in the right shows that the preferred choice for additional income-generation includes “handicraft and weaving” (36%), “farming” (11%), “livestock raising” (6%). In any resettlement, these livelihood activities are the ones that the affected families hope to initiate in their new locations of residence.

Resettlement schemes should attempt, to the extent possible, to enable the affected families to continue their livelihood activities which they are used to (mostly “agriculture” by providing adequate land). At the same time, efforts should also be made to assist them in generating additional incomes through “handicraft and weaving”, “coconut/corn/palaya/abaca farming” and, “livestock raising”.

Major Daily Livelihood

	Number of Response	%
Farming	679	67.6
Carpentry	126	12.5
Pawn shops/Money lending	65	6.5
Selling of abaca/copra etc.	44	4.4
Sari-sari store	10	1.0
Sinamay making	1	0.1
Materials for rope	1	0.1
Entertainment	1	0.1
Repair of appliances	2	0.2
No comment/no idea	67	6.7
No response	8	0.8
	1,004	100.0

Source: Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

Hope for Livelihood Improvement

	Number of Response	%
Handicraft/weaving	448	36.5
Farming (coconut, com, palaya, abaca, etc.)	145	11.8
Hog dispersal	110	9.0
Livestock/poultry raising	72	5.9
Lending/financing	83	6.8
Sari-sari store	54	4.4
Seed nursery	47	3.8
Factory jobs	34	2.8
Cooperative	11	0.9
Others	80	6.9
No comment/no idea	96	7.8
No response	49	4.0
All items	1,229	100.0

Source: Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

It is also to be noted that, as the above table shows, when asked their preferences for livelihood activities, some of the resident brought up “lending/financing” (6%) and “cooperative” (1%). The fact that these activities emerged (despite the fact that these are not “livelihood” activities *per se*), however, suggests that access to fund livelihood activities is perceived to be essential. Resettlement projects should entail financing schemes for the target populace to initiate new livelihood activities.

A survey of those who already live in resettlement sites confirms the importance of livelihood considerations, as well as other important issues to be tackled in resettlement schemes.

According to the table on the right which is on the survey of those who already participated in the past resettlement schemes, about one-third were not satisfied with their new resettlement sites. Those not satisfied with the new residence mention that their livelihood was affected, due to lack of employment opportunities, etc (33%). The

Satisfaction with Living Conditions

		Number of Response	%
1.Satisfied	All response	222	—
2.Not satisfied	Livelihood was affected	37	33.6
	Lackof electricity and water supply	29	26.4
	Afraid of being relocated	17	15.5
	No income opportunity	9	8.2
	No comments/ideas	9	8.2
	Lack of food assistance	8	7.3
	Far from school	1	0.9
	All response	110	100.0
	Total Response		332

Source : Survey on Disaster Awareness and Preparedness incl. Evacuation, 1999

The second major reason for their dissatisfaction is the lack of basic services, e.g., water supply, electricity (26%). Accordingly, those not content with their new residence consider “job creation” (24%), and the “provision of basic services” (20%). Other major suggestions include the “provision of land” (18%), the “provision of social services, e.g. health and education” (17%), and the “improvement of housing” (16%). This indicates that, unless these factors are addressed, any resettlement program is difficult to implement.

It is also to be noted that there is an overwhelming preference for households in the danger zone to be relocated only within boundaries of the Province of Albay. The implication is that there is a greater likelihood for resettlement programs, in case alternative land is provided inside Albay, to be implemented orderly and with less resistance. On the other hand, if the people are to be shifted outside the province, resettlement will become a more formidable task. However, in reality, for the affected households around Mayon Volcano, it is usually difficult to find alternative sources of livelihoods near resettlement sites. This implies that, unless similar or better economic opportunities are available in the resettlement area, the affected families are likely to take the risk of going back to their previous places and face the consequences of eruption rather than staying in the resettlement areas. Social factors add to this tendency, since the affected households are mostly tilling the land located in their original places of birth, and thereby know only of their ways of lives on the slope of Mayon. Social and economic activities similar to what they have been used to in their previous residence will take time and resources to nurture in their new places.

However, the past experiences in resettlement should not be construed as non-feasibility of relocation schemes. There are some successful examples, which attest to the possibilities of bringing about changes in the people’s attachments to their original place of residence if accompanied by continuous education and social preparation activities.

4. SOCIOECONOMIC FRAMEWORK

4.1 General Setting

The islands of the Philippines lie on an area where moving continental plates (the Asian and Pacific ones) come in contact with each other. This is believed to make the country prone to earthquakes and volcanic activity. In addition, some twenty typhoons visit most part of the country (except for the Mindanao) on average annually. In reality, the Philippines is beset by natural disasters like volcanic eruptions, earthquakes and repeated floods caused by typhoons and heavy torrential rains. The Study Area around Mayon Volcano in Albay Province is subjected to volcanic hazards, floods and debris flows usually caused by typhoons seasonal heavy rains, and other common disasters.

The Philippines consists of some 7,000 islands and the Bicol region is situated in the southeastern end of the Luzon, the largest island. This location at the southeastern tip of the Luzon near the Visayas gives to this region some specific socioeconomic and cultural features. Under such geological situations, the regional capital of Legazpi in the Study Area is considered as a “gateway” to the both regions of Luzon and Visayas, as described in “Albay Development Master Plan 1996 - 2006”.

In view of the fact that there are 16 regions and 78 provinces in the Philippines, one sixteen (1/16) or 6.25% for a region and one seventy-eighth (1/78) or 1.28 for a province would be the standard average share. Otherwise, the population and/or land figures could be referred to or used as “standard share” when assessing the regional and provincial “position” in each totality.

The Philippine economy, reflecting its physical geography, climate and socio-cultural background, is significantly different in each region, ecological zone, and even in each respective area. The relative position of Albay Province in Bicol Region and whole country in terms of socioeconomic and spatial development could be perceived with the key indicators presented in the figure in the next page.

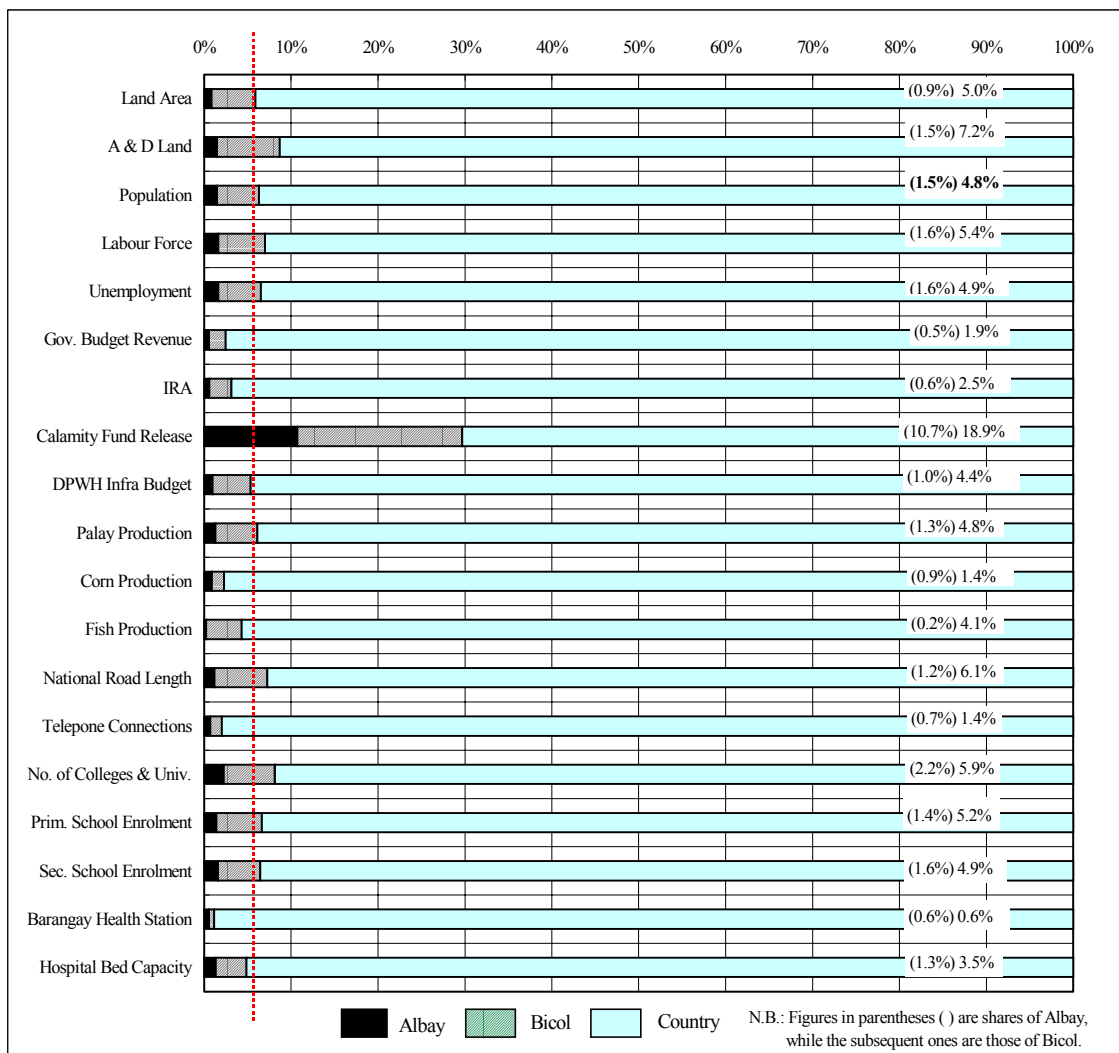
As for the economic development constraint and issues of the area, please refer to Table XII 4.1.1.

According to Table XII 4.1, Albay Province, one of the six provinces in Bicol Region, occupies 14.5% of the region’s total land area, while its population accounts for 23.2% of the regional total. Although the average population density of the region remains at 245 persons per km², which of Albay Province amounts to 394 persons per Km² in 1995, which is the highest among those in six provinces of the region. To the contrary, the average calamity fund released in two years of

1996-97 worked out at PHP71.4 million, which accounts for 36.1% of the Bicol Region and 10.7% of the national total. This relatively large share indicates that the Province is subjected to various natural disasters and their damages.

4.2 Population Projection

The following table shows the results of population projections, undertaken in 1998, by the NSO (National Statistics Office). The projections have been made based upon the latest population census conducted in 1995, considering three elements affecting the population size, fertility, mortality, and migration. According to the following table, while the relative position of the Bicol Region population will decline, the position of Albay will stay almost the same level.



Note : Bicol Region (Region-V) consists of six (6) provinces : Albay, Camarines Norte, Camarines Sur, Catanduanes, Masbate and Sorsogon

Sources: Statistical Data of NSO, NSCB and others.

Proportions of Albay Province to the Regional and Country's Totals
Projected Population of Albay Province, Bicol Region, & Philippines 1995 -2020

	1995	2000	2005	2010	2015	2020
Albay	1,001,387 (1.47%)	1,108,015 (1.45%)	1,213,176 (1.44%)	1,318,417 (1.44%)	1,417,701 (1.43%)	1,505,701 (1.43%)
Bicol	4,309,488 (6.31%)	4,755,076 (6.23%)	5,161,007 (6.13%)	5,541,343 (6.04%)	5,904,788 (5.96%)	6,207,492 (5.88%)
Philippines	68,349,452	76,348,114	84,241,341	91,868,309	99,015,818	105,507,209

Note: () denotes the proportion to the national population

Source: 1995 Census-based National, Regional and Provincial Population Projections, NSO (National Statistics Office), 1998.

Albay Province is expected also to keep pace with the country's population growth, as indicated in the table in the right showing the projected annual population growth between 1995-2020. Since the NSO population projection does not extend below the provincial level, disaggregated population projection, based on assumptions that the current population growth will continue in the future to come, are provided in Table XII 4.2 in the annex. The projection indicates that the portion of the populace residing in the target city(1)/municipalities (9) will grow, attesting to the fact that the population pressure has been mounting on the areas around Mayon Volcano.

Projected Annual Population Growth
in Albay, Bicol, & Philippines 1995-2020

	1995-2000	2000-2005	2005-2010	2010-2015	2015-2020
Albay	2.04%	1.83%	1.68%	1.46%	1.21%
Bicol	1.99%	1.65%	1.47%	1.24%	1.00%
Philippines	2.24%	1.99%	1.75%	1.4.1%	1.28%

Source: 1995 Census-based National, Regional and Provincial Pop. Projections, NSO (Nat'l. Statistics Office), 1998.

4.3 Outlook of Economic Structure

(1) GDP Target

1) Total GDP

The target of total GDP of the Philippines for the years of 2000, 2005, 2010, 2015 and 2020 as a target year was set up on the basis of the Medium-Term Development Plan (from 1999 to 2004) and the Long-Term Development Plan in the Philippine National Development Plan ('Plan 21') which was prepared by NEDA.

Three scenarios for economic growth were assumed to be low, medium and high. "High and low" growth scenarios of Plan 21 were adopted as "high and medium"

ones in this Study. Low growth scenario was set up for GDP excluding GRDP of NCR in low growth scenario set up in Plan 21. The average annual growth rates by growth scenario are shown in the following table.

Average Annual Growth Rate of GDP by Growth Scenarios

(Unit:%)

Growth Scenarios	1999/ 2000	2000/ 2005	2005/ 2010	2010/ 2015	2015/ 2020	1999/ 2020
Low	1.99	4.89	4.85	4.83	4.25	4.57
Medium	4.37	8.70	9.42	9.28	8.83	8.83
High	4.51	8.42	9.18	9.02	9.02	8.70

2) GDP by Sector

The total GDP is composed of three sectors such as agriculture, industry and services. The target of sectoral GDP is derived from basically the same methodology as the one of total GRDP as follows:

- To set up the average annual growth rate(AAGR) of each sector by taking into consideration of the AAGRs in the past eleven years during the period from 1985 and 1997, the Medium-Term Development Plan and the Long-Term Development Plan(Plan 21)
- To accumulate GDP of all sectors
- To adjust the accumulated GDP of all sectors to coincide with the total GDP as a control total
- To check the contribution rate of GDP by sector to the total GDP whether it will keep good balance
- To re-adjust the AAGR of each sector to make the contribution rate of each sector balanced if there are some sectors of which contribution rates are exaggerated the past tendency of the sectoral contribution rate to GDP.

The share of three sectors by growth scenario is shown in the following table.

Share of GDP by Sector and by Growth Scenario

(Unit : %)

Growth Scenarios	Sector	1999	2000	2005	2010	2015	2020
Low	Agriculture	20.2	20.0	17.4	14.6	12.3	10.1
	Industry	35.8	35.8	37.2	38.7	40.0	40.8
	Service	44.0	44.2	45.4	46.7	47.7	49.1
Medium	Agriculture	20.2	20.0	17.4	14.6	12.3	10.1
	Industry	35.8	35.8	37.2	38.7	40.0	40.8
	Service	44.0	44.2	45.4	46.7	47.7	49.1
High	Agriculture	20.2	20.0	17.4	14.6	12.3	10.1
	Industry	35.8	35.8	37.2	38.7	40.0	40.8
	Service	44.0	44.2	45.4	46.7	47.7	49.1

3) Per Capita GDP

GDP per capita was derived from dividing targeted total GDP by population for three growth scenarios. The result is shown in the following tables.

Average Annual Growth Rate of Per Capita GDP by Growth Scenarios

(Unit:%)

Growth Scenarios	1999/2000	2000/2005	2005/2010	2010/2015	2015/2020	1999/2020
Low	0.56	5.70	6.62	6.85	6.94	6.24
Medium	0.60	3.93	6.14	6.39	6.64	5.52
High	1.57	4.92	8.11	8.36	8.61	7.20

Per Capita GDP by Growth Scenario at Constant 1999 Prices

(Unit : Peso)

Growth Scenarios	1999	2000	2005	2010	2015	2020
Low	31,654	31,832	41,996	57,875	80,588	112,734
Medium	39,808	40,048	48,572	65,443	89,216	123,023
High	40,191	40,822	51,890	76,632	114,508	173,070

(Unit : US\$)

Growth Scenarios	1999	2000	2005	2010	2015	2020
Low	821	826	1,089	1,501	2,090	2,924
Medium	1,033	1,039	1,260	1,698	2,314	3,191
High	1,043	1,059	1,346	1,988	2,970	4,489

Note: The exchange rate of peso to US\$ is 38.55 peso/US\$ at the end of May 1999.

