

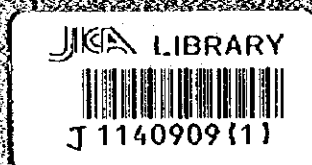
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

THE STUDY ON SABO AND FLOOD CONTROL
IN THE ILAGAC RIVER BASIN

FINAL REPORT
VOLUME III
MASTER PLAN STUDY
(SUPPORTING REPORT)

DECEMBER 1977



CI ENGINEERING CO., LTD.
IN ASSOCIATION WITH
SANYU CONSULTANTS INC.
PASCO INTERNATIONAL INC.



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1140909 (1)

The cost estimates in this Study are based on the price levels indicated below and expressed in Philippine Peso according to the following exchange rates:

Master Plan : US\$1.00 = Philippine Peso 26.00
= Japanese Yen 105, as of August 1996

Feasibility Study : US\$1.00 = Philippine Peso 26.00
= Japanese Yen 115, as of June 1997

APPENDIX A

***SOCIO-ECONOMY
AND LAND USE***

APPENDIX A

SOCIO-ECONOMY AND LAND USE

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CHAPTER I ADMINISTRATION

The Philippines consists of 15 administrative regions: the National Capital Region (NCR), the Cordillera Administrative Region (CAR), the Autonomous Region in Muslim Mindanao, and Region I to Region XII. These regions are further divided into provinces, the provinces into cities/municipalities, and the cities/municipalities into barangays. As of 1993, there were 76 provinces, 60 cities, 1,544 municipalities and 41,921 barangays.

There are four types of local government units (LGUs) in the country. They are the province, the city, the municipality and the barangay in the order of governmental authority. The Laoag River Basin is located in the province of Ilocos Norte in Region I, and there are eleven LGUs involved consisting of one city and ten municipalities as shown in the following table. The eleven LGUs are further divided into the basic administrative units of 284 barangays. Their locations in the basin are given in Fig. A.1.1, which shows the physical basin boundary and the administrative units. The aggregate area of the city and the ten municipalities is 2,114 km².

City/Municipality	Administrative Area		Area in Laoag River Basin	
	Land Area (km ²)	Number of Barangays	Land Area (km ²)	Number of Barangays
Laoag City	107.5	80	63.2	60
San Nicolas	49.3	24	49.3	24
Sarrat	80.7	24	80.7	24
Dingras	100.2	31	100.2	31
Solsona	163.5	22	163.5	22
Piddig	179.7	23	150.8	23
Marcos	79.4	13	73.2	13
Banna (Espiritu)	74.5	20	68.7	20
Nueva Era	644.7	11	480.4	9
Carasi	121.9	3	50.2	2
Vintar	512.9	33	51.9	7
Total	2,114.3	284	1,332.1	235

The area of the Laoag River Basin is estimated at 1,332.1 km², accounting for 39% of the provincial territory (3,399 km²) of Ilocos Norte Province. Of the 284 barangays in the eleven LGUs, 235 are included in the basin as shown in the table above. Among the eleven LGUs, four municipalities are thoroughly included: San Nicolas, Sarrat, Dingras and Solsona.

CHAPTER II POPULATION AND LABOR FORCE

2.1 Population

According to the 1995 census by National Statistics Office (NSO), the Philippines has a population of 68.3 million. This population increased by 7.8 million as compared to the 1990 census, as shown in Table A.2.1. During the 1970's, the average growth rate was 2.79% per annum. Although it slowed down to 2.28% per annum in 1980's, it recovered to 2.45% per annum during the first half of 1990's.

In Ilocos Norte Province, the census population was 482,651 or 0.71% of the national population. The average growth rate during the 1980's was 1.66% per annum, but it slowed down to 0.94% per annum as shown in the table. This growth rate was still smaller than that of the country.

The census population of the city and ten municipalities covered by the Laoag River Basin is listed in Table A.2.2. Among the LGUs, Laoag City is the largest one in terms of population, and it functions as the center of the basin. Its population was 87,770 in 1995. Although the growth rate during the 80's was 1.79% per annum on average, it slowed down to 1.07% during the first half of 90's. It was larger than that of the province but smaller than that of the country. Of the ten municipalities, seven recorded smaller growth rates than the city. Other three municipalities, such as Marcos, Nueva Era and Carasi, recorded higher growth rates. As a result, the census population of the eleven units in the basin was summed up to 271,000 and its growth rate in the five years was calculated at 0.85% annually on average, as shown in Table A.2.1.

The basin population within 1,332 km² of the basin area was estimated at 196,938 in the 1995 census year. It accounted for 73% of the total population of 11 LGUs in the basin. The population distribution and the basin share of the total municipal population in the respective LGUs was estimated in the table below.

City/Municipality	Municipal Population	Basin Population	Share of Basin
Laoag City	87,770	39,863	45%
San Nicolas	28,996	28,996	100%
Sarrat	21,292	21,060	99%
Dingras	31,482	31,482	100%
Solsona	19,653	19,653	100%
Piddig	17,793	17,630	99%
Marcos	13,688	13,688	100%
Banna (Espiritu)	15,965	15,778	99%
Nueva Era	6,217	4,959	80%
Carasi	730	432	58%
Vintar	27,397	3,397	12%
Total	271,003	196,938	73%

The population density of the eleven units was 1.29 persons/ha, as shown in Table A.2.3. The density of the respective units were ranged from 8.22 persons/ha for Laoag City to 0.06 persons/ha for Carasi Municipality. Besides Carasi, three municipalities, Nueva Era, Vintar and Piddig, recorded a small population density of less than 1.00 person/ha. The units which exceeded the density of 5 persons/ha were only Laoag City and San Nicolas Municipality. Thus, the basin is characterized as a sparsely populated area. Incidentally, the population

density in the Laoag River Basin was estimated at 1.48 persons/ha, somewhat larger than the above density of the eleven units.

