

Gross Domestic Product

In 1989, the Gross Domestic Product (GDP) of Indonesia amounted to Rp. 166,330 billion at current market prices and at an average annual growth rate of about 15% for the period 1985-1989. The highest growth rate of 24.1% was attained by the manufacturing industrial sector (see Table 2-4). On the other hand, the real growth rate of the GDP of Indonesia was under 5% per annum during the same period.

The agricultural sector, which has the highest share in the GDP among all industrial sectors, contributed to the GDP with a share of 23.4% in 1989 and following the agricultural sector, the manufacturing industrial sector ranked second with a share of 18.4% of the GDP in the same year.

The per capita GDP at current market prices amounted to Rp. 819 thousand in 1988, on the increase by 50% from the Rp. 546 thousand in 1984. This growth corresponds to an annual rate of 10.8%, but the real growth rate was only 4.2% per annum (see Table 2-8). During the period 1984-1988, despite the GDP and other economic factors achieving a steady growth, the growth of per capita GDP was rather low. This matter seems to be due mainly to the relatively high growth in population.

Government Budget

Budget expenditure of the Central Government amounted to Rp. 38,165 billion in fiscal year 1989/1990, consisting of Rp. 24,331 billion for the routine sector and Rp. 13,834 billion for the development sector (see Table 2-5). The average annual growth rate of the entire budget expenditure was 13.7% during the period 1985/86- 1989/1990, and 19.5% for the routine sector and 6.2% for the development sector.

2.3 Regional Economy

Gross Regional Domestic Product

At current market prices, the Gross Regional Domestic Product (GRDP) of North Sumatra Province amounted to Rp. 7,592 billion in 1988 at an average annual growth rate of 17.1% (equivalent to the real growth rate of 6.5%) since 1983. This growth rate is fairly high compared with the GDP growth rate (13.1%) of the country as a whole, especially the sector of electricity, gas and water supply which indicated the highest average growth rate of 25.1% per annum for the period 1983-1988. The agricultural sector, which had a large share of 36.6% in the GRDP in 1988, also achieved the high growth rate of 19.6% during the same period. (See Tables 2-6 and 2-7).

The GRDP in the study area amounted to Rp. 2,765 billion at current market prices in 1988, achieving a high annual growth rate of 16.5% (the real growth rate of 6.3%) during the same period. The GRDP in Kab. Deli Serdang showed a high rate of 18.9% at current market prices and 8.2% (the real growth rate) at the 1983 constant prices. Details are given in Table 2-7.

The per capita GRDP at current market prices for North Sumatra Province grew from Rp. 390 thousand in 1983 to Rp. 759 thousand in 1988 which was somewhat low compared with the per capita GDP (Rp. 819 thousand) of the country as a whole. The average annual growth for the period 1983-1988 was the rate of 12.4% at current market prices and 3.8% at real growth rate (see Table 2-8).

In the study area, the per capita GRDP in 1988 at current market prices was Rp. 591 thousand for Kab. Deli Serdang, Rp. 997 thousand for Kodya. Medan and Rp. 895 thousand for Kodya. Tebing Tinggi, i.e., the per capita GRDP of Medan and Tebing Tinggi is 30% and 15% more than the per capita GDP for the country as a whole. During the period 1983-1988, the average annual growth rates of the per capita GRDP of Deli Serdang, Medan and Tebing Tinggi were 13.9%, 11.0% and 11.7% at current market prices and 5.0%, 2.5% and 4.1% at the 1983 constant prices, respectively (see Table 2-8).

Agriculture

(1) Major Food Crops

Typical food crops produced in North Sumatra Province and the study area are shown in Tables 2-9 and 2-10. In 1989, paddy produced was 2,541 million tons with a yield rate of 3.74 tons/ha in North Sumatra Province and 567 million tons with a yield rate of 4.12 tons/ha in Kab. Deli Serdang. The yield rate of paddy in North Sumatra was rather low compared with that in the country as a whole. On the other hand, the unit yield rate of maize, sweet potato and peanuts in North Sumatra Province indicated higher figures than the yield rate in the whole country every year for the period 1983-1988.

(2) Plantation Crops

North Sumatra Province is among the most developed regions in the country on the estate plantation which is represented by rubber and oil palm. Table 2-11 shows the planted area, production and yield rate of rubber and oil palm in North Sumatra Province, classified into three holders; small holders, private estates and estate enterprises.

Plantation statistics show that the total area of rubber plantation in 1989 was 647,068 ha, consisting of 325,540 ha for small holders, 208,634 ha for private estates and 112,894 ha for estate enterprises (II to IX). The oil palm plantation with the area of 569,871 ha is composed of 66,893 ha for small holders, 172,582 ha for private estates and 330,396 ha for estate enterprises.

In 1989, rubber production in North Sumatra Province amounted to 335,144 tons, consisting of 120,227 tons for small holders, 114,874 tons for private estates and 100,043 tons for estate enterprise, that is, the production shares by holder were 36%, 34% and 30%, respectively. The yield rate showed about 518 kg/ha on average of the whole in the same year, but for the small holders it was only 369 kg/ha, which was rather low compared with the yield rate (551 kg/ha and 886 kg/ha) of the other two holders.