(2) GRDP Target for Bicol Region

1) Total GRDP

To get the targeted figure of GRDP of Bicol region, the total GRDP by region in the Philippines was calculated under the control total, GDP. The process to project the GRDP is as follows:

- To set up the AAGR of each region by taking into consideration of the AAGRs in the past ten years during the period from 1985 and 1997
- To accumulate GRDP of all regions
- To adjust the accumulated GRDP of all regions to coincide with the total GDP as a control total
- To check balanced contribution rate of GRDP by region to the total GDP
- To re-adjust the AAGR of each region to make the contribution rate of each region balanced if there are some regions of which contribution rates are abnormally increased or decreased by taking account of past behavior of the contribution rate of GRDP by region.

The results of calculation for GRDP target of Bicol region by growth scenario are shown in the following tables.

Average Annual Growth Rate of GRDP of Bicol Region by Growth Scenarios

(Unit:%)

Growth Scenarios	1999/2000	2000/2005	2005/2010	2010/2015	2015/2020	1999/2020
Low	4.04	6.00	7.30	7.30	7.30	6.83
Medium	4.54	6.50	8.50	8.50	8.50	7.83
High	5.53	7.50	10.50	10.50	10.50	9.54

GRDP Target of Bicol Region by Growth Scenario

(Unit : Milli. Peso)

Growth Scenarios	1999	2000	2005	2010	2015	2020
Low	85,896	89,365	119,590	170,129	241,978	344,126
Medium	86,313	90,229	123,597	185,855	279,401	420,206
High	87,136	91,957	131,987	217,408	358,165	590,074

2) GRDP by Sector

The GDP by sector was broken down into regions by sector through the same method as the projection of the GRDP for all sectors mentioned above.

Share of GRDP of Bicol Region by Sector and by Growth Scenario

(Unit : %)

Growth Scenarios	Sector	1999	2000	2005	2010	2015	2020
Low	Agriculture	20.2	20.0	17.4	14.6	12.3	10.1
	Industry	35.8	35.8	37.2	38.7	40.0	40.8
	Service	44.0	44.2	45.4	46.7	47.7	49.1
Medium	Agriculture	20.2	20.0	17.4	14.6	12.3	10.1
	Industry	35.8	35.8	37.2	38.7	40.0	40.8
	Service	44.0	44.2	45.4	46.7	47.7	49.1
High	Agriculture	20.2	20.0	17.4	14.6	12.3	10.1
	Industry	35.8	35.8	37.2	38.7	40.0	40.8
	Service	44.0	44.2	45.4	46.7	47.7	49.1

3) Per Capita GRDP

Referring to the projected population and GRDP target for Bicol region, per capita GRDP of Bicol was acquired. The results are shown in the following tables.

**Average Annual Growth Rate of Per Capita GRDP of Bicol Region
by Growth Scenarios**

(Unit:%)

Growth Scenarios	1999/2000	2000/2005	2005/2010	2010/2015	2015/2020	1999/2020
Low	2.41	4.28	5.75	5.98	6.23	5.41
Medium	2.90	4.77	6.93	7.16	7.42	6.39
High	3.88	5.75	8.90	9.14	9.40	8.07

Per Capita GRDP of Bicol Region by Growth Scenario At Constant 1999 Prices

(Unit : Peso)

Growth Scenarios	1999	2000	2005	2010	2015	2020
Low	18,352	18,794	23,172	30,646	40,980	55,437
Medium	18,441	18,975	23,948	33,479	47,318	67,693
High	18,616	19,339	25,574	39,163	60,657	95,058

(3) GRDP Target of Albay Province

1) GRDP in 1999

GRDP of Albay province in 1999 as a basic year is estimated. In fact, there is no available data for GRDP by province. Then GRDP by sector is estimated making the GRDP by sector of Bicol region as a control total which was estimated from the trend. GRDP of agriculture is estimated on the basis of composite ratio of agricultural land area by province. The ones of industry and service were estimated

by taking account of composite ratio of no. of employee by province. Total GRDP is acquired by accumulating these three sectors of GRDP.

2) Setting Up of Target

Per Capita GRDP

Under the agreement between GOP and the JICA Study Team, it was targeted that per capita GRDP of Albay Province will reach the per capita GDP national average by 2020. Then the result of setting up of per capita GDP of the Philippines is adopted to the per capita GRDP of Albay Province. The results of calculation are shown in the following tables.

**Average Annual Growth Rate of Per Capita GRDP
of Albay Province by Growth Scenarios**

(Unit: %)

Growth Scenarios	1999/ 2000	2000/ 2005	2005/ 2010	2010/ 2015	2015/ 2020	1999/ 2020
Low	5.17	7.24	8.42	8.88	9.47	8.34
Medium	5.22	7.37	9.42	9.47	9.62	8.79
High	6.23	8.38	11.45	11.50	11.65	10.52

**Per Capita GRDP of Albay Province by Growth Scenario
At Constant 1999 Prices**

(Unit : Peso)

Growth Scenarios	1999	2000	2005	2010	2015	2020
Low	20,978	22,063	31,287	46,879	71,723	112,734
Medium	20,989	22,085	31,514	49,429	77,707	123,023
High	21,191	22,511	33,667	57,880	99,736	173,070

(Unit : US\$)

Growth Scenarios	1999	2000	2005	2010	2015	2020
Low	544	572	812	1,216	1,861	2,924
Medium	544	573	817	1,282	2,016	3,191
High	550	584	873	1,501	2,587	4,489

Note: The exchange rate of peso to US\$ is 38.55 peso/US\$ at the end of May 1999

Total GRDP

The target of total GRDP of Albay province is derived from multiplying the projected population to per capita GRDP of Albay province mentioned above.

GRDP by Sector

The target of GRDP by sector of Albay province is derived from setting up the average annual growth rate and share by sector on the basis of the share by sector in 1999 and past trends of Bicol Region. After deriving the share by sector, the share of agricultural sector was revised by taking account of the potentiality for development for productivity enhancement. On the basis of survey with regard to agricultural productivity for the past performance, land use plan and interview to the Agricultural Office of Albay Province and City and each Municipality, the potentiality of productivity enhancement is assumed to be three times of the present productivity in the average for all kinds of crops. Then the average annual growth rate were adjusted to the one of agricultural sector. The results of projection are shown in the following tables.

Average Annual Growth Rate of GRDP of Albay Province by Growth Scenario

(Unit:%)

Growth Scenarios	1999/2000	2000/2005	2005/2010	2010/2015	2015/2020	1999/2020
Low	6.79	9.20	10.24	10.47	10.79	10.01
Medium	6.84	9.33	11.26	11.07	10.95	10.47
High	7.87	10.37	13.32	13.13	13.01	12.23

GRDP of Albay Province by Sector and by Growth Scenario

(Unit : Million Peso)

Growth Scenarios	Sector	1999	2000	2005	2010	2015	2020
Low	Agriculture	4,224	4,426	5,613	6,236	6,896	7,609
	Industry	8,604	9,202	15,001	26,443	45,406	77,263
	Service	10,065	10,818	17,342	29,127	49,380	84,872
	Total	22,892	24,446	37,956	61,806	101,682	169,744
Medium	Agriculture	4,226	4,431	5,654	6,575	7,471	8,304
	Industry	8,608	9,211	15,110	27,882	49,195	84,314
	Service	10,070	10,829	17,468	30,712	53,500	92,618
	Total	22,904	24,470	38,231	65,168	110,166	185,236
High	Agriculture	4,266	4,516	6,040	7,699	9,589	11,682
	Industry	8,691	9,389	16,142	32,649	63,141	118,614
	Service	10,167	11,038	18,661	35,962	68,667	130,296
	Total	23,124	24,943	40,843	76,310	141,396	260,591

Share of GRDP of Albay Province by Sector and by Growth Scenario

(Unit : %)

Growth Scenarios	Sector	1999	2000	2005	2010	2015	2020
Low	Agriculture	18.4	18.1	14.8	10.1	6.8	4.5
	Industry	37.6	37.6	39.5	42.8	44.7	45.5
	Service	44.0	44.3	45.7	47.1	48.6	50.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0
Medium	Agriculture	18.4	18.1	14.8	10.1	6.8	4.5
	Industry	37.6	37.6	39.5	42.8	44.7	45.5
	Service	44.0	44.3	45.7	47.1	48.6	50.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0
High	Agriculture	18.4	18.1	14.8	10.1	6.8	4.5
	Industry	37.6	37.6	39.5	42.8	44.7	45.5
	Service	44.0	44.3	45.7	47.1	48.6	50.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0

(4) GRDP Target of the Study Area

1) GRDP in 1999

GRDP of the Study Area in 1999 as a basic year is estimated. There is no available data for GRDP of the Study Area as well as the one of Albay province. Then GRDP by sector of the Study Area is estimated according to the following process:

Agricultural Sector

- To divide the GRDP of agricultural sector of Albay province in 1999 into agriculture and fishery on the basis of share of land area for agricultural land and fish pond in 1996 (there is no available land use data in 1999).
- To divide the GRDP of agriculture excluding fishery of Albay province in 1999 into each city/municipality by referring to share of production(MT) by crop, livestock and poultry by city/municipality
- To divide the GRTDP of fishery of Albay province into each city/municipality by referring to share of land area for fishpond by city/municipality in 1996.
- To accumulate the GRDP of fishery and agriculture for city/municipalities in the Study Area.

Industrial Sector

- To divide the GRDP of industrial sector for Albay Province in 1999 into the one of each city/municipality on the basis of share of no. of employee by subsector of industry and by city/municipality. No. of employee by subsector is based on the data in 1993 (there is no available data in 1999).

- To adjust the GRDP of industrial sector by city/municipality estimated above by the share of no. of establishments by city/municipalities in data of 1996
- To accumulate the GRDP of industrial sector for city/municipalities in the Study Area.

Service Sector

- To divide the GRDP of service sector for Albay province in 1999 into the one of each city/municipality on the basis of share of no. of employee by subsector of service sector and by city/municipality. No. of employee by subsector is based on the data in 1993 (there is no available data in 1999).
- To adjust the GRDP of service sector by city/municipality estimated above by the share of no. of establishments by city/municipalities in data of 1996
- To accumulate the GRDP of service sector for city/municipalities in the Study Area.

Total GRDP

Total GRDP of the Study Area is acquired by adding up of GRDP of three sectors in the Study Area estimated above.

Per Capita GRDP

Per capita GRDP of the Study Area is derived from referring to the projected population and GRDP for the Study Area.

2) Setting Up of Target

The same methodology as the one in 1999 is basically adopted to the future as follows.

GRDP by Sector

Agricultural Sector

- To divide the GRDP of agricultural sector of Albay province in the years of 2000, 2005, 2010, 2015 and 2020 into agriculture and fishery on the basis of share of land area for agricultural land and fish pond in 1996 by assuming that these shares will be the same as the one in future.
- To divide the GRDP of agriculture excluding fishery of Albay province into each city/municipality by referring to share of production(MT) by crop, livestock and poultry by city/municipality in 1996 by assuming that this shares of production will be the same as the one in future.

- To divide the GRDP of fishery of Albay province in the future into each city/municipality by referring to share of land area for fishpond by city/municipality in 1996 which is assumed to be the same as the one in future.
- To accumulate the GRDP of fishery and agriculture for city/municipalities in the Study Area.

Industrial Sector

- To divide the GRDP of industrial sector for Albay province in the future into the one of each city/municipality on the basis of share of no. of employee by subsector of industry and by city/municipality on 1993. It is assumed that this share of no. of employee will be the same as the one in future.
- To adjust the GRDP of industrial sector by city/municipality estimated above by the share of no. of establishments by city/municipalities in data of 1996 which is assumed to the same as the one in the future.
- To accumulate the GRDP of industrial sector for city/municipalities in the Study Area.

Service Sector

- To divide the GRDP of service sector for Albay province in the future into the one of each city/municipality on the basis of share of no. of employee by subsector of service sector and by city/municipality in 1993. It is assumed that this share of no. of employee in the future will be the same as the one in the future.
- To adjust the GRDP of service sector by city/municipality estimated above by the share of no. of establishments by city/municipalities in data of 1996 which is assumed to the same as the one in the future.
- To accumulate the GRDP of service sector for city/municipalities in the Study Area.

Total GRDP

Total GRDP of the Study Area is acquired by adding up of GRDP of three sectors in the Study Area estimated above. The results of projection including the one in 1999 are shown in the following tables.

GRDP of the Study Area by Sector and by Growth Scenario

(Unit : Million Peso)

Growth Scenarios	Sector	1999	2000	2005	2010	2015	2020
Low	Agriculture	2,409	2,506	3,178	3,531	3,904	4,308
	Industry	6,178	6,661	10,859	19,141	32,868	55,928
	Service	8,314	8,937	14,326	24,061	40,791	70,110
	Total	16,901	18,104	28,363	46,733	77,564	130,347
Medium	Agriculture	2,410	2,509	3,201	3,723	4,230	4,702
	Industry	6,181	6,667	10,938	20,183	35,611	61,033
	Service	8,318	8,945	14,430	25,370	44,195	76,508
	Total	16,909	18,121	28,568	49,275	84,036	142,243
High	Agriculture	2,433	2,557	3,420	4,359	5,429	6,614
	Industry	6,241	6,796	11,685	23,633	45,706	85,861
	Service	8,398	9,118	15,415	29,707	56,723	107,633
	Total	17,072	18,471	30,520	57,700	107,858	200,108

Share of GRDP of the Study Area by Sector and by Growth Scenario

(Unit : %)

Growth Scenarios	Sector	1999	2000	2005	2010	2015	2020
Low	Agriculture	14.3	13.8	11.2	7.6	5.0	3.3
	Industry	36.6	36.8	38.3	41.0	42.4	42.9
	Service	49.2	49.4	50.5	51.5	52.6	53.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0
Medium	Agriculture	14.3	13.8	11.2	7.6	5.0	3.3
	Industry	36.6	36.8	38.3	41.0	42.4	42.9
	Service	49.2	49.4	50.5	51.5	52.6	53.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0
High	Agriculture	14.3	13.8	11.2	7.6	5.0	3.3
	Industry	36.6	36.8	38.3	41.0	42.4	42.9
	Service	49.2	49.4	50.5	51.5	52.6	53.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0

Average Annual Growth Rate of GRDP of the Study Area by Growth Scenario

(Unit:%)

Growth Scenarios	1999/2000	2000/2005	2005/2010	2010/2015	2015/2020	1999/2020
Low	7.11	9.39	10.50	10.66	10.94	10.22
Medium	7.17	9.53	11.52	11.27	11.10	10.67
High	8.20	10.56	13.58	13.33	13.16	12.44

Per Capita GRDP

Per capita GRDP of the Study Area in the future is derived from referring to the projected population and GRDP for the Study Area. The results of projection are shown in the following tables.

**Average Annual Growth Rate of GRDP Per Capita
of the Study Area by Growth Scenario**

(Unit:%)

Growth Scenarios	1999/2000	2000/2005	2005/2010	2010/2015	2015/2020	1999/2020
Low	5.41	7.64	8.72	8.86	9.12	8.43
Medium	5.46	7.78	9.72	9.46	9.28	8.88
High	6.48	8.79	11.75	11.48	11.30	10.62

**Per Capita GRDP of the Study Area by Growth Scenario
At Constant 1999 Prices**

(Unit: Peso)

Growth Scenarios	1999	2000	2005	2010	2105	2020
Low	22,691	23,918	34,565	52,500	80,279	124,217
Medium	22,702	23,942	34,815	55,357	86,977	135,554
High	22,920	24,404	37,194	64,821	111,634	190,698

(Unit : US\$)

Growth Scenarios	1999	2000	2005	2010	2105	2020
Low	589	620	897	1,362	2,082	3,222
Medium	589	621	903	1,436	2,256	3,516
High	595	633	965	1,681	2,896	4,947

Note: The exchange rate of peso to US\$ is 38.55 peso/US\$ at the end of May 1999.

In this study, the detailed analysis has been conducted with regard to conditions to develop the Study Area to attain at least the low level of GRDP of 125,030 peso and per capita GRDP of 110,324 peso (2,862 in US\$) till 2020.