The average family size was 5.2 persons per household in the eleven units, as shown in the table. It was larger than the provincial average of 4.8, and slightly larger than the national average of 5.1. The unit which recorded the largest family size was Laoag City of 6.2. The unit with the smallest was Sarrat which had 4.6.

2.2 Labor Force

In 1990, the labor force in the Philippines was registered at 21.1 million. This accounted for 57.7% of the total working age population (36.6 million), i.e., 15 years old and over. Of this number, 19.3 million or 91.5% were employed. Thus, the unemployment rate was 8.5% nationwide. In the province of Ilocos Norte, the unemployment rate was 7.2%, as shown in Table A.2.2. In the same manner, the unemployment rate in the eleven LGUs was 6.1%, which was also smaller than that of the province. Of the eleven units, only the municipalities of Piddig, Vintar and Sarrat registered higher unemployment rates than those of the country and the province.

In the past, the agricultural sector, so called as the primary sector, used to absorb the greatest portion of manpower resources in the country. In the 1990 census this sector accounted for only 7.95 million or 37.7% of the total labor force, a drastic decrease from the 1980 census figure of 51.5%, as shown in Table A.2.4.

This decrease phenomenon was seen in Ilocos Norte, as well. In the province, the share of the primary sector dropped from 63.6% in 1980 to 51.3% in 1990, although the number of workers increased from 69,000 in 1980 to 77,000 in 1990. During the decade, the growth rate of the sector was calculated at 1.0% per annum which was fairly lower than that of the labor force of 3.2% per annum.

The industrial sector, or the secondary sector, employed the smallest share of the labor force among the three major economic sectors. Its share was 14.3% in the country and 9.2% in Ilocos Norte, as shown in the table. In the province, it recovered at an annual rate of 3.5% in 1980's, but was still lower than that of 13.6% in 1970.

On the other hand, the number of workers in the service sector, or the tertiary sector, expanded at annual rates of 6.5% in the whole country and of 7.0% in the province during 1980's. In particular, the commercial sub-sector in the province registered the highest rate of 8.0% per annum among all sectors and sub-sectors. Then, the share of the services sector increased from 25.4% in 1980 to 36.5% in 1990 in the province.

2.3 Housing Condition

Based on the 1990 census, there were 86,675 housing units in Ilocos Norte Province and, as shown in Table A.2.5, there were 48,602 housing units in the eleven LGUs in Laoag River Basin. In general, building structures are classified into four types: (a) Type I, which is defined as a house made of strong materials such as concrete and iron; (b) Type II, which is defined as a house of semi-strong materials such as concrete bricks, stone and iron; (c) Type III, made of usual materials such as wood and asbestos; and, (d) Type IV, made of light materials such as cogon, nipa and bamboo. With regard to building structure, the above housing units in the basin were distributed as follows: (a) Type I and II accounted for 13,991 units or 29% of the total number of units; (b) Type III, 20,624 units or 42%; and (c) Type IV, 13,987 units or 29%. In 1980, this constitution was 9%, 50% and 41%, as shown in Table A.2.8. The structure of housing units were fairly improved during the 1980's.

The average age of housing units is 23 years in both the province and the basin. In the eleven LGUs in the basin, the age range is from 16 years old in Carasi to 26 years old in Laoag City, as shown in Table A.2.6. This means that the outskirts of Laoag City are being developed, and new dwelling units are constructed. In the 1980 census, the average age of dwelling units was 16 years old, as shown in Table A.2.8. Thus, most of the dwelling units of those days might still be in use, and perhaps they were improved to maintain their good condition.

Table A.2.7 shows the distribution of the floor area of housing units in the 1990 census. The average floor area was 43 m² in the province and 42 m² in the basin. In the basin, the smallest unit of 22 m² is in Carasi while the largest unit of 52 m² is in Laoag City. Both figures in the province and in the basin are almost similar with those of the 1980 census as shown in Tables A.2.8 and A.2.9. Those in Laoag City, Solsona and Banna have increased during the decade but those in other municipalities have either decreased or remained the same.

CHAPTER III NATIONAL AND REGIONAL ACCOUNTS

3.1 Macro Economy

Gross domestic product (GDP) in the Philippines was 1,906 billion pesos in 1995, as shown in Table A.3.1. It was broken down into gross value added (GVA) of main economic sectors as shown in Table A.3.2. They were summarized as follows: 412 billion pesos in the agricultural sector or 21.7% of GDP, 613 billion pesos in the industrial sector or 32.1%, and 881 billion pesos in the services sector or 46.2%. Per capita GDP was 27,956 pesos, equivalent to approximately US\$1,084, as shown in Table A.3.3.

Gross regional domestic product (GRDP) of Region I in 1995 was 58.3 billion pesos, as shown in Table A.3.1, accounting for 3.1% of GDP. GVA of main three economic sectors in the region were shown in Table A.3.1 and their share to GRDP was tabulated in Table A.3.2. They are broken down into: 24.2 billion pesos or 41.6% of GRDP, 9.1 billion pesos or 15.7%, and 24.9 billion pesos or 42.7%. The above figures are summarized as follows.