On the other hand, the 1989 production of palm oil and palm kernel in North Sumatra Province showed 1,312,202 tons and 178,682 tons, respectively, and most of them were produced by private estates and estate enterprises, which accounted for 26% and 68% of the total production of palm oil and palm kernel. The yield rates of these crops in the small holders, the private estates and the estate enterprises were 1,117 kg/ha, 2,005 kg/ha and 2,698 kg/ha for palm oil, and 149 kg/ha, 273 kg/ha and 368 kg/ha for palm kernel, respectively. Details are given in Table 2-11.

Statistics of the estate enterprises (PTP II to IX) which have accounted for the greater part of plantation production show that the productions of palm oil and palm kernel increased at an average annual rate of 7.7% and 2.0%, respectively, during the period 1983- 1989. On the contrary, the production of rubber had decreased at an average annual rate of minus 1.0% during the same period, due to the decline in the world market of crude rubber (see Table 2-12).

In Kab. Deli Serdang, the plantation area in 1989 was 28,115 ha for rubber and 766 ha for oil palm, which corresponded to 8.6% and 1.1% of the plantation area in North Sumatra Province. The productions were 14,216 tons of rubber, 732 tons of palm oil and 257 tons of palm kernel. Details are given in Table 2-13.

Establishment and Employee

Table 2-14 shows the number of establishments and employees by industrial origin in North Sumatra Province and the study area. In 1986, North Sumatra Province had 326,839 establishments including the 141,273 establishments in the study area (except Kab. Simalungun), and the number of employees was 675,513 including the 323,932 in the study area. In either case, the study area had nearly a half of the number in North Sumatra Province.

In the same year, the distribution of establishments in the study area was 45,605 (32%) for Kab. Deli Serdang, 88,949 (63%) for Kodya. Medan and 6,719 (5%) for Kodya. Tebing Tinggi. The percent distribution for the number of employees was 30%, 66% and 4%, respectively.

In number of establishments by industrial origin, the sector of trade, hotel and restaurant ranked first among all sectors in either case of the North Sumatra Province and the study area, i.e., 208,711 (64 %) and 88,348 (63%) in 1986, respectively. In general, the scale of establishments is small, that is, the statistics show that in 1986 the average number of employees per establishment was 2.1 persons in North Sumatra Province and 2.3 persons in the study area. More details are given in Table 2-14.

Transportation (Road, Railway and Port)

(1) Road

Except railway transportation for oil and plantation crops, land transportation in the study area depends heavily on roads with the total length of 5,088 km in 1989. This consists of 156 km of national roads, 252 km of provincial roads and 4,680 km of kabupaten/kotamadya roads.

The national road, which runs through the study area from northwest to southeast, is among the most important trunks of transportation in North Sumatra Province. Based on the 1990 traffic survey of Bina Marga, the daily traffic volume of vehicles (except bicycles and tricycles) is estimated at over 30,000 at present on the route between Medan and Lubuk Pakam. All national and provincial roads are in good conditions with surface paved. In contrast to the national and provincial roads, the majority of kabupaten/kotamadya roads are still in unfavorable condition, i.e., in 1989 the paved roads were only 1,736 km in length which is only 37% (see Table 2-15).

(2) Railway

In 1990, the Indonesian State Railways had a track of 499 km in length in the Sumatra Province, composed of the main line of 359 km and some branch lines of 141 km in total length. Among them, 152 km of tracks are located in the study area as shown below:

Railways in the Study Area

Section	Length (km)
Medan - Tebing Tinggi (main)	86
Medan - Belawan (branch)	22
Medan - Batu (branch)	15
Tebing Tinggi - Dolok Merangir (branch)	29
Total	152

The main purpose of the existing railway is to transport plantation products from the production areas to the harbor of Belawan for export. Transport statistics of cargo and passenger by train in North Sumatra Province are given in Table 2-16.

In 1989, the transport of cargo amounted to 154 million ton-km, consisting of 117 million ton-km for plantation products, 22 million ton-km for oil and 15 million ton-km for other commodities, i.e., the proportions to the total transportation capacity were 76%, 14% and 10%. The average annual growth rates of commodity transport (ton-km) for the period 1984-1989 was 9.4% for the whole commodity, 11.1% for plantation products, 3.0% for oil and 8.5% for other commodities.

On the other hand, passengers transported by train showed 185.6 million million person-km in 1989, but the average annual growth rate was only 0.6% during the same period.

(3) Port

The study area has an international port, Belawan, which is located in the northern part of Medan City. In 1990, freight handled at the Belawan Port achieved 3.543 million tons (for international trade), consisting of 2.374 million tons of goods loaded (for export) and 1.169 million tons of goods unloaded (for import). The main goods loaded were plantation products such as palm oil and rubber, and the major goods unloaded were fertilizer, chemicals, building materials, and

transportation and telecommunication equipment. In addition to commodities for the international trade, a fair quantity of commodities for interior trade is loaded and unloaded at the Belawan Port.