The integrated results of all kinds of projections mentioned above are summarized in Table XII 4.3 to XII 4.9 In these tables, the changes of GDP(or GRDP) can be compared among national level, regional level, Albay province and the Study Area, respectively.

5. SCENARIO TO REALIZE THE PER CAPITA GRDP SET AT THE TARGET YEAR OF 2020

Under the agreement between the Philippine Government and the JICA Study Team, it was decided that the Per Capita GRDP of Albay Province is targeted to be reached to the National average per capita GDP until 2020. The scenarios to achieve the target is mentioned in this section. The purposes of description for achievement of the national average per capita GDP is to recommend that:

- (i) The proposed disaster prevention should be sustainable.
- (ii) The economic development is indispensable and will generate the surplus funds to be sustainable for disaster prevention.

The following description is the structure of scenario for achievement of the per capita GRDP for Albay province.

5.1 Conceptual Structure of Achievement of Per capita GRDP Target for Albay Province

5.1.1 Basic Concept

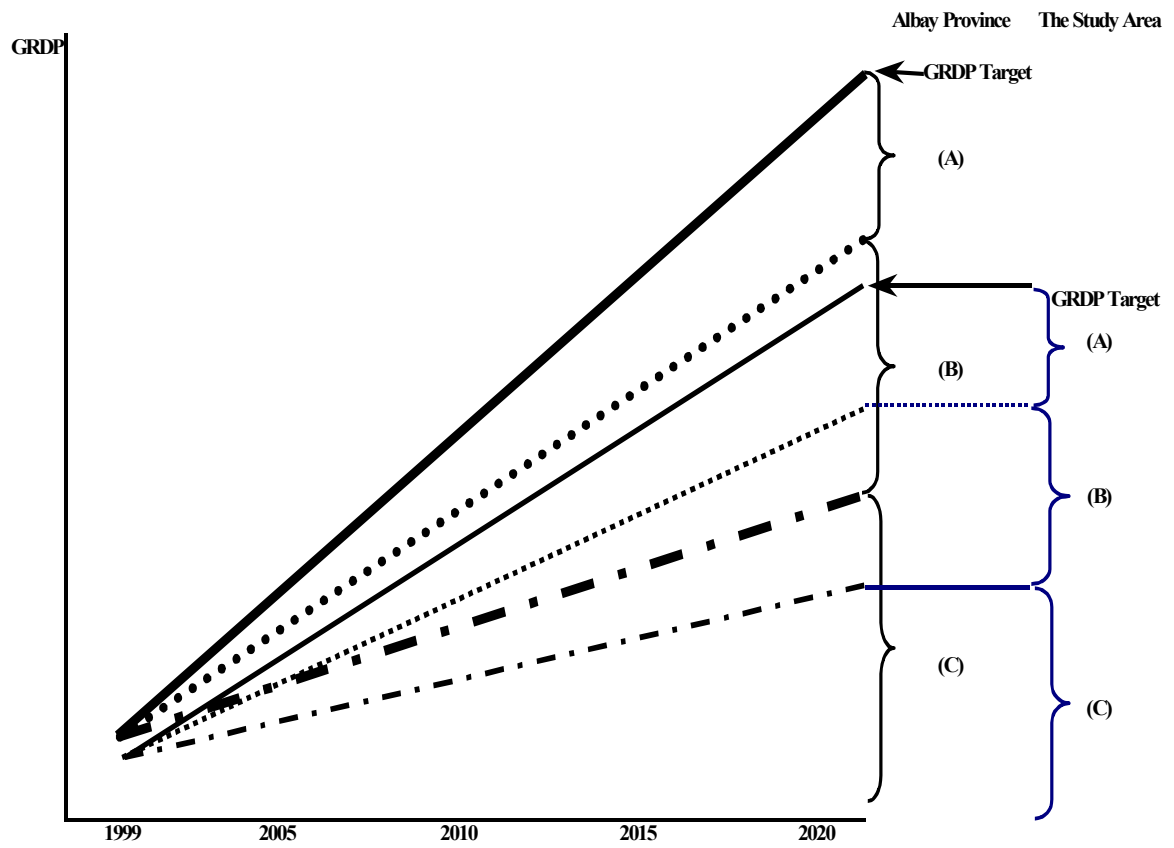
The basic concept with regard to the scenario for achievement the per capita GRDP for Albay Province is composed of the following elements:

- (i) Natural Growth
- (ii) Growth to be Generated by the Projects Planned in This Study
- (iii) Growth to be Generated by the Existing Plans Including Ongoing Projects
- (iv) Growth to be Accelerated by Synergy Effect among the Projects Planed in this Study and the Existing Development Plans
- (v) Growth by Spatially Direct Effects

By taking account of these basic concepts, the development potentials and necessary infrastructure by industrial origin are studied and the possible growth rate to be achieved are estimated for (i) medium term development by referring to the investment programs of regional, provincial and city/municipal (LGU) levels and for (ii) long-term development by referring to long term development visions for all levels as much as possible.

5.1.2 Natural Growth

As shown in the following schematic figure, the natural growth is considered to be one factor of historical performance of economic growth which is a result of actual economic growth mixed with a natural growth, economic development, economic recession by business fluctuation and social and natural disasters. It is difficult to know accurately the weight of these factors in economic growth.



Conceptual Structure of Achievement of GRDP Target for Albay Province and the Study Area

Note:

- (A) Accelerated Growth by Synergy Effect between Development Projects
- (B) Growth by Development Project
- (C) Natural Growth in Normal Condition

5.1.3 Growth to be Generated by the Projects Planned in This Study

This category of economic growth is considered to be realized by the projects set up by the Master Plan of this Study which are composed of comprehensive disaster prevention plans and economic development plans. The economic development is expected to be achieved in the protected area against mud flow.

5.1.4 Growth to be Generated by the Existing Development Plans Including Ongoing Projects

Many varieties of projects have been already planned and implemented in the Albay province including regional, provincial and municipal level. In this study, the economic development plans of them will be mainly taking account of and are carefully compared with the projects in this Study because both of them are closely related each other.

5.1.5 Growth to be Accelerated by Synergy Effect among the Projects Planned in This Study and the Existing Development Plans

It is expected that synergy effects among the Projects Planned in this Study and the Existing Development Plans will accelerate the economic growth. Both of them are closely related as mentioned above. The synergy effects will be created among following industries as an example.

- i Agriculture and Agri-Industry
- ii Agri-Industry and Tourism
- iii Trade and Transportation
- iv Tourism and Transportation
- v Quarrying and Construction

5.1.6 Growth by Spatially Direct Effects

The protected area against mudflow disaster is very limited in the Albay Province. But the development effects generated inside protected area will more directly influence to the area next to or surrounding the protected area.

5.1.7 The Integrated Growth

The composition of economic growth mentioned above will not be generated independently but dependently each other. Then the integrated and mixed economic growth on the basis of composition mentioned above will be actually

achieved. But we will strive to figure out the individual component of economic growth.

5.2 Agricultural Development Potentials

5.2.1 Development Performance

Of the 158,312 hectares agricultural land, 100,623 hectares or 63.58% are planted to permanent/commercial crops and 85,351 hectares or 53.91% devoted to temporary/food crop production. The Province of Albay is predominantly an agricultural area with rice, corn, abaca, vegetables, and coconut as its major crops.

Among the crops in the province, coconut is the most dominant permanent crop and it occupies the largest area with a gross of over 98,861 hectares or 62.44% of the total agricultural land. The highest production of coconut was in 1995 and 1997, however in 1998 production went down to 97,446,775MT.

Noteworthy, there was a decrease in palay hectare due to the conversion of cultural lands into commercial, residential and industrial areas. Palay production showed a fluctuating trend from 1994-1998. On 1997-1998, palay production experienced decrease. This decrease was caused by calamities like drought and infestation of pests before harvest time. Another dominant crop grown in the province is corn. From 1994 to 1998, production of corn showed a fluctuating trend. In 1998, it showed a tremendous decrease in yield. The low production could be accounted also for the calamities and disaster that beset the province. Another factor is the high cost of production inputs as well as the lower cost of demand.

Abaca is used to be a major crop occupying 10,254 hectares in 1983 and Albay was the second abaca producing province in the Bicol Region. But, in 1996, Abaca area decreased to 5,063 hectares largely due to the shift in land use or simply abandoned or aggravated by the slump in fiber prices and unabated spread of abaca mosaic and disease. Then total production of fiber has similarly gone down.

Aside from the temporary and permanent crops grown in the province, root crops are likewise available. Cassava and Camote are mostly produced and grown in gently sloping areas and lowland in almost all of the municipalities in the province. The highest increase recorded in root crops production in 1994.

Fruit and leafy vegetables are also widely grown in the province. Most of which are backyard vegetables. Fruits in the province are classified as highly commercial

fruits with high processing alternative production and the commercial fruits. The first classification is banana and pineapple and the latter are mangoes and papaya.

From 1994-1996, there was a decrease in fish production. This was attributed to the illegal activities that affected marine life. In 1997, there was an increase in fish production because of the increase in municipal and commercial fishing. However, in 1998, a big decrease of production was recorded with only 5,797MT or 52.38% compared to 1997.

Animals raised in the province are mostly on a backyard level. As to the classification, hog industry has the highest rate of raised species. Animal population in 1994, were 191,044 heads for backyard farm and 4,795 heads for commercial farms with a slight decrease in 1995 to 1997. However, in 1998 there was a big increase with 230,288 heads not to include raised on commercial farm.

Poultry industry in the province is mostly on a backyard farm and so with the livestock. Poultry raised are mostly chicken. In 1994 to 1996, poultry production was on its balance level while in 1997-1998 poultry production was a big increase of production, which includes backyard and commercial farms. Hog and chicken reflects the highest percentage of animals slaughtered. It was in 1996 that hog has the highest number of slaughtered animal and it's lowest in 1994.

5.2.2 Development Potentials

The irony of poverty in the midst of abundant natural resources, which is typical all over, the country is very true in Albay. Productivity in crops, livestock and fisheries remained below the potential in 1998. Low agricultural productivity in the face of high population growth rate explains why farmers and fishermen belong to the lowest income bracket in the province.

Albay is only sufficient in the production of beef of which sufficiency level is 104%. The sufficiency levels for major crops are: rice (44%), yellow corn (56%), vegetables (35%), fruits such as banana, papaya and pineapple (32%), chicken meat (11%), eggs (41%), fish (62%) and pork (57%).

The major determinants of agricultural production are considered to be (i) productivity of land, (ii) land area. But in Albay province, as already pointed out, the production has been fluctuated by natural condition like calamities and land area for agriculture has decreased by the conversion to other purpose of land use. Then there are many obstacles to overcome the low productivity and reduction of agricultural land.

But the production of crops of which productivity are lower than the potential like rice, yellow corn, rootcrops and coconut could increase by maximization of their potential productivity. And the crops of which sufficiency levels are under 100% are assumed to be able to be enhanced of their productivity by active investment for innovation of technology for production.

According to “Regional Action Agenda for Productivity” by Regional Development Council V and NEDA Region V, the most promising agricultural crops are listed as follows:

- Coconut

One of the coconut types, which can contribute to increase farm productivity, is the MAKAPUNO. In the local market, the price of makapuno is about PHP 20 per kg and in Manila the price is double at PHP 40 per kg. In the export market, annual prices of makapuno (2,777 US\$ per MT in FOB in 1996) are higher compared to copra (438 US\$/MT) and coconut (721 US\$/MT). Survey shows that makapuno are available only in Camarines Sur and Albay with 1,045 ordinary makapuno bearing coco trees in the region which is less than one percent of the region’s total coco bearing trees. Bicol region has the competitive advantage in the makapuno industry and its commercialization program.

- Abaca

Bicol region is strategically located South of mainland Luzon and is one of the three regions in the country as the most suitable area for abaca farming. It is bestowed with good soil types and climatic conditions conducive to abaca production in commercial scale despite being disadvantageously situated along the typhoon belt zone of the country. The abaca industry is facing major problems as low productivity, inadequate manpower, lack of financial support/incentives and abaca bunchy-top and mosaic diseases infestation mentioned above. Today, four development projects are being implemented in Bicol, namely: 1) Evaluation and Control of Abaca Diseases; 2) Integrated Abaca Development Project in Catanduanes; 3) Sustainable Research and Management of Abaca Diseases, 4) Abaca Rehabilitation Project in the 2nd District of Sorsogon and; 5) Abaca sa Isla.

- Pili

Pili are a promising crop of Bicol, which has high potential for development, and as a major export crop. It is widely adopted in various agroclimatic conditions. It can be grown alone or intercropped with other crops. It is primarily planted for its kernel, which is very important material in the preparation of pili sweets, candies and other pili based processed products

such as cakes, ice creams, etc. In the provinces of Albay and Camarines Sur, the scenario is very encouraging. In the former, the number is maintained but in the latter, the number of bearing trees modestly increased by 9% in 1997. But production decline was most significant in Albay with 52% and Cam. Norte, 61%.

- Palay

Rice is one of the dominant commodities in the Bicol region. The area planted of rice in Albay province is 38,063 hectares occupying 16.54% in the Bicol region. From 1990-1996, the region had an annual production of 598,618 to 744,523MT of palay with an average yield of 2.13 to 2.49MT per hectare which is quite low than standard yields of 4.5 to 7.9MT per hectare of outstanding varieties being promoted under the DA's Ginteng Ani Program like the Rice-Techno Demos and Techno Adaptation packages of technologies. The low productivity could be attributed to the low acceptance/adoption of packaged technologies, high cost of inputs, inadequate infrastructure support facilities and services, i.e., irrigation, farm-to-market roads, etc.

5.2.3 Structure of Impact of Agriculture to Economic Growth

The impact of agriculture to economic growth will be formed by the following process by successive causes and effects:

- Improvement of safety of society around Mayon volcano caused by comprehensive disaster prevention works
- Reduction or mitigation of shrinking effects to investment by the fear for natural calamities like typhoon and floods after the comprehensive disaster prevention project
- Acceleration of investment to agricultural facilities such as irrigation
- Acceleration of agricultural products by increase of agri- and aqua- tourism
- Increase of income of farmers by increase of productivity enhancement
- Increase of expenditures for food staffs and inducement of increase of production related to consumed food by farmers
- Increase of expenditures to other products and services as a result of higher level of income (raise of Engel coefficient)
- Increase of affordability of tax payment to LGUs
- Increase of investment for disaster prevention and economic development by LGU
- Further acceleration of agricultural products

5.3 Agro-industrial Development Potentials

5.3.1 Development Performance

Albay accounted for the most number of cottage industry firms among the provinces in Bicol Region. This is due to the large number of handicrafts and furniture produced. Among other are gifts, toys, housewares, ceramics, food & beverages, light metals especially cutlery and farm implements.

The most of industrial products in Albay Province are materialized from agricultural products. Then agri-industry is the key industry in industrial sectors and the future industry of Albay province is highly depending on the development of agriculture.

5.3.2 Development Potentials

Albay has the most promising resources when it comes to agri-industry development. The promising and high potential agri-industrial products can be listed up as follow;

- **Gifts and Housewares**
Gifts and houseware, commonly known as handicraft in the locality, is the major non-agricultural pre-occupation among most residents. The industry makes use of indigenous materials that abound in the area, like abaca, seagrass, “bangkuan(woodbark)” assorted vines, bamboos, coco midrib. The major problems of these products are (i) low productivity due to the traditional method affecting the quality and volume of products for exports, and (ii) the lack of access to financing by the micro-cottage gifts and houseware producer, hence, availing of cash advance from capitalist or buyer either for materials or for labor is a common practices of people in the industry.
- **Handloom Weaving**
The handloom industry has been in existence for 40 years in the province. Traditionally, only abaca fiber was woven into sinamay or “baclad”. Lately, however, other materials like bacbac, abaca twine, jute and plastic straws have been introduced in the market. Nevertheless, sinamay remains to have the biggest demand in the market. The foremost problem of handloom and weaving industry is the apparent low supply of abaca fiber, which can be attributed to the damage on abaca plantation caused by the infection of bunchy top diseases and abaca mosaic. Strong typhoons and floods that hit Albay and other abaca-producing provinces in the Region further aggravate these problems. To save the dying abaca industry, the abaca reforestation project is

being strengthened through convergence efforts of the concerned agencies and the Provincial Government of Albay.