Item	Philippines	Region I
Agriculture	21.7%	41.6%
Industry	32.1%	15.7%
Services	46.2%	42.7%
Total	100.0%	100.0%

Per capita GRDP in 1995 was 14,885 pesos (approximately US\$577), as shown in Table A.3.3. It was only 53% of the national per capita GDP. GRDP of provincial level was not estimated by the agency concerned. In this report, therefore, it is represented by the GRDP of the regional level. Similarly, GRDP in the Laoag River Basin is considered to be the same, i.e., 14,900 pesos in 1995.

Table A.3.4 shows GDP by economic sector at 1985 constant prices between 1990 and 1995. For six years, GDP increased from 721 billion pesos to 803 billion pesos in real terms, i.e., average growth rate of 2.20% per annum. GRDP in Region I grew at a rate of 1.89% per annum on average for the same period, which was smaller than the growth rate of the country. Then, the share of the region in the country diminished for this period. The real growth of the main economic sectors was calculated in Table A.3.5. The average annual real growth rates during 1990 to 1995 are summarized below:

Item	Philippines	Region I
Agriculture	1.48%	2.75%
Industry	2.22%	-1.38%
Services	2.55%	2.46%
G(R)DP	2.20%	1.89%
Per capita G(R)DP	-0.15%	-0.07%

In terms of average annual growth between 1990 and 1995, both per capita GDP and per capita GRDP of Region I were calculated as slightly negative, i.e., minus 0.15% and minus 0.07%, respectively. These figures connote that both economic conditions have been kept at the same level for the past five years, although the economy has fluctuated for the period. As shown in Table A.3.6, those in 1991 and 1992 resulted in serious negative growth in particular.

In 1995, it barely recovered up to the 1990 level as a consequence of the recent real growth.

3.2 Balance of Payment

The Philippines have traditionally run a deficit on its current account. In particular, it has consecutively recorded a deficit on merchandise trade, as shown in Table A.3.7. The deficit was mainly financed by borrowing overseas, from official and private sources. This activity has accelerated the worsening current deficit. The deficit is said to be partly offset by tourism and higher remittances from emigrants.

In 1990, the current account recorded the high level deficit of \$2.70 billion. In the following year, however, the improvement on the merchandise balance decreased the current account deficit to \$1.03 billion. In 1993 again, the worsening in the merchandise trade and an increase in imports of services pushed up the current account deficit to \$2.98 billion. In 1994 the further worsening of the trade gap was offset by inflow of income as interest, profit and dividends, and the net result of current account was a slightly recovered deficit of \$2.84 billion.

The Philippines has borrowed heavily from international capital markets. Being encouraged by the liberalization of investment regulations, foreign capital has accounted for a growing proportion of total new investment. Thus, total investment inflows have risen strongly and steadily in the 1990's. Inflows, surplus of capital balance, was \$2.06 billion in 1990, and doubled in 1994 to \$4.16 billion. Accordingly, an overall balance has recorded surplus since 1991, and reached \$1.52 billion in 1994.

3.3 External Debt and Outstanding Balance

The public debt was 625 billion pesos (equivalent to approximately US\$24 billion) in 1994. It comprised 613 billion pesos or 98% of the total public debt of the national government, 6 billion pesos or 1% of government corporations, and 5 billion pesos or 1% of monetary institutions, as shown in Table A.3.8. The national government appropriated 125 billion pesos for debt-service in 1994. This amount accounted for 33% of the total expenditure of the national budget. The debt-service of the national government was equivalent to US\$4.7 billion.

Gross receipts of official development assistance (ODA) from the OECD, Arab countries and multilateral agencies aggregated to US\$6.59 billion between 1990 and 1994 and averaged US\$1.32 billion per year. The receipts sharply fluctuated annually as shown in Table A.3.9. This fluctuation was caused by Japan's bilateral aid in particular.

The average annual receipt of ODA accounted for approximately 13% of the annual expenditure of the national government budget on average for the same period. It ranged from a minimum of 11% in 1991 and a maximum of 18% in 1992 as shown in the table below.

Item	(Unit: US\$ Billion)				
	1990	1991	1992	1993	1994
Receipt of ODA	1,428	1,140	2,126	1,491	0
Expenditure of Central Govt.	7,955	10,460	10,886	12,143	11,514
Share of ODA (%)	14	10	18	13	0

The Aquino Administration since 1986 has been struggling for the substantial improvement of external imbalance. At the end of the administration, however, the debt-service ratio (DSR) recovered to 23% in 1991, though it was 42% in 1982, the worst record in history. The incoming Ramos Administration let the external debt condition stand for the succeeding two years.

In 1994, the total external debt was US\$39 billion as shown in Table A.3.10. It accounted for 59% of GNP or 61% of GDP. The outstanding long-term debt was US\$32 billion in the same year. The total debt-service was US\$4.5 billion, comprising US\$2.4 billion principal repayment and US\$2.1 billion interest payment. Thus, the debt-service ratio (DSR) decreased to 19% in 1994, supported by good external trade.

CHAPTER IV ECONOMIC PROFILES

4.1 Agricultural Sector

The production of major crops in the Philippines and in the province are given in Table A.4.1. Based on the table, the major crops in the country are palay (rice), coconut, corn, sugarcane and banana in order of production value. Palay production has been kept at almost the same annual production level of around 10.5 million tons for the past two years. On the other hand, the country needs 6.3 million tons of rice for its nearly 70 million population. To maintain self-sufficiency in rice, palay production is expected to be 10.8 million tons (equivalent to 6.3 million tons of rice) in 1996. Thus, the country has to import some rice from the point of view of food balance. In fact, the country has recorded an excess of rice import in tens of thousand of tons since 1990 except for 1991, as shown in the table below.

Year	Import		Export	
	Quantity (1000 tons)	Value in CIF (US\$ Million)	Quantity (1000 tons)	Value in FOB (US\$ Million)
1990	592.7	127.7	0.0	0.0
1991	0.1	0.1	10.0	2.3
1992	0.6	0.3	-	-
1993	201.6	37.1	0.0	0.0
1994	2.8	0.7	-	-

Source: Trade Statistics in 1990 to 1994, NSO

In Ilocos Region, the agricultural sector is a leading industry, of which GVA accounted for 42% of GRDP. Ilocos Norte, one of the four provinces in the region, would be under the same condition as the overall regional economic situation. In the province, 51% of gainful workers were absorbed in the agricultural sector in the 1990 census. Since the GVA of fishery, livestock, and forestry subsectors accounted for only 10%, 15% and 0% of the total agricultural product, respectively, most agricultural activities would rely on crop production.

The major crops in the province are palay (rice), garlic, corn, tomato, tobacco, onion and mango in the order of production value. Although palay production have kept the top rank in crop production, it accounted for 130,000 tons in 1995 or only 1.2% of the national production. On the other hand, the province produced 9,700 tons of garlic in 1995, accounting for 56% of the national production. Thus, the province is characterized as a garlic producing area. In 1995 in particular, the production value of garlic exceeded that of palay because of a sharp rise in prices, as shown in the table. The cultivated area for garlic was 4,000 ha, only 8.3% of the palay area for the same year.

In the Laoag River Basin, Dingras is the top producer in terms of palay production, as shown in Table A.4.2. Its yield is 3.6 tons per ha in wet season and 4.6 tons per ha in dry season. The average yield of palay in the basin is 3.8 tons per ha in wet season and 4.4 tons per ha in dry season. Garlic production was 3.0 tons per ha in 1991.

Fishpond industry is one of the most vulnerable to flood disaster. Inland fishery in the province is poor as compared with the national production. The provincial production accounted for only 0.1% of the nation in 1995, as shown in Table A.4.3. Concerning its production value, it accounted for only 0.08% of the nation. In fact, there are no major fishponds in the basin. Most of inland fishery production is not for commercial use but for private consumption.

The livestock and poultry industry has received a more important position than inland fishery in the basin. Table A.4.4 shows an inventory of livestock and poultry in the country and in the province for the years 1993 to 1995. As shown there were 12,200 heads of carabao, 33,500 heads of cattle, 53,800 heads of hog and 16,300 heads of goat. There were also 465,200 heads of chicken. Since the number of agricultural households was estimated at 29,000 for the same year, the average holding of livestock and poultry was calculated per family at 0.4 head of carabao, 1.2 heads of cattle, 1.9 heads of hog, 0.6 head of goat and 16.0 heads of chicken.

4.2 Industrial Sector

Within the industrial sector, the manufacturing subsector contributed the largest share to the national economy, accounting for 23.0% of GDP in 1995. In Region I, however, its importance to the regional economy seems to be low, because its share was only 6.0% of GRDP as shown in Table A.3.2. In spite of that, it is natural that the manufacturing industry is expected to fulfill an important economic role in the region. In Ilocos Norte Province incidentally, 317 manufacturing establishments are registered in the Department of Trade and Industry (DTI) and obtain licenses for their business. In general, the factories have usually large properties for production, which are damageable and vulnerable to flood disasters.

Table A.4.5 shows the existing manufacturing establishments in the province and in the eleven LGUs of the Laoag River Basin as of 1996. As shown, there are 221 establishments in the eleven LGUs in 1996. They are classified into nine categories. Considering the number of establishments, the top three industrial types are (1) wood, paper products and furniture, (2) non-metal mineral products and (3) metal products. Regarding municipal distribution, Laoag City has the largest number of 82 firms or 37% of the total number in the basin. Following the city, the municipalities having a large number of factories are San Nicolas (54 establishments) and Sarrat (42 establishments). In these three LGUs, there are 178 establishments, accounting for 81% of the total.

Table A.4.6 shows the management conditions and internal asset holdings of manufacturing establishments in the country as well as in the region in 1991. Since the table includes both large and small scale manufacturing establishments, the data indicate management characteristics of respective scale establishments. The following table summarizes the management indices in the country and in the region:

Item	Philippines	Region I
Large Scale Establishments		
Average Output (million Pesos) ^{*1}	59.39	17.79
Average VA (million Pesos) ^{*2}	19.18	10.44
VA Rate (%)	32.29	37.37
Ratio of Fixed Assets ^{*3} to VA	0.14	0.08
Ratio of Inventory to VA	0.57	0.24
Small Scale Establishments		
Average Output (1000 Pesos) ^{*1}	366.09	97.80
Average VA (1000 Pesos) ^{*2}	138.39	52.76
VA Rate (%)	13.84	53.95
Ratio of Fixed Assets ^{*3} to VA	0.05	0.04
Ratio of Inventory to VA	0.25	0.09

Note: ^{*1} Average value of an establishment

^{*2} VA stands for value added

^{*3} Excluding land value of the establishment

Since management characteristics of manufacturing establishments in the basin are not available, the above regional figures in Table A.4.6 are applied to characterize the manufacturing establishments. Since there are few large scale manufacturers, the manufacturing industry is characterized by small scale and cottage manufacturer's figures.