- **Furniture and Woodcraft**

Woodcraft excels in Tabaco and St. Domingo whose current foreign market is Japan. Quality-wise, furniture and wooden products of the highly skilled workers and advanced craftsmanship. One factor that hampers the growth of this industry is the irregularity in the supply of raw materials due to the ban imposed on cutting trees such as narra and other kinds of quality wood. As such, some producers make prototype of similar furnitures, utilizing a combination of materials such as cast iron, round bars, angle bars, and with a minimum of wood.

With the proposed establishment of the Bicol Agro-Industrial Estate in Legazpi City and the development of the Pantao Port in Libon, Albay will bring a big boost to the province's economy.

5.3.3 Structure of Impact of Agri-Industry to Economic Growth

The following process will form the impact of agri-industry to economic growth by successive causes and effects:

- Improvement of safety of society around Mayon volcano caused by comprehensive disaster prevention works
- Reduction or mitigation of shrinking effects to investment by the fear for natural calamities like typhoon and floods after the comprehensive disaster prevention project
- Acceleration of investment to agro-industry
- Acceleration of agro-industrial products by increase of demand to agri- and aqua- tourism generated by increase of tourists
- Increase of income of workers for agro-industry by productivity enhancement
- Increase of expenditures for food staffs and inducement for increase of production related to consumed foods by workers
- Increase of expenditures to other products and services as a result of higher level of income (raise of Engel coefficient)

5.4 Tourism Industry Development

5.4.1 Development Performance

Among the provinces in Bicol Region, Albay still stands out to be the favorite destination of both domestic and foreign visitors. Noteworthy, its significant

landmark is the famous majestic Mayon Volcano, which is hailed as one of the Seven Wonders of the World. Aside from the clean beaches, which are also ideal for international sea sports, the tourist spots of Albay include caves, falls and springs. The Mayon Volcano National Park and forest reserves are ideal for nature hike. The beautiful beaches and seascapes which can host international sea sports will be a haven for tourists, not to mention other scenic spots which can provide amenities to become tourist attractions.

The volume of tourist arrivals for 1998 registered the highest with 279,449 domestic tourist while the foreign tourist for 1997 recorded the highest with 25,216. It could be noted that from 1994-1996, an increasing trend of foreign tourist was recorded. In 1995, domestic tourist more than tripled the number over that of 1994. The fluctuation trend of tourist arrivals could be attributed to peace and order situation, calamities and other circumstances that beset the region.

5.4.2 Potential and Advantages

The potentials and advantages with regard to tourism industry are as follows:

- Presence of the world renowned perfect coned Mayon Volcano
- Presence of prime and potential tourism resources and facilities
- Presence of cultural attractions such as archeological sites, historical attractions and other culture features
- A wide array of handicrafts and Bicol native products and
- Rich Bicol cultural heritage

5.4.3 Future Tourist Projection

The volume of tourist arrivals to Region V has increased at 8.8% per annum and the one to Albay Province at 6.8% per annum during the period from 1990 to 1998. On the basis of assumption that these volume will increase at the same growth rate as the past eight years, the volume of tourist arrivals in Region V will increase from 299 thousand in 1998 to 1,903 thousand in 2020 which is 5.9 times of 1998. On the other hand, the volume of tourist arrivals in Albay province will reach to 586 thousand in 2020, which is 5.4 times of 100 thousand in 1998. The most of tourists are expected to visit the tourism attractions around Mayon volcano.

5.4.4 Eco-Tourism

The Bicol Region Tourism Master Plan was conceptualized and envisioned to improve the tourism industry in the whole Bicol Region for a period of five years (1996-2000). According to this master plan, region's thrust for tourism development and promotion is envisioned in the project "GEMMA" or Grassroots Eco-tourism Management for Mainstream Advancement. Named after the tourism secretary, it combines the various essential elements of the regional tourism scene to tap and maximize the Bicolandia's potential contribution to the national tourism revenues.

Given the natural pluses, eco-tourism is one of the most viable enterprises in the region. It helps preserve the environment by mobilizing people in preserving the natural treasures, while at the same time generating livelihood. Among the existing activities, which can be classified as eco-tourism, are the annual Mayon Conquest, surfing, mountain trekking, bikathons, spelunking, beach swimming and island hopping. Developing roads and beachfront facilities and promoting the same on a national scope can strengthen Spelunking, bikathons and beach swimming.

5.4.5 Agro-Tourism

Agri-tourism is also a viable venture in the Bicolandia given the vast ricefields, numerous lakes and its pastoral ambiance where agricultural activities can be undertaken for both tourism and agricultural purposes.

Possible agri-based tourism projects in the region are demonstrated of "pili" culture and manufacture of the delicacy, field trip to ranches and animal farms, simple animal rides, culture of "*tabois*" (smallest fish in the world) in Lake Buhi, abaca plantations and its processing into various souvenir products. Visitor participation and interaction will be a salient point of these activities to make them as experiential and educational as possible. This is one way of preserving and showcasing the inherent products known in a specific locality.

5.4.6 Structure of Impact of Tourism Industry to Economic Growth

Taking account of various factors of growth of tourism industry mentioned above, the structure of impact of tourism industry to economic growth for Albay province can be formed through the process of successive causes and effects as follows:

- Improvement of safety of society around Mayon volcano caused by comprehensive disaster prevention works

- Increase of attraction for tourism resources especially around Mayon volcano
- Acceleration of arrivals of tourists from domestic area and abroad
- Increase of hotel construction
- Increase of tourists from Albay province to other region or to abroad by improvement of standard of living caused by increase of income on the basis of stabilization of economic activity which will be basically brought by mitigation of disaster.
- Direct impact to business
Increase of tourists will directly impact to business such as hotel, restaurant, souvenir shops, transportation, travel agency, parks and so on. Especially souvenir shops are supported by agri-tourism. Then the income of workers of this business will be boosted. The agricultural and other livelihood activities in the local areas can be integrated into the tourist circuit, whereby the unique feature of the culture and the demonstration of distinctive skill such as in handicrafts, culinary art or certain agricultural process/machinery become the key attraction. The multiplier effect of economic dependence on tourism relative to the primary local activity can be as high as 200% which is reported in “Master Plan for the Legazpi-Iriga-Naga-Daet Growth Corridor (LINDGC) Project”.
- Protection of natural environment
Promotion of ecotourism could protect the natural resources and secure the sustainable socioeconomic growth.

5.5 Service Industry Development

5.5.1 Development Performance

Service industry is classified into six sub-sectors with regard to GRDP such as (i) transportation, communication and storage, (ii) trade, (iii) finance, (iv) ownership of dwelling and real estate, (v) private services and (vi) government services.

In Region V, the development of service sector is characterized by the performance in the past ten years (1987 to 1997) as follows:

- The GRDP of service sector of Region V (in constant prices at 1985) recorded the increase from 7,490 million pesos to 10,702 million pesos by growth rate of 3.63% per annum. All sub-sectors show increase. The highest growth is realized by the government services by 1.7 times and 5.5% per annum followed by private services by 1.6 times (4.6%) and transportation, communication and storage by 1.5 times (4.1%), trade by 1.5 times (3.9%), finance by 1.3times, and occupied dwelling and real estate by 1.2 times (1.7%)

respectively. Judging from these figures, the high potentials to grow can be expected for government services, private services, and transportation, communication and storage.

- The increased share is indicated by transportation, communication and storage (11.1% to 11.7%), trade (23.6% to 24.1%), private services (17.6% to 19.2%) and government services (14.2% to 16.9%). On the other hand, the decreased share is observed for finance (3.34% to 3.06%), occupied dwelling and real estate (30.25% to 25.13%). This performance tells that the accumulation of GRDP is expected to the former three sub-sectors showing the increase of their shares.
- Private services include private educational services, private medical services, business services, recreational, personal services and restaurant and hotel services. The most tourism industries are included in the private services. It is well recognized that the tourism industries have highly been developed in the past in Region V.

Because of no available GRDP statistics by sector for Albay Province, the direct comparison of GRDP for each sub-sector mentioned above for Region V is difficult. But the structure and potentialities of service industry of Region V mentioned above are assumed to be more or less reflected on the ones of Albay Province. Trade including commerce in service industry as well as industry is important sectors in the economic structure of the Albay Province. These are the second source of income and a major contributor to the province's economic development. This could be manifested by the different trading, service and real estate.

Business activities thriving in the province vary from private services which composed of constructions, hotels/resorts/eateries, entertainment establishments, auto/machine/appliances, repair shops, clinics and hospitals, insurance companies and others. Trading sector, on the other hand, are stores like sari-sari stores/groceries, general, general merchandising and office supply and others. Among these sectors, the private service sectors remain to be the major contributor to the province's economy, not only in terms of employment generated and investment generation.

For the past five years (1994 - 1998), the bulk of investment poured into the province went to the private service sector of 690.6 million pesos or 56.24%, followed by the trading sector of 391.4 million pesos or 31.87% while the least recorded 70.5 million pesos or 5.74% went to others sector which includes real estate, mining and marine/aqua culture.

Albay is considered as the major exporting province in the region. In 1994-1996, Albay contributed 98.1% (2,043.3 million US\$) in the region's export and in 1996, the province contributed 1.52% (455.8 million US\$) to the total amount of the country's export at 29 billion US\$.

Out of 65 registered exporters in the province, 28 exporters or 45 percent come from Ligao, Malinao, Bacacay, Sto. Domingo, Oas, Tabaco, Polangui, Camalig and Guinobatan. The province's biggest world market are the United States of America, Japan, Asian Countries, Greece, Austria, United Kingdom, and so on. Albay province has high potentials with regard to service industries.

5.5.2 Close Inter-Dependency of Service Industry Between Other Industrial Origins

The service industry closely depends on the activities of other sectors of industries. For example, the products of agriculture and industry are distributed from firm or factory to ware house for temporary stockpile, wholesaler, retailer and consumer at final stage. The distribution is conducted by transportation service by truck. The works for from warehouse to distributor belong to service industry. Therefore, the increase of products by agriculture and industry generates directly increase of GRDP of service industry.

Then, the hardware and software connecting the service sector with agricultural and industrial sector are important factors. It has been often pointed out that the access road to firm and storehouse are urgently needed to be constructed to save the tome cost to transport the agricultural products and that the marketing has not been aggressive.

5.5.3 Structure of Impact of Service Industry to the Economic Growth

By taking account of the development performance and close inter-co-relationship among these three sectors, the structure of impact of service industry to economic growth for Albay Province can be formed through the process of cause and effects as follow;:

- Improvement of safety of society around Mayon volcano caused by comprehensive disaster prevention works
- Increase of stability of economic activity especially around Mayon volcano
- Spread of economic stability surrounding area of Mayon volcano to neighboring area and ultimately the whole area of Albay Province.

- Solution and overcome of disadvantages in service sector such as poor access road to firm, ware houses and effective distribution system as for infrastructure, and marketing, business diversification and so on as for software.
- Spontaneous acceleration of economic activity of service sector with acceleration of other sectors for agriculture and industry.
- Inducement for demand to industrial and service sector by farmers caused by raise of Engel coefficient derived by improvement of farmers' income
This phenomenon indicates that by raise of f income level, the weight of farmer's expenditure will shift from food staffs to more luxurious products and services.

5.6 Necessary Infrastructure and Development Investments

5.6.1 Core Problems of Infrastructure

The Province of Albay considered as one of the potential agricultural and industrial giants in the region abounds with resources that can considerably make it into the economic giant it dreams to be. But these resources are not utilized to the maximum due to lack of infrastructure support facilities such as farm-to-market roads and bridges, public markets, school buildings, ports and the improvement of communication facilities, specifically the telephone system should be undertaken to ensure that economic activities will run into a high gear. Provision of these infrastructure facilities would mean progress and development through province.

Furthermore, the proposed international airport (Barangai Bariis, Legaspi City) should be utilized considering that the existing airport has limited area for expansion due to the problems on:

- The existence of houses and hill around the existing airport makes difficult to widen the runway from the present 150 meters to ICAO recommended 300 meters. In addition, there are roadway and rivers in the northeastern side.
- The hilly terrain of the Kimantong range on the southwest side of the airport, which protrudes upon the runway approach surface by as much as 40 meters,
- Existing airport is within the threat or danger zone for ash fall and debris in times of eruption by Mayon Volcano, and
- The presence of Mt. Mayon attracts more clouds even during fair weather condition which may impair visibility during take off and landing; hence, causing possible cancellation of flights.

To maximize the fruits of economic development generated from comprehensive disaster prevention works, the problems and obstacles mentioned above should be overcome as soon as possible.

5.6.2 Agriculture

(1) Necessary Infrastructure

Major Problems of Agricultural Sector

The Local Development Program (LDP) of Province of Albay (2000-2004:Draft) is pointing out the following major problems of agricultural sector in Albay province.

- **Low Agricultural Productivity**
Low agricultural productivity is perceived to be one of the proximate determinants or direct causes of low household income. On one hand, low agricultural productivity is said to be influenced by inefficient farming practices and degraded natural resources. Aforementioned LDP points out that the general policies adopted to attain efficiency in farming practices and thereby enhance agricultural productivity are the promotion of agribusiness commodity systems development and intensified adoption of improved technologies for crops, livestock, poultry and fisheries production.
- **Inefficient Marketing System for Agricultural Commodities**
The identified direct cause of this proximate determinants is poor access to market information due to low level of education of farmers and their poor income which hinders them from having direct access to big buyers, processors and customers. It is a common marketing practice in the agricultural sector for producers to entrust their products to middlemen for various reasons like being indebted already to middlemen during the period of the production, need for immediate cash difficulty in transporting their harvests to market site, lack of storage facilities at the farm or in the barangay and others.
The strategies are pointed out by the LDP as intensifying market assistance for the agricultural sector, intensifying research on processing, product development and post-harvest handling, and upgrading of agricultural courses to strengthen market management component.

Necessary Infrastructure

By taking account of the aforementioned major problems for agricultural sector, and on the basis of reviewing (i) Bicol Strategic Plan (1999-2004), NEDA Region

V (ii) Local Development Program of Albay Province and (iii) Regional Action Agenda for Productivity, Bicol Region (1998-2004) prepared by RDC V and NEDA V, the following infrastructures are necessary for supporting the strategies for agriculture.

- Farm to market roads to distribute effectively agricultural products and to save the transportation cost as one factor of agricultural production cost.
- Agricultural support facilities like irrigation system to provide adequate supply of water to farm and agricultural land for increased population
- Rehabilitate the railroad network so as to make the province accessible to the railroad system for low cost transportation of agricultural products to the trade center of Metro Manila.
- Food terminals/Ice plant and cold storage facilities

(2) Development Investment

Development investment includes not only the infrastructures mentioned above which are physical infrastructure but also social infrastructure such as institutional matter or software. The following investments are actually planned or ongoing projects.

- Technology generation and dissemination for crops
This project includes (i) production technology researches, (ii) demo farms, (iii) seedbanks/nurseries, (iv) IEC on production technologies, (v) soil analysis
- Farm inputs/Farm implements assistance program
This project includes (i) farm input distribution and (ii) farm machineries and equipment
- Market linkage program
- Livestock auction program
- Integrated animal health and production service
- Modernization/improvement of agricultural facilities
- Product development assistance program
- Food terminal/ice plant and cold storage facilities
- Inland fisheries
- Coastal resources conservation program
- Seedling production projects
- Promotion of food basket approach
- Abaca industry recovery and promotion project

- Multi-purpose drying pavement
The construction of multi-purpose drying pavements in strategic locations is in support to agricultural development to attain higher productivity through minimizing post-harvest losses.

5.6.3 Agro-industry

(1) Necessary Infrastructure

The development of agro-industry is mostly depending on the supporting infrastructure not only for agricultural sector but also for service sector. Especially infrastructure for service sector is significantly contribute to the development of the agro-industry by the power supply and water supply both of which are essential for industrial production, transportation for their products and communication. Furthermore the agricultural infrastructure such as irrigation facilities could accelerate the increase of the agro-industrial production by productivity enhancement of their products. Then most of the infrastructure necessary for agro-industry are supported by other sectors' infrastructure.