4.3 Services Sector

Within the services sector, the trading (or commercial) subsector is considered the most popular and plentiful industry contributing to the national economy, accounting for 13.7% of GDP in 1995. The trading subsector accounted for 10.8% of GRDP in Region I, as seen in Table A.3.2. In Ilocos Norte Province, shops and stores perform an important role and are scattered all over the province. In the province, 2,289 trading establishments were registered with DTI for business licenses as of 1996. In 11 LGUs of the basin, 1,441 trading establishments were registered as formal licencees in 1996. As shown in Table A.4.7, they comprise 77 wholesale stores, 116 ordinary food stores, 791 "sari-sari" (variety) food stores and 534 non-food stores.

Table A.4.8 shows the management conditions of trading establishments involved in both wholesale and retail trading in the country and in the region in 1991. The management indices of both wholesale and retail trading establishments are summarized in the table below. As seen in the table, the samples chosen in the region seem to be comparatively large scale establishments, because their average annual sales in the region were 4.9 times of the national average for wholesale and 6.7 times for retail trade.

Item	Philippines	Region I
Wholesale		
Average Annual Sales ^{*1} (million Pesos)	11.69	57.00
Average VA ^{*2} (million Pesos)	2.00	24.27
VA Rate (%)	17.13	42.58
Ratio of Fixed Assets ^{*3} to VA	0.05	0.02
Ratio of Inventory to VA	0.67	0.30
Retail Trade		
Average Annual Sales ^{*1} (million Pesos)	1.49	10.04
Average VA ^{*2} (million Pesos)	0.22	0.98
VA Rate (%)	14.67	9.73
Ratio of Fixed Assets ^{*3} to VA	0.04	0.06
Ratio of Inventory to VA	0.56	2.36

Note: ^{*1} Average value of an establishment

^{*2} VA stands for value added

^{*3} Excluding land value of the establishment

4.4 Foreign Trade

The Philippines' external trade balance has recorded a widening deficit as shown in the table below. Although the major traditional commodity exports have contributed to the national trading performance for a long time, its contribution has fallen well below that of manufacture. In the 1990's, the leading positions were held by electrical goods (code 77) and garments (code 84). As shown in Table A.4.9, the top five exports in 1994 comprised the following articles: (1) electrical machinery, which accounted for US\$1.73 billion; (2) articles of apparel, US\$0.90 billion; (3) telecommunication and sound recording, US\$0.68 billion; (4) vegetables and fruits, US\$0.57 billion; and (5) fish and fish preparations, US\$0.53 billion. The total of these five

articles accounted for US\$4.41 billion or one-third of the total exports of US\$13.30 billion in 1994.

(Unit: US\$ billion)					
Item	1990	1991	1992	1993	1994
Merchandise Export	8.09	8.76	9.73	11.21	13.30
Merchandise Import	13.04	12.86	15.46	18.77	22.64
Trade Balance	-4.95	-4.10	-5.73	-7.56	-9.34

The country's top five imports in 1994 comprised the following articles, which are shown in Table A.4.10 in detail: (1) petroleum, petroleum product and related mineral, which accounted for US\$1.94 billion; (2) electrical machinery, US\$1.80 billion; (3) road vehicles including air cushion, US\$1.10 billion; (4) iron and steel, US\$0.97 billion; and (5) machinery specialized for particular industry, US\$0.92 billion. The total of these five articles accounted for US\$6.73 billion or 30% of the total imports of US\$22.64 billion in 1994. Import of petroleum and its products has been the top ranking for a long time due to its higher demand in the domestic economy.

Overall exports are showing sustained growth for the last five years as shown in Table A.4.9. On the other hand, imports failing to respond to the resumption of economic growth were increasing heavily as shown in Table A.4.10. Thus, foreign trade in 1994 registered a record deficit of US\$9.34 billion as shown in the above table.

Major trading partners for export in 1994 were USA and Japan. Following them, Singapore, Hongkong, Germany, UK and The Netherlands recorded an annual export amount of more than US\$0.5 billion, as shown in Table A.4.11. Trade with these seven countries accounted for US\$10.36 billion or 77% of the total export of US\$13.48 billion in 1994. USA has been the most important partner for the Philippines, which kept the largest share for a long time as shown in the table.

In terms of import, USA kept the top position until 1991, as shown in Table A.4.11. Japan had kept the second position till 1991, but since 1992 it has kept the top position for the recent three years, as shown in the table. Accordingly, trade imbalance between the Philippines and Japan has increased from US\$0.60 billion in 1991 to US\$3.16 in 1994.

4.5 Family Income and Expenditure

Living conditions may be derived sketchily from family income and expenditure. As regards average family income, the regional annual averages in the region and the province were lower than the national average of 65,186 pesos in 1991, accounting for 86% and 89% of the national family income. This disparity between national and regional figures was not so much as that observed in the per capita GDP which was discussed in Chapter A.3.1.

Engel coefficient, which is a rate of food expenditure to total income, is said to characterize destitute living condition. The lower income family shows the higher coefficient. The coefficient of both the region and the province was calculated at 51%, referring to Table A.4.12. It was larger than that of the nation, 48%. Thus, the living condition in the region and the province may be more serious than the national average.

In the province, people spend 4.7% of the total expenditure or 2,100 pesos per month for clothes and wears. If they stocked these materials, value of which are equivalent to a half year expenditure, their value could be estimated at 12,600 pesos. Besides, they also have to stock some food stuff for daily use. If they have their food stock of three days, it could amount to

2,000 pesos. Accordingly, an average family might stock 14,600 pesos of foodstuffs and clothes.