The infrastructure specified for agro-industry can be listed as follows:

- Establishment of small-medium scale enterprise/industry (SMED)
- Establishment of Bicol Regional Industrial Center
- Establishment on handicraft industries on abaca, shell crafts, cocomidrib, woodcrafts and cocofurniture

(2) Development Investment

Actually planned and on-going investment plans are as follows:

- Seedling production project
- Provincial industrial cluster promotion center
- Bicol regional agro-industrial center
- Legazpi PEZA (Philippine Economic Zone Authority)
- Malilipot Ecozone
- Product development and promotion of export commodities
- Enterprise development program
- Investment promotion program
- Public employment service

5.6.4 Tourism Industry

(1) Necessary Infrastructure

The tourism industry does need less initial cost than other sectors of industry. Because the most of the tourism resources are originated from natural assets and no needs much capital cost to develop. But the facilities related to tourists are indispensable.

- Transportation

Transportation facilities are the most basic infrastructure for acceleration of tourism industry. With regard to land transportation, the more upgraded road is needed and should be expanded to shorten travel time and the well cared rehabilitation for railway should be implemented as soon as possible. From environmental point of view, the railway must be more effectively utilized as the cost saving transport means. Seaport with deep-water depth is needed especially for international cruiser. Tabaco port is expected to be expanded as an international port. The airport is very important means especially for foreign tourists. The international airport is necessary to be constructed to meet with increasing foreign tourists. The pre-feasibility study, which was conducted by JICA, recommends Bariis as the new site for the New Legazpi City airport to be developed while maintaining the existing airport to be serviceable until the Bariis (New site) is developed. Thereafter, the existing airport would be developed into a new Central Business District (CBA) without changing its existing land use.

- Accommodation

There are accredited accommodation in the province of Albay, broken down as follows: first class hotel: 1, apartelle: 1, inns: 3, standard hotels: 3, economy hotels: 6, pensions: 11 and lodging houses: 13. But these facilities are not necessarily enough to meet increasing tourists year by year. In addition, resorts and beaches also offer accommodation services and facilities, which cater both to local and foreign tourists located on the different municipalities.

(2) Development Investment

For the development for tourism industry, not only the infrastructure as hardware but non-infrastructure as the software is important investment.

According to “Albay Tourism Development Master Plan (Draft)” in 1999, which was prepared by the Provincial Planning and Development Office of Albay (PPDO), the future development investment for tourism industry is classified into three core tourism development areas as follow.

1) Sea-based Development

The prime sea-based eco-tourism area shall be concentrated in the island municipality of Rapu-Rapu, island or coastal barangays in the municipalities of Tabaco, Bacacay and Timi

2) Land-based Development

The core project is the Mayon Skyline Hotel Development. Other developments are planned for Mayon Volcano National Park and Waterfalls (Bubusuran, Vera, Pale, Busay falls)

3) Ecological based Development

The core project is the development of Mayon View Park. Other development projects are planned for Penaranda Park, Hoyop-Hoyopan Cave Park and Sumalang Lake.

5.6.5 Service Industry

(1) Necessary Infrastructure

The economic growth of the service sector is basically depending on the one of other two sectors (Agriculture and Industry). Then the infrastructure for other two sectors will contribute to the service sector. The infrastructure inherently necessary for service sector are such as the one for transportation, communication, building of school, hospital, water supply system and so on.

(2) Development Investment

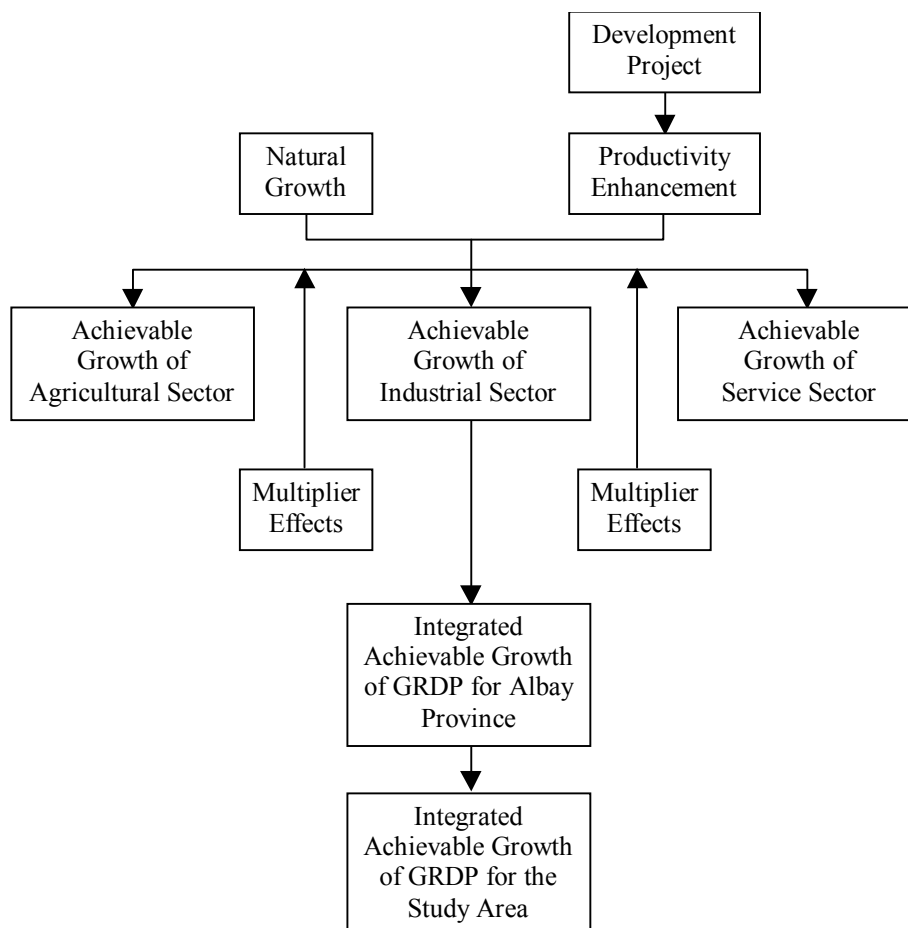
Mainly the following investment is important for development for service sector in Albay province.

- Develop Pio Duran Port as municipal port serve as a gateway to the Visayas and the island of Mosbate
- Improvement of Tabaco and Legazpi Ports to upgrade their services/facilities that could accommodate bigger ships and sea vessels as international port
- Agricultural support facilities like irrigation system to provide adequate supply of water to farm and agricultural land for increased production
- School buildings in accordance with DECS and LGU to accommodate increasing enrolment and improve delivery of educational services to rural area

- Installation of modern technology of communication system so as to make the province more updated and equipped with the service of high-tech telephone system
- Rehabilitate the railroad network so as to make the province accessible to the railroad system for low cost transportation of goods to the trade center of Metro Manila.
- An international airport and to open/construct domestic airport in a particular municipality, to accommodate other passengers and cargoes for easy accessibility and delivery. Likewise, to modernize air navigation and communication facilities/equipment.

5.7 Achievement of GRDP Target for Medium-Term Economic Growth

The basic concept for achievement of GRDP target is shown in the following figure.



Concept of Scenario for Achievable GRDP of Albay Province and the Study Area

5.7.1 Growth of Agricultural Sector

Agriculture sector is fundamental industry and high potentials in Albay Province of all sectors. So study for achievement of GRDP target for agricultural sector is conducted in advance of studying other two sectors. Already there are many projects, which have been proposed and ongoing by region, province and city/municipalities as shown in Table XII 5.7.1 to 5.7.5.

In the Master Plan, the Study Team concluded that the alternatives on the basis of “Option-3” have the highest economic feasibility. In this option, the land use of the protected area will be enhanced by industrial and residential usage as well as agriculture. It is assumed that the agricultural productivity for most of crops will enhance by two times until 2020 and newly established industrial factories will produce manufactured goods.

The projects/programs recommended to be immediately executed in the Master Plan are combined as “priority package” which is subjected to the feasibility study. This priority package is to be implemented by 2005. The revised investment cost is shown in the following table.

The Investment Cost for the Feasibility Study (2000-2005)

(Unit: Milli. Peso)

Contents of Projects	Cost
1. Yawa River System Sabo Project	1,369.7
2. Legazpi City Urban Drainage Project	593.9
3. Forecasting and Warning System Strengthening Project	407.4
4. Evacuation System Strengthening Project	506.4
5. Resettlement Site Development Project	379.9
Total	3,257.3

Besides the projects in the Master Plan, the projects which are expected to highly contribute to productivity enhancement of agriculture for short-term are listed up as follows:

- Technology generation and dissemination of crops
- Farm inputs/farm implements assistance program
- Market linkage program
- Integrated animal health and production service
- Modernization/improvement of agricultural facilities
- Food terminal/ice plant and cold storage facilities
- Inland fisheries
- Seedling production projects
- Promotion of food basket approach

- Abaca industry recovery and promotion project
- Multi-purpose drying pavement

The construction of multi-purpose drying pavements in strategic locations is in support to agricultural development to attain higher productivity through minimizing post-harvest losses.

The study team collected and reviewed widely as much as possible all levels of projects such as city/municipality, province and region. Then the achievable growth rate is predicted on the basis on the following assumptions:

- Natural growth rate is expected to be 0.5% as a half of the average growth rate. This growth rate is based on the actual growth rate of agricultural sector in Albay province as 0.99% during the period from 1995 to 1998 which was estimated by the Study Team as shown in the following table. The residual rate of 0.49% is assumed to be the growth rate of other factors such as development program, damages by disaster as negative factor.

GRDP Target for Economic Growth Scenario of Albay Province

(Unit: Million. Peso)

Growth Scenario	Sector	1995	1998	1999	2000	2005	Average Annual Growth Rate (%)			
							1995/1998	1999/2000	2000/2005	1999/2005
Low	Agriculture	3,912	4,030	4,224	4,426	5,613	0.99	4.80	4.86	4.85
	Industry	6,869	8,045	8,604	9,202	15,001	5.41	6.95	10.27	9.71
	Service	8,073	9,364	10,065	10,818	17,342	5.07	7.48	9.90	9.49
	Total	18,854	21,439	22,892	24,446	37,956	4.38	6.79	9.20	8.79
Medium	Agriculture	3,912	4,030	4,226	4,431	5,654	0.99	4.85	5.00	4.97
	Industry	6,869	8,045	8,608	9,211	15,110	5.41	7.00	10.41	9.83
	Service	8,073	9,364	10,070	10,829	17,468	5.07	7.54	10.04	9.61
	Total	18,854	21,439	22,904	24,470	38,231	4.38	6.84	9.33	8.91
High	Agriculture	3,912	4,030	4,266	4,516	6,040	0.99	5.86	5.99	5.97
	Industry	6,869	8,045	8,691	9,389	16,142	5.41	8.03	11.45	10.87
	Service	8,073	9,364	10,167	11,038	18,661	5.07	8.57	11.07	10.65
	Total	18,854	21,439	23,124	24,943	40,843	4.38	7.87	10.37	9.95

- According to Local Development Program (LDP) of Province of Albay (2000 – 2004), one of the development goals is the increase the level of productivity and production of the following commodities by specific levels in the year of 2004;
 - Rice: from 3.93mt/ha. to 4.72mt/ha.(+20%)
 - Yellow Corn: from 2.03mt/ha. to 3.00mt/ha.(+48%)
 - Vegetables: from 7.90mt/ha. to 10.27mt/ha. (+30%).
 - Rootcrops: from 7.89mt/ha. to 10.26mt/ha.(+30%)
 - Fruits: from 6.07mt/ha. to 7.89mt/ha. (+30%)

- Meat and Eggs: from 8,483mt/ha. to 10,180mt/ha.(+20%)
- Fish : from 23,626mt/ha. to 28,352mt/ha. (+20%)

These productivity enhancement will be realized on the basis of the local investment programs (LIP) mentioned above. Judging from these figures and the development projects proposed by this study including agricultural enhancement plan in the protected area of Yawa River System Sabo Project and livelihood development project of Resettlement Site Development Project for Banquelohan (Phase II in Legazpi City) and Anislag (Daraga municipality), it can be expected that approximately total agricultural product for Albay Province and the Study Area will increase by 25% (3.92% per annum) and 30% (4.97% per annum) in the average at least and until 2005 respectively. The productivity enhancement rate by crop is shown in the Table XII 5.7.6

By taking account of natural growth rate and productivity enhancement mentioned above, the average annual growth rate is achievable by 4.4% for Albay Province and by 5.5% for the Study Area, respectively.

5.7.2 Growth of Industrial Sector

As already mentioned, the increase of agricultural production will accelerate the production of agri-industrial production. Industrialization through agri-industrial progress is envisioned to be attained as modernization of agriculture, industry, and services generates dynamic inter-relationship among sectors, and cultivates and creates: (1) a highly productive and internationally competitive agriculture, forestry and fisheries sector, powered by viable farm enterprises with strong production and marketing linkage with industry; (2) a dynamic and equally productive and globally competitive industry sector, run by industries that use locally produced and imported raw materials and inputs in an efficient and sustainable manner and generate employment opportunities that absorb urban and surplus rural labor emanating from the rise in agricultural productivity; and (3) a strong services efficiently delivering the services needs of modern agriculture and industry. Within the context of sustainable development, the transformation of the production sectors from low to higher value-added activities which are productive and cost-and-resource-efficient ones will put in place an internationally competitive agri-industrial sector with enhanced and widened areas of competitive advantage.

According to the projects during the medium-term development plans in Albay Province, the most promising investments to accelerate the industrial production are listed up as follows:

- **Product development and promotion of export commodities**
This will involve the IEC (Information Education Campaign) on processing technologies for export products, institutional capability building for current and potential exporters, marketing assistance to exporters and other similar activities. Since various national agencies are already undertaking this project, PGA will support the projects and activities of these agencies and will concentrate in assisting the less-established or small entrepreneurs. This project objects to increase value of exports by at least 5% annually and to increase family income.
- **Enterprise development program**
This will involve various forms of assistance to small and medium-scale enterprise to promote self-employment and income-generation utilizing indigenous materials. The assistance may include training on product development on processing, credit linkage, market linkage, productivity training and others
- **Investment promotion program**
An Investment Promotion Program is vital in accelerating the economic growth of the province through attracting investors from other parts of the country and abroad to establish business here. It will be focused on marketing the province as a favorable investment destination. In Albay, investment promotion is being handled by the Investment Facilities and Display Center (IFDC). However, it needs to be strengthened and it should be run by a competent group of marketing expert.
- **Public Employment Service**
This project is mainly concentrated on linking job seekers and possible employers. The group of employers who seek this kind of assistance includes corporations and multinationals, which are based in special economic zones in the country.

The achievable growth rate of industrial sector is estimated by the following scenario:

- **Natural Growth**
According to the result of the estimate conducted by the Study Team, the average annual growth of industrial sector during the period from 1995 to 1998 was achieved by 5.41%. In the same assumption as the one of agriculture,

the natural growth rate of industrial sector considered to be around 2.7% of the half of average growth rate.

- Multiplier Effect

Most of developing countries have experienced that the agricultural sector have rendered multiplier effects on the industrial sector because the agricultural products would be added on their value by input of resources for labor and materials for processing in producing manufactured goods. Normally higher valued machines and highly skilled labor than those of agricultural production are input for the industrial production. In this study, the output multiplier was applied to estimate the impact of agricultural production on the industrial sector. For this purpose, the following procedure was conducted.

- Technical coefficient matrix of 229 sector commodity x commodity competitive input-output table of the Philippines in 1994, which is latest in this country provided by NSCB, was integrated 21 sector commodity to commodity input-output table.(See Table XII 5.7.7)
- The category of 21 sector is based on the classification of industrial sub-sector of Albay province.
- Inverse coefficient matrix of 21 sector commodity x commodity was calculated by using the technical coefficient. (See Table XII 5.7.8) By this matrix, we can know the multiplier effect of output for every sector.
- Induced GRDP of industrial and service sectors from agricultural sector was estimated by applying the output multiplier of these sectors for agricultural GRDP in 2005 for Albay province and the Study Area respectively.
- Induced GRDP of industrial and service sectors from construction works was estimated by applying the output multiplier of these sectors for construction cost until 2005 for Albay province and the Study Area respectively. Construction costs include the project cost for infrastructure of the priority project in this study and major projects with regard to Albay province and the Study Area listed up in ODA projects, Local Investment Programs (LIP) which were screened for the projects of City/Municipality and the Master Plan for the Legazpi-Iriga-Naga-Daet Growth Corridor Project/Program.

As a result of estimation of induced GRDP for the industrial and service sector, the average annual growth rate was calculated as 6.2% for Albay province and 6.7% for the Study Area respectively. Then the mostly achievable growth rate of industrial sector are set as 8.9% for Albay province and 9.4% for the Study Area

respectively by taking account of natural growth and output multiplier effect mentioned above.

5.7.3 Growth of Service Sector

The service sector has duplicated multiplier effects from agricultural sector and industrial sector. For example, trade business is closely related to agricultural sector and industrial sector, because trade business can exist only in the condition of these sectors' activities.

The investment which will contribute effectively to achieve the GRDP target for service sector can be listed as follows:

- Product development and promotion of export commodities
- Enterprise development program
- Investment promotion program
- Public employment service

These five projects are not only viable to industrial sector but to service sector.

- Education support program
- Hospital facilities modernization program
- Emergency assistance program

This project is composed of the following subprojects

- Aid to individuals/families in crisis situation
- Emergency disaster relief program
- Emergency shelter assistance
- Food for work/cash for work
- Programs for persons with disabilities and senior citizens
- Rehabilitation program for disaster victims
- Resettlement project

It is a disaster responses and mitigation strategy, which involves acquisition of land that will serve as a relocation site. Some housing materials will also be provided to the project beneficiaries. Work items will be organized to pool their labor and resources together to construct their houses as counterpart.

- Road opening and upgrading
- Construction and repair of bridges
- Electrification project
- Water supply system
- Flood control and erosion control system

In the Master Plan of this Study, the following projects are proposed as a priority package.

- Yawa River System Sabo Project
- Legazpi City Urban Drainage Project
- Forecasting, Warning and Evacuation System Strengthening Project
- Resettlement Site Development Project
- Institutional Strengthening and Supporting Program

These projects will contribute to growth of service sector. The achievable growth rate of service sector is estimated by the following scenario:

- Natural Growth

According to the result of the estimate conducted by the Study Team, the average annual growth of service sector during the period from 1995 to 1998 was achieved by 5.07%. The natural growth rate is expected to be 2.5% per annum at least.

- Multiplier Effect

It is also expected that service sector will have multiplier effect to both sector of agriculture and industry. The service sector includes the tourism industry, which has multiple impact to many sub-sectors such as transport, hotel, restaurant, agri-industry and so on. Then the multiplier effects of service sector are more complex than the one of the industrial sector. In the same way as for the industrial sector, the induced GRDP of service sector was estimated by applying the output multiplier of service sector from agricultural sector and construction works. As a result of estimation, the average annual growth rate will be expected to be 3.6% for Albay province and 3.4% for the Study Area respectively. But taking account of the past performance of each sector of Albay province, the share of service sector has increased year by year. Furthermore, the new kinds of business is expected to be emerged in the future without relating directly to agriculture and industry. Taking these factors, the service sector will grow more rapidly than the industrial sector.

Then the achievable growth rate is set up as 9.0% for Albay province and 9.4% for the Study Area by taking account of natural growth, output multiplier effects and new types of service or business.

5.7.4 Achievable Integrated Economic Growth of Albay Province and the Study Area

The achievable GRDP integrated of all sectors are estimated on the basis of the achievable growth rate of three sectors. The estimated achievable GRDP of Albay

Province is 37,357 million pesos which corresponds to 98.4% of low growth scenario and 91.5% of high growth scenario respectively. On the other hand, the achievable GRDP of the Study Area is estimated as 28,209 million pesos of which achieved rate to the target is 99.5% for the low growth scenario and 92.4% for high growth scenario respectively. The rate of achievement of the Study Area is slightly higher than the one of Albay province reflecting aggressive agricultural and agri-industrial development. (See the following tables)

On the other hand, the per capita GRDP of Albay province and the Study Area are estimated as 30,793 peso (799US\$) and 34,402 peso (892US\$) respectively. The rates of the achieved to the targeted are almost the same as the ones of the GRDP because the population projected does not differ for the achieved and the targeted each other. (See the following tables)

The analysis mentioned above is on the assumption that the development projects and plan will be achieved on the basis of sustainable disaster prevention policy and its success. But if the disaster prevention will not be sustainable or be carried out, how much the economic growth will be decelerated or shrunk? It is considerably difficult to estimate it. But here in this study, it was tried to figure out the growth rate of GRDP by sector in the case of “without-disaster prevention policy” by the following brief assumptions:

- The annual average growth during the period from 1995 to 1998 of Albay province as 4.38%, which was estimated by the study team, is considered to be the result of integrated economic growth of natural growth, economic development project/plan, disaster mitigation policy, social and natural disaster as negative growth and so on.
- The impact of disaster mitigation policy in the past is not assumed to contribute to accelerate remarkably the economic growth of Albay province. One of the main reasons for it is considered to be relatively small amount of public investment for disaster mitigation in Albay province. The most of the public investment is occupied by highway construction works as 707 million pesos (63.4%) during the period from 1993 to 1998 for DPWH, Region V. On the contrary, the investment for flood control and urban drainage including disaster prevention was 318 million pesos which occupies only 28.5%.
- Therefore the average growth rate of 4.38% is considered to be reflected by very few contribution of the disaster mitigation/prevention policy.
- If the disaster prevention policy would not be executed in the past, the realized economic growth would not differ so much from the actual growth.
- Then the growth rate without the disaster prevention policy is considered to be slightly less than the one of the actual growth rate.

On the basis of these brief assumptions, the average annual growth rates for three sectors during the period from 1998 to 2005 were set up for Albay province and the Study Area respectively. According to the result of estimates, the total GRDPs of Albay province and the Study Area are 28,126 million pesos and 21,286 million pesos in 2005 respectively which are about 75.2% and 75.5% of the achievable GRDPs. With regard to per capita GRDP, 23,183 million pesos (601US\$) for Albay province and 25,941 million peso (673US\$) for the Study Area are projected. Their ratios to the achieved per capita GRDP are the same as of the total GRDP. (See the following tables)

**Achievable GRDP of Targeted GRDP for Albay Province and the Study Area(2005)
(With Disaster Prevention Policy)**

(Unit : Milli. Peso)

Administrative Area	Growth Scenario	Industrial Sector	Actual GRDP		Targeted Average Annual Growth Rate(%)	To be Achieved [B]	Achievable Average Annual Growth Rate(%)	Rate of the Achieved to the Target [B]/[A]		
			1998	2005						
Albay Province	Low	Agriculture	4,030	5,613	4.85	Agriculture 5,455	Agriculture 4.4	97.2		
		Industry	8,045	15,001	9.31			97.4		
		Service	9,364	17,342	9.20			99.7		
		Total	21,439	37,956	8.50			14,607	8.9	98.4
	Medium	Agriculture	4,030	5,654	4.95	Service 17,295	Service 9.2	96.5		
		Industry	8,045	15,110	9.42			96.7		
		Service	9,364	17,468	9.32			Total	Total	99.0
		Total	21,439	38,231	8.61			37,357	8.3	97.7
	High	Agriculture	4,030	6,040	5.95			90.3		
		Industry	8,045	16,142	10.46			90.5		
		Service	9,364	18,661	10.35			92.7		
		Total	21,439	40,843	9.64			91.5		
Study Area	Low	Agriculture	2,315	3,178	4.63	Agriculture 3,361	Agriculture 5.5	105.8		
		Industry	5,730	10,859	9.56			98.8		
		Service	7,736	14,326	9.20			Industry	Industry	98.5
		Total	15,781	28,363	8.74			10,733	9.4	99.5
	Medium	Agriculture	2,315	3,201	4.74	Service 14,115	Service 9.0	105.0		
		Industry	5,730	10,938	9.67			98.1		
		Service	7,736	14,430	9.32			Total	Total	97.8
		Total	15,781	28,568	8.85			28,209	8.7	98.7
	High	Agriculture	2,315	3,420	5.73			98.3		
		Industry	5,730	11,685	10.71			91.9		
		Service	7,736	15,415	10.35			91.6		
		Total	15,781	30,520	9.88			92.4		

Achievable GRDP of Targeted GRDP for Albay Province and the Study Area(2005)
(Without Disaster Prevention Policy: Tentative Estimates)

(Unit : Milli. Peso)

Administrative Area	Growth Scenario	Industrial Sector	Actual GRDP	Target [A]	Targeted Average Annual Growth Rate(%)	To be Achieved [B]	Achievable Average Annual Growth Rate(%)	Rate of the Achieved to the Target [B]/[A]
			1998	2005	1998/2005	2005	1998/2005	[B]/[A]
Albay Province	Low	Agriculture	4,030	5,613	4.85	Agriculture 4,275	Agriculture 0.8	76.2
		Industry	8,045	15,001	9.31			74.3
		Service	9,364	17,342	9.20			Industry 73.3
		Total	21,439	37,956	8.50			11,139 4.8
	Medium	Agriculture	4,030	5,654	4.95	Service 12,712	Service 4.5	75.6
		Industry	8,045	15,110	9.42			73.7
		Service	9,364	17,468	9.32			Total 72.8
		Total	21,439	38,231	8.61			28,126 4.0
	High	Agriculture	4,030	6,040	5.95			70.8
		Industry	8,045	16,142	10.46			69.0
		Service	9,364	18,661	10.35			68.1
		Total	21,439	40,843	9.64			68.9
Study Area	Low	Agriculture	2,315	3,178	4.63	Agriculture 2,459	Agriculture 0.9	77.4
		Industry	5,730	10,859	9.56			76.0
		Service	7,736	14,326	9.20			Industry 73.8
		Total	15,781	28,363	8.74			8,255 5.4
	Medium	Agriculture	2,315	3,201	4.74	Service 10,573	Service 4.6	76.8
		Industry	5,730	10,938	9.67			75.5
		Service	7,736	14,430	9.32			Total 73.3
		Total	15,781	28,568	8.85			21,286 4.4
	High	Agriculture	2,315	3,420	5.73			71.9
		Industry	5,730	11,685	10.71			70.6
		Service	7,736	15,415	10.35			68.6
		Total	15,781	30,520	9.88			69.7

5.8 Achievement of GRDP Target for Long-Term Economic Growth (2020)

5.8.1 Growth of Agricultural Sector

The Philippine National Development Plan (Directions for 21st Century) prepared by NEDA stresses the following points for long-term regional development directions and prospect with regard to the development of agricultural sector:

- Natural resources of the cluster have yet been fully tapped. It is a major supplier of geothermal energy: Tiwi and Bacon-Manito Geothermal Plants in Bicol and the Tongonan Geothermal Plant in Leyte. These power plants can provide the energy requirements of industries.
- The even rainfall distribution throughout the year and fertile volcanic land throughout the area are favorable for agricultural production. Extensive coastline and seacoasts indented with numerous bays and gulfs can serve as

refuge for ships. The coastal area, on the other hand, abounds with various life forms of economic and biological importance.

The Regional Action Agenda for Productivity for Bicol region expresses the vision for agricultural sector for the next 25 years and the action plan that will enhance agricultural productivity through: (i) enhancement of productive assets through capital accumulation, labor force empowerment and resource allocation; (ii) enhancing total factor productivity (TFP) through investment in research and development, human resources development and technology development;

(iii) enhancing total factor productivity (TFP) by attaining economies of scale in agricultural operations; and (iv) enhancing total factor productivity (TFP) through favorable policy environment and active service delivery.

By taking account of these visions as basic directions, the achievable GRDP is predicted by the Study team.

The year of 2020 is the final and completion year of all projects for the Comprehensive Disaster Prevention Projects. Then it can be expected that the impact to socio-economy in the Albay Province including the Study Area will be maximized and accumulated. The most obvious effects are the acceleration of socioeconomic development in the Albay Province directly as a result of mitigation of disaster by sustainable disaster prevention works. In this context, the contents of multiplier effects and productivity enhancement of the industrial sector is studied from long-term view point as follow;

- Natural Growth

Natural growth of agricultural sector for long-term development can be assumed to be at the same rate as of the medium-term. Then the growth rate is set up at 0.5%.

- There is no concrete figurative development plan with regard to productivity enhancement for agriculture. But if the agricultural sector will grow to attain the potential productivity enhancement as a target in 2020, its GRDP will be three times the present. It is necessary to grow at 5.2% per annum including natural growth (4.7%:excluding it) to attain this potential for Albay Province. This growth rate is only 0.8% higher than the growth rate during the medium term.

But this gap of growth rate between them could be easily covered by increase of production by technology development and intensification of land use although the conversion of agricultural land to other kinds of land by industrialization and urbanization is expected in the future.

With regard to the Study Area, it is necessary to grow at 4.6% per annum including the natural growth (4.1%:excluding it) to attain the potential productivity. This growth rate is less than the one of medium term as 5.5%. Then the growth rate of 4.6% is attainable enough.

Then it is realizable that agricultural production will increase at maximum potentiality of development until 2020.

The major elements to contribute the productivity enhancement are as follows:

- Technology development such as breed improvement
- The increase of weight of commercial crops and agricultural products with high value for agro-industry like abaca, pili, and coconut
- The increase for demand of agro-industrial products will accelerate the agricultural production.
- Reduction of production cost by scale economy mainly by construction of infrastructure with long gestation period. The infrastructure is not only of agriculture like irrigation facilities but of other sectors like transportation, water resources development and power plant.
- Strong incentives for investment by mitigation for fear or anxious for destruction of facilities by calamities and disaster after completion of comprehensive disaster prevention facilities
- Pushing up of productivity by strengthening of disaster coping capacity by comprehensive disaster prevention plan.

By taking account of these conditions, the agricultural production will increase to maximize the potentialities. So the total growth rate of the agricultural sector to achieve the targeted GRDP should average 5.2% annually for Albay Province and 4.6% for the Study Area, respectively.

5.8.2 Growth of Industrial Sector

According to Regional Action Agenda for Productivity for Bicol region, the vision for industry/service sector for the next 25 years is as follows: The industry and services sector leading the Bicol Region's march into an agri-industrialized economy within the first 10 years of 21st century by providing the framework to produce consistent, reliable and environment-friendly world class products and services which have competitive advantages in both the local and international markets, contribute significantly to the region's economic growth and development; generate more remunerative employment, uphold workers

empowerment; and ultimately provide an improved quality of life to the Bicolanos in particular, and the country in general.

By taking account of these visions, the achievable growth rate is set up as follows:

- Natural Growth
It is assumed that the same rate of growth rate (2.7%) as of the medium-term is also achievable in the long-term development plan.
- Multiplier Effect and Productivity Enhancement

The following can be the main factors of multiplier effects and productivity enhancement of the industrial sector.

- Acceleration of incentives to investment
The improvement of natural security from disaster will be induced and the incentives of investment from the Government, LGUs and the private sector will be spurred. Especially the investment by the private sector will be stimulated.
- Gear up of production of high value added product
Technology development, intensified demand structure and progress of infrastructure construction will emerge the high-value added products in Albay province including agro-industrial product and electronics. Especially the electronics production is possible on the conditions of industrial water with high quality and power supply, which are sufficient in the province.
- Expansion of Market
The market for the industrial product will be expanded more widely not only to the domestic but also to the world through international airport and sea port.
- Reduction of production cost by scale economy
The production cost will be significantly reduced by the capital intensive industry with regard to establishment and equipment. The integration of the small and medium sized industries into big sized industries will be progressed. The scale economy of industry will be also generated by the infrastructure with long gestation period such as road, railway, communication, power plant and so on.
- Pushing up of productivity by strengthening of disaster coping capacity by comprehensive disaster prevention plans.
- The growth of the Study Area will be more accelerated than the one of Albay province because of development intensification in all directions.

Judging from these factors, the industrial sector might grow by the annual rate of 11.4% for Albay Province and 11.7% for the Study Area to achieve the targeted GRDP.