Housing expenses of the national average accounted for 22% of the total family expenditure, which is higher than those of the region (19%) and of the province (14%). This means that although the national level goes into diversified spending stage and approaches the international level, the regional level still stays at the same stage or goes into the diversified spending stage at a slack pace. Thus, the housing conditions might not proceed to a high standard level abruptly.

4.6 Price Indices

Table A.4.14 shows price indices in the metropolitan area from the year 1990 to 1997. The wholesale price index of construction materials increased from 157.5 (Base: 1985=100) in 1990 to 219.4 in April 1997, up by about 139% in the past eleven years.

Average inflation rates of the country, the region and the province are shown in Table A.4.13. In the province, the inflation rate was 12.9% in 1995 and 17.3% between January and July in 1996. However, the rate has calmed down in the second half of 1996. The highest monthly rate of 23.2% was recorded in May, but in July the rate went down to 6.5%, as shown in the table. In 1997, the inflation in the province has kept a low rate of 0.8% per annum in the first half-year.

Table A.4.15 shows the monthly exchange rate of pesos per US\$ from 1987 to 1997 and the annual average. The value of the peso dropped from 20.48 pesos per US\$ at the beginning of 1987 to 26.37 pesos in April 1997.

CHAPTER V INFRASTRUCTURE

5.1 Educational Facility

As of school year 1994-95, educational facilities are as follows:

Level	Philippines	Ilocos Norte	Laoag River Basin
Pre-school	6,362	101	65
Elementary	35,671	360	187
Secondary	6,055	63	32
Tertiary	2,457	10	4

Table A.5.1 shows the detailed distribution of these facilities. On the average, the rates of elementary schools to population was 5.2 schools per 10,000 people in the country, but 6.9 schools per 10,000 in the Laoag River Basin. Thus, the primary school density in the basin is larger than that in the national average. In the same manner, the national average of secondary and tertiary schools was 0.88 and 0.35, and the basin average was 1.43 and 0.24. Accordingly, the school density per people in the basin was larger for primary and secondary schools than that of the country, but smaller for tertiary school.

5.2 Medical Facility

Table A.5.2 shows the distribution of medical facilities such as hospitals, barangay health stations and rural health units in the Philippines and in the Laoag river basin. They are summarized below.

Facility	Philippines	Ilocos Norte	Laoag River Basin
Hospital	1,632	19	13
Barangay Health Station	11,072	100	54
Rural Health Unit	2,327	26	13

Although hospitals are managed by both public and private entities, other facilities such as barangay health station and rural health unit fall under the jurisdiction of LGUs in general. In the basin, there are six public hospitals and seven private hospitals. Rural health unit is usually located in a municipal center and barangay health station is located in a barangay center area or sometimes absorbed in a barangay hall.

In terms of bed capacity of hospitals, the basin's 0.9 bed per 1,000 people appears backward as compared with the national average of 1.1 bed. Even the national average is still lower than the recommended level of 5 beds per 1,000 people.

5.3 Road

As of 1994, the existing road network was 160,900 km in the country. In Ilocos Norte Province, there were 3,300 km of roads, as shown in Table A.5.3. The road density in the province, i.e., the total length of road to the total land area, was 982 m/km², which was denser than the national average of 536 m/km².

Concrete surface road is resistant to flood damage. The total length of this type in the province was 320 km or 9.6% of the total length in 1994, larger than that of national composition of

8.4%. On the other hand, the length of asphalt surface road, vulnerable to flood, was 154 km or 4.6%, which was smaller than that of 8.1% in the country.

5.4 Water Supply

The waterworks system is classified into three levels, namely; (a) Level 1, indicating a service level by a point source such as protected well and spring with an outlet and no distribution system; (b) Level 2, indicating a communal faucet system; and (c) Level 3, referring to a piped system connected to individual consumers.

The coverage of households served by these three levels was 36% throughout the country in 1990. In the region, this rate was 59%, as shown in Table A.5.4. However, the data of Level 1 and 2 in the basin are not available, so the total coverage is not known. According to LWUA, there were six service systems of Level 3 in the province in 1995. They cover around 65,000 people, accounting for 66% of the total provincial population. Taking this into account, the coverage of water supply in the basin might be fairly higher than the national and regional average.

5.5 Electrification

The electrification program for the country, the region and the province are shown in Table A.5.5. In the province, while electrification coverage in the municipal and barangay levels is sufficient, individual connections are somewhat deficient (94%), as seen in the table. This electrification situation is fairly better than the regional status and much better than the national one.

Although the coverage of individual connection was 82,000 families or 94% of the program coverage in the province, there may be about 100,000 households in 1996 so the real coverage is around 82%. Virtually, rural houses could not be reached by electricity distribution network. In the habitual inundation areas, there are no such houses. In other words, all existing houses are covered by the electricity distribution system.

5.6 Communications

Telephone service penetration in the province is quite behind the expected level. This is quite different from electrification. Telephone density, i.e., the number of connections per 100 persons, is 1.11, as shown in Table A.5.6. This figure is better than the regional rate, but worse than the national average of 2.01. Incidentally, the regional density in NCR is 8.31.

CHAPTER VI PUBLIC FINANCE

6.1 National Revenue and Expenditure

The national government has suffered major fiscal deficits. Table A.6.1 shows revenue and expenditure of the national government for the recent six years. For 1995 the government proposed a sharp rise in tax receipt to 310 billion pesos and also had a rise in spending on public services. As a result, it caused a deficit of 24 billion pesos, although this deficit was a sharp decline from 37 billion pesos in 1994. The revenue rise was achieved by value-added tax (VAT) which was projected to bring in some 7 billion pesos for a full year of 1994.