5.8.3 Growth of Service Sector

The Philippine National Development Plan (Directions for 21st Century) prepared by NEDA stresses the following points for long-term regional development directions and prospect with regard to the development of service sector: “Investments in infrastructure have enhanced the region’s access to domestic and international markets. The ports of Tabaco and Legazpi serve as national ports of entry for international and domestic cargo vessels while the Port of Matnog in Sorsogon effectively connects Luzon with the Visayas and Mindanao. The proposed Regional Port in Panato, Libon in the West Coast of Albay can boost the development of the Legazpi-Iriga-Naga-Daet Growth Corridor (LINDGC). To date, two growth poles have emerged as central places in the region: Legazpi City on the southern coast and Metro-Naga in the mid-section of the Peninsula. The latter is in the middle of the Bicol River Basin which serve as the regions rice granary.”

By taking account of this prospect and the vision for service aforementioned in Regional Action Plan Agenda for Productivity, the following are the main factors of multiplier effects and productivity enhancement of the service sector.

- Natural Growth
The natural growth is expected to be 2.5% per annum as the same as of the medium-term economic growth.
- Acceleration of incentives to investment
The improvement of natural security from disaster will be induced and the incentives of investment from the Government, LGUs and the private sector could be spurred. Especially the investment by the private sector will be more stimulated.
- Acceleration of investment for social infrastructure
The social infrastructure will increase its share in comparison with the physical infrastructure. As the population will increase and the standard of living will rise after 20 years, then the higher quality of social service will be required. The facilities such as sanitation, environment, health, education and culture will be more important than the service provided by physical infrastructure.
- Trade and transportation
The integrated transport network will be established in more complete system between airport, land and sea. This integrated network could maximize its function when the individual transport mode will be made use of its characteristics at the maximum. The trade industry will receive the vast

benefits from the domestic and international market through the integrated transport network.

- Tourism industry
The well equipped infrastructure such integrated transportation network with international airport, sea port, access roads to attractive points, and accommodations will maximize to reveal the potential demand for tourism from the domestic and abroad demand.
- Acceleration of high value added services
The higher income will generate the needs to high value and high quality service.
- Diversification of business and management
The taste and senses of value of the people will diversify and the business and management are necessary to cope with.
- Pushing up of productivity by strengthening of disaster coping capacity by comprehensive disaster prevention plan.
- The share or weight of service sector of all sectors will be higher by intensification of industrial structure as the developed countries have experienced.

As already mentioned in the achievable growth in GRDP of the service sector for medium-term development plan, the multiplier effects of service sector is more complex than the one of the industrial sector. But it is difficult to grasp accurately the inter-action among three sectors without a concrete investment plan.

Then, by taking account of accelerating growth than the industrial sector, the growth rate in the average to be achieved during the period from 2005 to 2020 is assumed to be 11.7% for Albay province and 12.4% for the Study Area respectively.

5.8.4 Achievable Integrated Economic Growth of Albay Province and the Study Area

The GRDP integrated of all sectors to be achieved are the same as the one of the targeted. The GRDP of Albay Province and the Study Area in 2020 will be realized by 176,049 million pesos and 139,826 million pesos of which rate to the targeted GRDP are 103.7% and 107.3% for the low growth scenario and 67.6% and 69.9% for the high growth scenario, respectively. On the other hand, the per capita GRDP of Albay province and the Study Area will be reached to 116,921 peso (3,033US\$) and 130,610 peso (3,457US\$), respectively. Their achievement

rates are 103.7% and 107.6% for the low growth scenario and 67.6% and 70.1% for the high growth scenario, respectively.(See the following tables)

According to the same assumptions as of the medium-term economic growth, the economic growth without disaster prevention policy for long-term economic growth was estimated. The result shows that the total GRDPs for Albay Province and the Study Area are 50,881 million pesos and 40,821 million pesos and per capita GRDPs are 33,792 pesos (877US\$) and 38,902 peso (1,009US\$) respectively. Their ratios to the achieved GRDP and per capita GRDP are 28.9% and 29.2% respectively. (See the following tables.)

**Achivable GRDP of Targeted GRDP for Albay Province and the Study Area(2020)
(With Disater Prevention Policy)**

(Unit : Milli. Peso)

Administrative Area	Growth Scenario	Industrial Sector	Target [A]		Targeted Average Annual Growth Rate(%) 2005/2020	To be Achieved [B]		Achievable Average Annual Growth Rate(%) 2005/2020	Rate of the Achieved to the Target [B]/[A]
			2005	2020		2005	2020		
Albay Province	Low	Agriculture	5,613	7,609	2.05	Agriculture	Agriculture	Agriculture	153.5
		Industry	15,001	77,263	11.55	5,455	11,682	5.2	95.1
		Service	17,342	84,872	11.17	Industry	Industry	Industry	107.1
		Total	37,956	169,744	10.50	14,607	73,468	11.4	103.7
	Medium	Agriculture	5,654	8,304	2.60	Service	Service	Service	140.7
		Industry	15,110	84,314	12.14	17,295	90,899	11.7	87.1
		Service	17,468	92,618	11.76	Total	Total	Total	98.1
		Total	38,231	185,236	11.09	37,357	176,049	10.9	95.0
	High	Agriculture	6,040	11,682	4.50				100.0
		Industry	16,142	118,614	14.22				61.9
		Service	18,661	130,296	13.83				69.8
		Total	40,843	260,591	13.15				67.6
Study Area	Low	Agriculture	3,178	4,308	2.05	Agriculture	Agriculture	Agriculture	153.5
		Industry	10,859	55,928	11.55	3,361	6,614	4.6	105.8
		Service	14,326	70,110	11.17	Industry	Industry	Industry	105.6
		Total	28,363	130,347	10.70	10,733	59,196	11.7	107.3
	Medium	Agriculture	3,201	4,702	2.60	Service	Service	Service	140.7
		Industry	10,938	61,033	12.14	14,115	74,016	12.4	97.0
		Service	14,430	76,508	11.76	Total	Total	Total	96.7
		Total	28,568	142,243	11.30	28,209	139,826	11.3	98.3
	High	Agriculture	3,420	6,614	4.50				100.0
		Industry	11,685	85,861	14.22				68.9
		Service	15,415	107,633	13.83				68.8
		Total	30,520	200,108	13.36				69.9

Achievable GRDP of Targeted GRDP for Albay Province and the Study Area(2020)
(Without Disaster Prevention Policy: Tentative Estimates)

(Unit : Milli. Peso)

Administrative Area	Growth Scenario	Industrial Sector	Target [A]		Targeted Average Annual Growth Rate	To be Achieved [B]		Achievable Average Annual Growth Rate(%)	Rate of the Achieved to the Target [B]/[A]						
			2005	2020		2005/2020	2005			2020	2005/2020				
Albay Province	Low	Agriculture	5,613	7,609	2.05	Agriculture 4,275	Agriculture 4,789	Agriculture 0.8	62.9						
		Industry	15,001	77,263	11.55				Industry 11,139	Industry 21,618	Industry 4.5	28.0			
		Service	17,342	84,872	11.17							Service 12,712	Service 24,473	Service 4.5	28.8
		Total	37,956	169,744	10.50										Total 28,126
	Medium	Agriculture	5,654	8,304	2.60	Service 12,712	Service 24,473	Service 4.5							
		Industry	15,110	84,314	12.14				Total 28,126	Total 50,881	Total 4.0				
		Service	17,468	92,618	11.76							Total 28,126	Total 50,881	Total 4.0	
	Total	38,231	185,236	11.09	Total 28,126	Total 50,881	Total 4.0	27.5							
	High	Agriculture	6,040	11,682				4.50	Total 28,126	Total 50,881	Total 4.0				41.0
		Industry	16,142	118,614				14.22				Total 28,126	Total 50,881	Total 4.0	18.2
		Service	18,661	130,296	13.83	Total 28,126	Total 50,881	Total 4.0							18.8
		Total	40,843	260,591	13.15										Total 28,126
Study Area	Low	Agriculture	3,178	4,308	2.05				Agriculture 2,459	Agriculture 2,798	Agriculture 0.9				
		Industry	10,859	55,928	11.55							Industry 8,255	Industry 17,371	Industry 5.1	
		Service	14,326	70,110	11.17	Service 10,573	Service 20,652	Service 4.6							
		Total	28,363	130,347	10.70										Total 21,286
	Medium	Agriculture	3,201	4,702	2.60				Service 10,573	Service 20,652	Service 4.6				
		Industry	10,938	61,033	12.14							Total 21,286	Total 40,821	Total 4.4	
		Service	14,430	76,508	11.76	Total 21,286	Total 40,821	Total 4.4							
	Total	28,568	142,243	11.30	Total 21,286				Total 40,821	Total 4.4	28.7				
	High	Agriculture	3,420	6,614							4.50	Total 21,286	Total 40,821	Total 4.4	42.3
		Industry	11,685	85,861		14.22	Total 21,286	Total 40,821			Total 4.4				20.2
		Service	15,415	107,633	13.83	Total 21,286			Total 40,821	Total 4.4					19.2
		Total	30,520	200,108	13.36										Total 21,286

These figures are based on the brief assumption without detailed analysis. But they tell us one of the undesirables or not to-be realized future economic situations without disaster prevention policy for Albay Province and the Study Area.

5.8.5 Financial Affordability of Local Government Unit

(1) Budget Structure of the Study Area

The budget structure by city/municipality was projected on the assumptions that

- The rate of IRA (Internal Revenue Allotment) is fixed at the one of the year of 1999.
- The rate of Development Fund in IRA is 2%.
- The rate of Reserve for Calamity in Development Fund is 5%.

- The rate of fund for flood control is 15% of Development Fund.
- The tax revenue will increase in proportion with the increase of achievable GRDP by city/municipality.

The present budget structure and the results of projection are shown in Table XII 5.8.1 to XII 5.8.5. At the same time, the budget structure without disaster prevention policy was projected on the basis of the estimated GRDP without disaster prevention policy. The comparison of achieved GRDP by city/municipalities for with- and without-disaster prevention policy is shown Table XII 5.8.6. The average annual growth rates during the period from 1999 to 2020 by city/municipalities are more than 10% for with the disaster prevention policy and less than 3.5% for without the disaster prevention policy respectively. It is obvious that the extremely low level of GRDP will be attained if no disaster prevention policy would be executed.

(2) Financial Affordability of Legazpi City and Daraga Municipality

As an example, the financial affordability and sustainability for the priority projects in the Master Plan were studied for Legazpi City and Daraga Municipality. The priority projects in this study directly relating to Legazpi City and Daraga Municipality are (i) Yawa River System Sabo Project, (ii) Legazpi Urban Drainage Project and (iii) Resettlement Site Development Project. The annual operation and maintenance cost of these projects were calculated as 15 million pesos. Financial sources for these OM cost will come from flood control budget.

The amounts of flood control budget were calculated as 12 million pesos in 2005 and 65 million pesos in 2020, respectively. The balances are the shortage of three million pesos in 2005 and the surplus of 49 million pesos. This indicates that these two LGUs can not afford enough to pay even the OM cost for the projects in the first Phase in this project. It is needed to rise up the rate of development fund from present 20% to 30% and to revise the legal system to heighten the financial affordability of the LGUs.

The flood control fund was tentatively estimated in case of without disaster prevention policy on the basis of projection of GRDP by city/municipalities in this case. The result shows that the OM cost could not be paid for both years of 2005 and 2020. The situation is more serious than the case of with disaster prevention policy.

By taking into consideration comprehensively the studied and analyzed mentioned above, it can be concluded as follows;

- 1) The income level of local residents in Albay province including the Study Area will be improved by the economic development of the Province.
- 2) The surplus funds in the budgets of LGUs will be generated by the disaster prevention policies.
- 3) It will be possible that the surplus funds will be allotted to the operation and maintenance cost for the disaster prevention policies and the sustainable disaster coping capacity will be preserved.
- 4) No economic development will be realized without the disaster prevention policies and no the disaster coping capacity will be strengthened without the economic development.

The summary tables are shown in the following pages.

**Summary Table for GRDP Target and Achievement for Albay Province
(With Disaster Prevention Policy)**

(Unit: Milli.Peso)

Sector	Agriculture	Industry	Service	Total
1. Actual GRDP				
- Average Growth Rate(1995-1998) (%)	0.99	5.41	5.07	4.38
- GRDP (1998)	4,030	8,045	9,364	21,439
2. Targeted GRDP (Low Growth Scenario)				
-2005	5,613	15,001	17,342	37,956
-2020	7,609	77,263	84,872	169,744
3. Scenario for Achievable GRDP				
[Average Growth Rate:%]				
-2005				
* Natural Growth	0.5	2.7	2.5	
* This Project	}			
* Planned/On-going		3.9	6.2	6.6
* Synergy Effects				
* Total	4.4	8.9	9.2	8.3
-2020				
* Natural Growth	0.5	2.7	2.5	
* This Project	}			
* Planned/On-going		4.7	8.7	9.2
* Synergy Effects				
* Total	5.2	11.4	11.7	10.9
4. Achieved GRDP				
-2005	5,455	14,607	17,295	37,357
-2020	11,682	73,468	90,899	176,049
5. Conditions for Achievement				
- Increase of incentives for investment by mitigation of disaster				
- Technology development				
- Realization of scale economy by effective investment to infrastructure				
- Acceleration of high value added production				
- Intensification for agri-industry				
- Achievement of integrated transportation system				
- Expansion of market to the world				
- Diversification of business and management				
- Intensification for consuming structure				
- Intensification of eco-tourism				

**Summary Table for GRDP Target and Achievement for Albay Province
(Without Disaster Prevention Policy:Tentative Estimates)**

(Unit: Milli.Peso)

Sector	Agriculture	Industry	Service	Total
1. Actual GRDP				
- Average Growth Rate(1995-1998) (%)	0.99	5.41	5.07	4.38
- GRDP (1998)	4,030	8,045	9,364	21,439
2. Targeted GRDP (Low Growth Scenario)				
-2005	5,613	15,001	17,342	37,956
-2020	7,609	77,263	84,872	169,744
3. Scenario for Achievable GRDP [Average Growth Rate:%]				
-2005	0.8	4.8	4.5	4.0
-2020	0.8	4.5	4.5	4.0
4. Achieved GRDP				
-2005	4,275	11,139	12,712	28,126
-2020	4,789	21,618	24,473	50,881
5. Conditions for Achievement	<ul style="list-style-type: none"> - Increase of incentives for investment by mitigation of disaster - Technology development - Realization of scale economy by effective investment to infrastructure - Acceleration of high value added production - Intensification for agri-industry - Achievement of integrated transportation system - Expansion of market to the world - Diversification of business and management - Intensification for consuming structure - Intensification of eco-tourism 			

**Summary Table for Financial Affordability of Legazpi City and Daraga Municipality
(With Disaster Prevention Policy:Tentative Estimates)**

(Unit : Milli. Peso)

1. Revenue of Local Government (Increase of Tax revenue)			
- 2005		Legazpi City Daraga Muni.	
* Total Revenue (IRA+Local Tax)	:	417	94
- IRA	:	327	73
- Tax	:	91	21
* Development Budget(20% of IRA)	:	65	15
* Flood Control Budget(15% of Dvt. B.)	:	10	2
- 2020			
* Total Revenue (IRA+Local Tax)	:	2,297	456
- IRA	:	1,798	353
- Tax	:	499	103
* Development Budget(20% of IRA)	:	360	71
* Flood Control Budget(15% of Dvt. B.)		54	11
2. Necessary O/M Cost for Priority Projects			
- 2005	:	13	12
- 2020	:	13	12
3. Sustainability			
* Balance between Flood Control Budget and O/M Cost			
- 2005	:	△ 3	△ 10
- 2020	:	41	△ 1
* Necessary Rate for Development Budget in IRA to avoid the deficit			
- 2005	:	30%	45%
- 2020	:	15%	40%
* Necessary Rate for Flood Control Budget in Development Budget to avoid the deficit			
- 2005	:	20%	25%
- 2020	:	15%	15%
*Necessary for Revision of Legal System and Budget Allocation			

**Summary Table for Financial Affordability of Legazpi City and Daraga Municipality
(Without Disaster Prevention Policy:Tentative Estimates)**

(Unit: Milli. Peso)

1. Revenue of Local Government (Increase of Tax revenue)		Legazpi City	Daraga Muni.
- 2005			
* Total Revenue (IRA+Local Tax)	:	315	81
- IRA	:	247	55
- Tax	:	68	26
* Development Budget(20% of IRA)	:	49	11
* Flood Control Budget(15% of Dvt. B.)	:	7	2
- 2020			
* Total Revenue (IRA+Local Tax)	:	472	121
- IRA	:	370	82
- Tax	:	142	39
* Development Budget(20% of IRA)	:	74	16
* Flood Control Budget(15% of Dvt. B.)		11	2
2. Necessary O/M Cost for Priority Projects			
- 2005	:	13	12
- 2020	:	13	12
3. Sustainability			
* Balance between Flood Control Budget and O/M Cost			
- 2005	:	△ 6	△ 10
- 2020	:	△ 2	△ 9
* Necessary Rate for Development Budget in IRA to avoid the deficit			
- 2005	:	38%	54%
- 2020	:	15%	45%
* Necessary Rate for Flood Control Budget in Development Budget to avoid the deficit			
- 2005	:	25%	50%
- 2020	:	15%	35%
*Necessary for Revision of Legal System and Budget Allocation			

6. ECONOMIC EVALUATION

6.1 Basic Conditions

The basic conditions for economic evaluations are as follows:

- (1) Economic Evaluation is carried out by comparison between With-the-Project and Without-the-Project with regard to benefit and cost.
- (2) Economic evaluation is conducted for the projects for resettlement mud flow protection, flood control and urban drainage.
- (3) The period for evaluation is assumed to include two to three years as the implementation period for construction and 50 years including 30 years of project life.
- (4) The social opportunity cost of capital in the Philippines is considered to be 15%.
- (5) The indicators of economic evaluation are “Economic Internal Rate of Return” (EIRR), “Benefit Cost Ratio” (B/C) and “Net Present Value” (NPV).
- (6) The discount rate of social opportunity cost of capital of 15% is adopted to figure out B/C and NPV.

6.2 Economic Benefit

(1) Resettlement Plan

Three options are set up for land use plan in this study. In resettlement plan, Option 1 is taken into consideration. It is assumed that there is no Sabo project and all residents in hazard will resettled to other sites.

In resettlement plan, two kinds of benefits are calculated by return period of mud flow (2-, 5-, 10- and 50-year) as follows.

(i) Livelihood in Resettlement Area

Benefit generated from livelihood in resettled area is considered to be the balance (net benefit) between revenue and cost of production.

The revenue and cost were estimated for each industrial sector on the basis of the following factors for each area of construction works and protected area by the river system of Sabo projects: (i) No. of households, (ii) No. of workers per household, (iii) Revenue and cost per worker, (iv) Rate of no. of workers by industrial sector.

The annual production cost for agricultural sector are composed of land use fee, input materials and labor cost, and the one for industrial sector are composed of raw materials and labor cost. The production cost for the

service sector was applied as the average cost including labor cost and others.

(ii) Abolishment of Assets in Protected Area

It is assumed that residents in hazard area will completely abolish their present agricultural land and houses. Then the negative benefit by land use category as mentioned in the following “(2) Sabo Plan” is calculated for agricultural products and assets in the hazard area on the basis of probabilistic theory. The rate of damage is shown in Table XII 6.1 and 6.2.

(2) Sabo Plan

a. Methodology and Calculation Conditions

In Sabo plan, Option 2 and 3 are taken into consideration for land use data..

Direct Damage

Damageable value is the maximum amount of asset value that will suffer the mud and debris flow. Generally, direct damage in the area can be calculated as follows:

$$[\text{Direct Damage in the Area (Peso)}] = [\text{Area Size (ha)}] \times [\text{Damageable Value (Peso/ha)}]$$

Damageable value is calculated for each asset classification such as (i) agricultural products for main crops such as palay, coconut(copra), corn, banana, and vegetables, (ii) buildings for residence, industry and commerce), including indoor movables, (iii) public facilities including indoor movables and (iv) other agricultural products such as livestock, poultry and fishery (15% of other assets), is presented below. The unit values of agricultural products and other assets are shown in Table XII 6.3 and XII 6.4.

Indirect Damage

Damages caused by business suspension due to the mud flow are estimated using the rate (6%) to the damage to general assets (houses/building and their indoor movables). This rate is applied in accordance with other reports on flood control projects similar to this Study, as well as the "Main Principles on Investigation of River Economy, Ministry of Construction, Japan".

The costs for evacuation, clean-up, detour transportation and drainage of mud and debris are inherent for mud and debris flow. In this Study, 20% of

direct damage including business suspension is tentatively assumed as indirect damage.

Development Benefit

In this Study, socioeconomic development will be accelerated in the protected area by sabo works. In Option 1, it is assumed that the agricultural productivity will be enhanced. The productivity of the major crops such as rice, coconut and vegetables will be enhanced in future. In Option 2, it is assumed that the development of industrial and service sector will be promoted in the protected areas as well as the enhancement of agricultural productivity.

To implement these developments, the cost and benefit are assumed as follows;

- (i) The investment cost including land acquisition, land reclamation and construction of buildings for industrial and service sector is calculated.
- (ii) The production cost including cost for labor and materials by sector are calculated.
- (iii) The production in money terms is counted as the benefit generated from the development. With regard to agricultural sector, the increase of production derived from the enhancement of productivity is estimated as the benefit.

These conditions mentioned above is shown in Table XII 6.5.

b. Estimation of Annual Average Benefit

Sabo Works

Benefit generated by mud and debris flow control is defined as the expected amount of average annual reduction of damages by the designed works, and it can be estimated on the basis of the following assumptions.

- ***It is almost impossible that the damaged assets will be recovered to their existing conditions***

According to the field survey, most assets which was once damaged by mud and debris flow is very difficult to be completely recovered from damages or takes considerable time to be recovered. Then, in this study, it is basically assumed that the damaged assets are not be recovered their existing conditions. This assumption is fundamentally different from the one of flood control plan. Because the most of assets damaged by flood will be recovered their existing conditions before damage. Agricultural products will be

harvested in the next year or cropping time and buildings and infrastructure are mostly repaired and could be in use after the short period from the flood damage.

- ***Annual output from the land is damaged***

This assumption is based on the concept that the assets to be damaged are the output, which is ***annually*** generated from the disaster area. The annual output could be the annual production for the agricultural production and the annual depreciation for the buildings.

- ***The occurrence of damages caused by mud and debris flow of each return period is non-simultaneous during the project life of 30 years.***

This means the damages caused by some return period, for example, 10-year, will not be recovered. Then the damages after occurrence in return period 10-year must be excluded from the assets to be damaged by occurrence of other longer return period. But this assumption is approved only during the project life because there is no assurance of protection of assets from mud and debris flow after 30 years. During the project life, the probability is calculated for damages, which will be happened.

- ***Probability of “not” occurrence of damages caused by mud and debris flow after the project life is assumed after the project life.***

After the project life (30 years), the adverse benefit, “not damaged by mud and debris flow”, is assumed. Because the parts of assets will be always economically damaged when mud and debris flow will happen even if the structures for protection could work physically.

The damage rate and damaged value of assets are estimated on the basis of these assumptions.(Refer to DT V1 and V2 in Data Book).

Development Benefit

Development benefit per annum for respective return period of 10, 20, and 50-year is estimated in terms of production amounts by sector for each land use plan (Option 2 & 3).

(3) Flood Control Plan and Urban Drainage

a. Methodology and Calculation Conditions

Land Use Data

From the economic viewpoint, inundation and assets were examined for flood prone area by land use category. Land use pattern for “Option 1” is adopted to the flood control plan.

Direct Damage

Damageable value is the maximum amount of asset value that will suffer the inundation. Generally, direct damage in the area can be calculated as follows:

$$[\text{Direct Damage in the Area (Peso.)}] = [\text{Area Size (ha)}] \times [\text{Damageable Value (Peso/ha)}] \times [\text{Damage Rate}]$$

Damageable value for each asset classification is the same as the one of mud and debris flow already mentioned above.

As in case of Sabo Plan, the other assets such as livestock, poultry, fish in agricultural sector and public facilities except railway and roads are assumed to be 15% of the direct damages.

Indirect Damage

Damages caused by business suspension due to the flood are estimated using the rate (6%) to the damage to general assets (houses/building and their indoor movables). This rate is applied in accordance with other reports on flood control projects similar to this Study, as well as the "Main Principles on Investigation of River Economy, Ministry of Construction, Japan".

In this study, 10% of direct damage including business suspension and evacuation from flood is tentatively assumed as indirect damage

Damage Rate by Inundation Depth and Duration

The damage rates for each item vulnerable to flood damage are determined in accordance with the inundation depth and duration. The field survey and other reports on flood control projects similar to this study, as well as the "Main Principles on Investigation of River Economy, Ministry of Construction, Japan" are also referred to.

b. Estimation of Annual Average Benefit

Flood control benefit is defined as the expected amount of average annual reduction of damages by the designed works, and it can be calculated in the following procedure:

- i. Assume several levels of flood discharge: 2-, 5-, 10-, 20-, and 50-year return periods in this study (for urban drainage: 2-, 5-, and 10-year)
- ii. Obtain the average annual probability of the discharges between one discharge level and the next (this can be derived from calculation of the excess probability for each discharge level and then, attaining the difference between these probabilities):
- iii. Obtain the average annual amount of damage due to floods at this discharge level, multiplying the average annual probability by the amount of estimated damage at this discharge level; and
- iv. Obtain a cumulative total of these amounts from the minimum discharge to the maximum discharge.

The average annual benefit is calculated using the following formula:

$$B = \sum_{i=1}^n \frac{1}{2} [D(Q_{i-1}) + D(Q_i)] \cdot [P(Q_{i-1}) - P(Q_i)]$$

where;

- B : average annual benefit
 $D(Q_{i-1}), D(Q_i)$: flood damage caused by flood with Q_{i-1} and Q_i discharge, respectively
 $P(Q_{i-1}), P(Q_i)$: probability of occurrence of Q_{i-1} and Q_i discharge, respectively
 n : number of flood applied

The estimates of annual average flood damages by return period according to the procedure mentioned above are shown in DT V3 to V8 in Data Book.

6.5 Economic Cost

(1) Basic Conditions

Conversion Factor

The project cost is converted from financial price to economic price. The basic conditions for conversions are as follows:

- The price level is fixed at constant 1999. Then inflation is excluded from financial cost.

- In the Master Plan Study, the project cost is assumed to be the local currency portion. The local currency portion in financial price includes the transfer items such as custom duties for imported materials, sales tax, value added tax, and subsidies, and so on for locally procured materials. These transfer items are eliminated from them.
- The tradable goods in the locally procured materials do not reflect the international market price. Then the standard conversion factor (SCF) is applied to it. In this study, 0.909 is assume to be SCF which is based on the international trade statistics of the Philippines during the latest 5 years.
- The cost for unskilled labor does not reflect economic price by being overestimated generally. Then the shadow wage rate (SWR) is applied to the cost for unskilled labor. According to project evaluation procedure and guidelines prepared by ICC (Investment Coordinating Committee) of the Philippines government, The SWR of 60% id recommended. In this study, the labor cost is not yet figured. Then the SWR is not applied implicitly.
- In this study, the conversion factor for construction cost is tentatively assumed to be 0.82 by taking account of the factors mentioned above such as SCF, SWR and many kinds of taxes and duties.
- The land acquisition cost includes usually speculative factor. In this study, 10% of land acquisition cost is tentatively assumed to include speculative factor. Then the conversion factor of 0.9 is applied to the land acquisition cost.
- The operating and maintenance cost after completion of construction is assumed to be 0.5% of direct construction cost and contractor's indirect cost.

Disbursement Schedule and Implementation Period

The project cost is assigned according to disbursement schedule. The disbursement schedule is tentatively set up as follows:

Disbursement Schedule

No.	Kinds of Construction	Period (Year)	Annual Disbursement Rate
1	Land Reclamation	3	33, 34, 33
2	Sabo	3	20, 50, 30
3	River Improvement	3	30, 40, 30
4	Urban Drainage	2	30, 70

6.3 Economic Evaluation

(1) Resettlement Plan

The economic evaluation for the resettlement plan is conducted for hazard area. The indicators of economic evaluation are figured in the following table.

Judging from the indicators acquired, the alternative plans for return period of 20-year indicate relatively high economic viability. The annual cost-benefit flow for Yawa River system in case of return period of 20-year is shown in DT V9 in Data Book.

(2) Sabo Plan

Confirmation of Return Period

The economic evaluation is conducted for Yawa River System to decide the optimum construction design with regard to return periods for 2-, 5-, 10-, 20-, and 50-year by option of land use plan (Option 2 and 3)

To calculate the indicators of EIRR, B/C and NPV of alternative projects, the annual cost-benefit flow is calculated by accumulation of the annual costs and benefits of alternative projects in the Master Plan Study. The annual cost-benefit flows for return period of 20-year are shown in DT V10 and V11 in Data Book for Option 2&3. The indicators are summarized as follows.

**Comparison of Indicators for Economic Evaluation
for Alternatives of Yawa River System**

Option No.	Return Period	EIRR (%)	B/C	NPV (Milli. Peso)
1	10	16.96	1.07	60
	20	17.85	1.12	111
	50	16.73	1.07	91
2	10	17.79	1.16	190
	20	20.99	1.00	480
	50	18.00	1.18	280
3	10	24.10	1.54	2,848
	20	24.67	1.58	3,248
	50	23.33	1.50	2,904

Judging from the result, all indicators are evaluated to have high economic viability. Particularly, the alternative for the return period of 20-year for land use plan of Option 3 indicates the highest viability. Then the project of 20-year return period for Option 3 are selected to be optimum design.

Evaluation of Other Alternative Projects

The alternative projects of other river system are evaluated. The results are summarized as follows.

**Comparison of Indicators of Economic Evaluation for the Alternatives of Sabo Plans of
Other River Systems**

River system	Option No.	Return Period (Year)	EIRR (%)	B/C	NPV (Milli.Peso)
Quinali(A) River System	1	20	12.17	0.84	-52.3
	2	20	13.25	0.43	-79.4
	3	20	16.32	1.07	88.3
Buang River	1	20	9.24	0.64	-8.7
	2	20	13.12	0.53	-6.0
	3	20	21.67	1.43	40.8
San Vicente River	2	20	11.03	0.83	-26.4
	3	20	14.34	0.45	-18.8
Padang River	1	20	18.49	1.21	103.1
	2	20	12.52	0.88	-85.5
	3	20	13.46	0.62	-54.3
Basud River	1	20	19.14	1.28	168.7
	2	20	11.72	0.83	-25.5
	3	20	12.71	0.31	-42.3
Bulawan River	1	20	14.00	0.95	-21.8
	2	20	-2.20	-2.27	-85.5
	3	20	15.90	1.06	13.1
	1	20	17.16	1.16	700.4

The indicators of Option 3 are figured out the highest values for all alternatives of river systems. Judging from the values of EIRR, the highest economic viability is approved for Buang River of Option 3 as 21.67% followed by Padang River as 19.14% and Bulawan River as 17.16% respectively.

The annual cost-benefit flows for other projects by river system are shown in DT V12 to V17 in Data Book.

(3) Flood Control Plan

The alternative projects of river improvement projects are evaluated. The results are summarized as follows.

**Comparison of Indicators of Economic Evaluation
for the Alternatives of Flood Control Plans**

River Basin	Return Period (Year)	EIRR (%)	B/C	NPV (Mill. Peso)
Yawa River	10	-	-	-
	20	10.08	0.65	-65.9
Quinali(B) River	10	4.22	0.32	-662.1
	20	5.66	0.38	-555.4
Nasisi River	10	4.92	0.32	-338.4
	20	5.23	0.36	-364.7
San Vicente	10	4.61	0.32	-124.9
	20	6.47	0.43	-112.4
Ogsong River	10	5.06	0.35	-284.2
	20	6.10	0.41	-271.6

Unfortunately, all figures of EIRRs for flood control plan are figured out to be no economic viability. The annual cost-benefit flows of Yawa River Improvement Project for 20-year return period, which indicate the highest value of EIRR, is shown in DT V18 in Data Book.

(4) Urban Drainage Plan

The economic evaluation for the urban drainage plan for Legazpi City is conducted for return period of 10-year. The indicators of economic evaluation are figured out as follows;

- EIRR : 23.96%
- B/C : 1.73
- NPV : 197.4 million peso

Judging from the indicators acquired, the Urban Drainage Plan for Legazpi City has a high economic viability. The annual cost-benefit flow is shown in DT V19 in Data Book.