The total expenditure of the national government has nominally increased from 256 billion pesos in 1990 to 385 billion pesos in 1995. On the other hand, the ratio of this expenditure to GDP has gradually decreased from 24% in 1990 to 20% in 1995 as shown in the table below. This is the result of privatization promotion and cutback in public spending.

(Unit: Billion Pesos)						
Item	1990	1991	1992	1993	1994	1995
GDP	1,077	1,248	1,351	1,474	1,693	1,906
Expenditure	256	299	308	314	374	385
Percentage (%)	24	24	23	21	22	20

In terms of economic services shown in Table A.6.1, the water resources and flood control subsector is the related item to this project. The total amount disbursed for the subsector rose from 3.8 billion pesos in 1990 to 4.8 billion pesos in 1992. Since 1993 it has stagnated at a range of 3 to 4 billion pesos, in spite of the fact that total expenditure has steadily increased for six years as shown in the table. As a result, the share of this subsector to the total expenditure dropped from 1.5% in 1990 to less than 1.0% in 1995.

Table A.6.2 shows the financial statement of the provincial government of Ilocos Norte between 1990 and 1995. The total expenditure has undergone changes from 24 million pesos in 1990 to 146 million pesos in 1996. The ratio of these expenditures to the national has grown from 0.009% in 1990 to 0.038% in 1995. The local government has very minimal investment for flood control projects, but takes an important role in relief and evacuation of victims of flood disasters.

6.2 National Expenditure for Flood Control Project

The annual budget for the construction and maintenance of flood control projects is summarized in Table A.6.3. The record shows the annual budget of the country, Ilocos Norte Province, Region I and other Regions from 1990 to 1996. Moreover, the investment program allocated the amount of 3.5 billion pesos in 1997, 5.3 billion pesos in 1998 and 36.9 billion pesos beyond 1998. These figures were based on the "DPWH Medium-Term Public Investment Program (1993-1998)". For Ilocos Norte Province, the budget will be 800 million pesos after 1997, as shown in the table.

Table A.6.4 shows the actual disbursement of DPWH for flood control projects during the past six years from 1990 to 1995. The total investment for Region I was 284 million pesos during the six years, although the budget appropriated was 633 million pesos for the same period. Thus, about 45% of the budget was actually disbursed. On the other hand, the total investment

nationwide was 9.76 billion pesos for six years. The budget allocated was 11.19 billion pesos, so 87% of the budget was disbursed during the said period.

CHAPTER VII PROJECTION OF FUTURE SOCIO-ECONOMIC STRUCTURE

7.1 Medium-Term Development Plans

“Medium-Term Philippine Development Plan for 1993-1998” presents the national economic development policy to support the long-term goals of poverty alleviation and improved income and wealth distribution. The major macro-economic objectives in the medium-term plan are: (a) a sustained and broad growth of output and employment; (b) price stability; and (c) a sound balance of payments position.

The Medium-Term Philippine Development Plan proposes the macro-economic goals and target figures. They are essential information to project the future socio-economic frame for the current study. The targets of GNP and G(R)DP during the period are proposed as follows. In this study these target figures are applied to project the future framework, although the target year of the plan is 1998, only two years more.

Item	1993	1994	1995	1996	1997	1998	Average
GDP Growth Rate (%)							
High Scenario	-	4.4	6.2	7.2	8.5	9.8	7.2
Low Scenario	-	3.4	4.1	5.0	7.4	8.1	5.6
Actual * ¹	2.1	4.4	4.8	-	-	-	-
GRDP Growth Rate (%)							
High Scenario	-	4.5	5.9	5.7	6.6	8.3	6.2
Low Scenario	-	3.5	4.3	4.0	5.7	6.9	4.9
Actual * ¹	2.7	6.7	7.7	-	-	-	-

Remark: *¹ Refer to Table A.3.5

The actual GDP growth rates up to the year 1995 were somewhat lower than the high scenario, but clearly higher than the low scenario, as shown the above table. The actual GRDP growth rates of Region I were much higher than the high scenario. This means that the economic activities recovered to the ordinary economic level, because the economic performance in 1991 and 1992 was negative as shown in Table A.3.5. In fact, the average growth rates between 1991 and 1995 were 2.2% for the whole country, 2.0% in Region I.

In 1996, the government revised the plan as “Updated Medium-Term Philippine Development Plan 1996-1998”. Corresponding to this updated plan, NEDA Region I also provided the “Updated Regional Development Plan, Region I, 1995-1998”. According to these updated plans, the GDP and GRDP were projected as follows:

Item	1995	1996	1997	1998	Average('96-'98)
GDP Growth Rate (%)					
High Scenario	-	6.8	7.8	8.3	7.6
Low Scenario	-	6.0	7.1	7.8	6.9
Actual * ¹	4.83	-	-	-	-
GRDP Growth Rate (%)					
Target	7.54	8.21	8.85	9.65	8.90
Actual * ¹	7.74	-	-	-	-

Remark: *¹ Refer to Table A.3.5

According to a news medium, it is said that the GDP growth in 1996 could attain at more than 7%, which is more than the above national high projection of 6.8%. The Philippines' economy is projected to keep up a durable growth for the time being. Taking this information into consideration, the high scenario of the updated growth projection could be applied to the current study as a scenario.

In addition to the Medium-Term Plan, the Government is preparing to proclaim the long-term development plan. It is named as "The Philippines in the 21st Century: A Development Vision and Framework for the Next Generation". However, it is still under discussion. It will propose a national macro-economic targets and goals for the proposed terms.

7.2 Population Projection

The NSO provides population projections for the country and for its subdivisions down to regional level during the period 1990 to 2020 in the publication called "Philippine Population Projection 1990-2020." These projections were based on the results of the 1990 census.

In 1995, however, the new census was conducted and the final figures were published in December, 1996. Based on these figures, NSO provides the population projected up to the year 2020, which is broken down to the regional level. NEDA Region I made a population projection down to the municipal lever and provide it to the JICA study team in June 1997. In this study, the future population in the Laoag river basin is based on the NEDA projection.

Table A.7.1 shows the population projected up to the year 2020 at 10-year intervals. In 2020, the population in the country was projected at 106 million, which was based on the NSO projection. Its growth rate was 1.75% on average between 1995 and 2020. The rate is expected to decrease from the 2.45% between the 1990 and 1995 censuses.

The population of Ilocos Norte Province was estimated at 603,000 in 2020, as shown in Table A.7.1. Its growth rate was 0.89% on average between 1995 and 2020, which was much smaller than that of the country. On the other hand, the population of the Laoag River Basin consisting of one city and ten municipalities was estimated at 337,000 in 2020. The growth rate was 0.87% on average between 1990 and 2020. The rate was somewhat smaller than that of the province.

In planning, however, the population projected on the basis of household population is generally used instead of total population which is mentioned in the above paragraphs. In this context, the population in eleven LGUs of the basin was estimated at 336,000 in 2020, as shown in Table A.7.1. The growth rate was the same 0.87% on average between 1995 and 2020. The population within the basin boundary was estimated at 247,000 in 2020. Its growth rate was 0.9% on average.

7.3 GDP and GRDP Projection

The long-term projection of GRDP is indispensable for formulating the future framework of the socio-economic structure in the project site. Official GRDP projections in the Medium-Term Development Plans is described in Section 7.1. Based on the projections, the GDP and GRDP growths during plan period are set up into three scenarios, i.e., high, medium and low scenarios, as follows. In simplification of the study hereinafter, the medium scenario is placed in the main position and discussed other scenarios timely in sensitivity analysis:

Item	High Scenario	Medium Scenario	Low Scenario
GDP Growth Rate	7.60	7.20	5.60
GRDP Growth Rate	8.90	6.20	4.90

The plan period, however, is only to the year 1998. After that, no projection scenarios were suggested in any of the development plans, at present. Therefore, GRDP in the future is estimated on the following assumptions:

- (1) Till the year 1998, GRDP of Region I will increase at the growth rates predicted on the basis of the above scenarios.
- (2) Between 1998 and 2000, GRDP will grow at the same of the above rates.
- (3) Beyond the year 2000, GRDP will grow at three quarters of the rates applied in the above item (1) till the year 2010, and at a half of the rates till the target year 2020.

GRDP projected under the above assumptions are shown in Table A.7.2. By 2020, GRDP of Region I was projected as follows: (1) high scenario, P263 billion at 1995 constant prices, accounting for 3.8% of the national high projection; (2) medium scenario, P168 billion, accounting for 2.6% of the national medium projection; and (3) low scenario, P135 billion, accounting for 2.7% of the national low projection.

GRDP per capita in 2020 was calculated as follows: (1) high scenario, P49,400 at 1995 constant prices, equivalent to 3.2 times of that (P15,400) in 1995 and corresponding to 75% of the national high projection; (2) medium scenario, P31,600, 2.1 times of the 1995 level and corresponding to 51% of the national high projection; and (3) low scenario, P25,400, 1.6 times of the 1995 level and corresponding to 54% of the national high projection.

7.4 Public Expenditure for Flood Control

Inadequate public finance is said as one to the most serious constraints for project implementation in developing countries. In formulation of projects in the current study, this is also considered to play a serious role. Investment ceiling of public finance for projects is laid out by the government policy. In this context, the policy is the most important decisive factor for project formulation, which declared in the development plans and is usually piled on top of the accumulation of the past capital formation.

A public expenditure for development by the national government is estimated in the following assumptions and procedure:

- (1) The total expenditure by the national government increases in proportion to the GDP growth. Its rate is assumed to be 22.1%, referring to the past records between 1990 and 1995.
- (2) The economic sector's expenditure is assumed to be 21.1% of the total expenditure, referring to the past share of the national government financial statement and budget between 1990 and 1995.
- (3) 1.9% of the economic sector's expenditure or 0.4% of the total expenditure is spent for the capital investment of flood control schemes, referring to the past records.

Table A.7.3 shows the trend projection of public expenditure estimated applying the above assumptions. The public expenditure for flood control projects is expected to amount to 2.5 billion pesos in the year 2000, 3.8 billion pesos in 2010 and 5.9 billion pesos in 2020, in the case of the medium growth scenario of GDP. Its total amount accumulated from 1995 will be 8.8 billion pesos by 2000, 40.2 billion pesos by 2010 and 88.9 billion pesos by 2020.

Between 1990 and 1995, the national government spent around 6.5 billion pesos for flood control project, according to Table A.6.4. Of this total amount, only 0.2 billion pesos or only 3.1% was used for Region I. For Ilocos Norte Province, the national government invested 10 million pesos or 0.2% of the total amount. Once this percentage was applied for the projected expenditures above, 180 million pesos at 1995 prices could be invested for flood control projects in Ilocos Norte Province by the target year 2020.