Exports at the Belawan Port amounted to US\$1,372 million in 1990, on the increase at an average annual rate of 10.1% since 1985 owing to the increased production of plantation crops. On the other hand, imports came to an amount of US\$658 million in 1990 at a high average growth rate of 12.1% per annum for the same period due to increase in chemicals and manufactured goods (see Table 2-17).

Budget of Regional Government

Budget Expenditure of North Sumatra Autonomous Government amounted to Rp. 290,356 million in fiscal year 1988/89 at an average annual growth rate of about 16.1% during the period 1980/81 to 1988/89. This expenditure is composed of Rp. 245,681 million (85%) for routine work and Rp. 44,674 million (15%) for development. Both indicated average growth rates of 17.8% and 9.5% per annum, respectively, during the said period (see Table 2-18).

According to the financial information from the Provincial Government of North Sumatra, budget expenditures of both sectors of flood control and water resources development were about Rp. 7,100 million and Rp. 120 million, respectively, in fiscal year 1988/89. All budgets related to flood control were maintained exclusively by the national finance including foreign loan, and the budget of water resources development was composed of both national and provincial finances.

Expenditure, Wage and Prices

Results of the National Socio-Economic Survey in 1987 indicate that the per capita average monthly expenditure in North Sumatra Province was Rp. 32,684 for urban areas and Rp.19,272 for rural areas. In these expenditures the ratio of food and non-food was 57:43 for the urban areas and 74:26 for the rural areas. The figures present that expenditure cost is low and Engel's coefficient is relatively high, i.e., it shows that the living condition of inhabitants is not economically favorable.

The average wage in the Kab. Deli Serdang and Kodya. Medan at present is estimated at approximately Rp. 3,000 per day for unskilled labour and Rp. 5,000 per day for skilled labour, based on a standard wage by occupation published in fiscal year 1990/91 by the Public Works Service of North Sumatra Province. It appears that these wages would not be sufficient for improving the said unfavorable living condition, judging from the high rise in prices in recent years.

Table 2-19 shows consumer price indices in Medan and Jakarta for the period 1984-1989. During this period, the average annual rise rate of prices in Medan indicated 7.9% for general goods and 10.3% for food which were high rather than those in Jakarta.

Retail prices of individual commodities at the Medan market are given in Table 2-20. A high rise of retail prices is seen for almost all foods as well as textile, for example, the price of rice rose from Rp. 303.7/kg in 1984 to Rp. 570.9/kg in 1989 at an average annual rate of 13.5%.

With regard to food crops, the rise rate of producer prices was somewhat low compared with that of retail prices during the same period. For example, the price of dried paddy rose from Rp. 169.2/kg in 1984 to Rp.284.1/kg in 1989 and its average annual rise rate showed 10.9% for that period (see Table 2-21).

3. ADMINISTRATIVE ORGANIZATION AND INSTITUTION

3.1 Administrative Organization

Central Government

Indonesia is a republic based on the 1945 Constitution and is headed by a President. Departments or ministries in the Government of the Republic of Indonesia are led by Ministers who are responsible directly to the President. The ministries bear the responsibility for execution of government administration and formulation of national development policy, and have regional offices as execution bodies of the administration and policy. Fig. 3-1 gives a hierarchical structure of the governmental organizations from the central to the local units.

Besides the said ministries, the Republic of Indonesia has some governmental agencies such as BAPPENAS, BATAN, BKPM, LIPI and BULOG, at the central government level. These agencies are responsible directly to the President.

Local Government

Local Government is classified into four levels: Province (or Region), Kabupaten (or Kotamadya), Kecamatan and Desa (or Kelurahan).

(1) Provincial/Regional Government (Datil)

Regional administration is based on Law No. 5/1974 regarding the Basic Principle on Administration in the Region, and the territory of the Republic of Indonesia is divided into the Autonomous Region and the administrative territory, where the Autonomous Region is defined as an organization to implement the decentralization policy of the Government, and it is formed as "Daerah Tingkat I" and "Daerah Tingkat II".

On the other hand, the administrative territory is divided into provinces and a national capital city. Administratively, each province is composed of units called Kabupaten (District and Kotamadya (municipality), which are divided into smaller units called Kecamatan (Sub-District). The Provincial Government conducts home affairs, management and administrative tasks in the province, and in general it consists of the Chief of the Region (or Governor), his staff and advisors.

(2) Kabupaten (District)/Kotamadya (Municipality) Dati II

Kabupaten/Kotamadya (Dati II) is led by a Bupati or Walikota/Kepala Dati II, who is responsible to the President through the Governor/Kepala Dati I and the Minister of Home Affairs. The Bupati is supported and assisted by Dinas-dinas (or Services) and Bappeda Dati II.

(3) Kecamatan (Sub-District)

Administration of the Kecamatan is headed by a Camat (Chief of Kecamatan) who is directly responsible to the Bupati/Kepala Dati II. In case there is a municipality within the Kabupaten Dati II, the Camat in the municipality is subordinate to the Walikota.

(4) Desa (Village) and Kelurahan (Town)

Desa is the lowest administrative unit in the rural area and is directly led the Camat of the Kecamatan. On the other hand, Kelurahan is the lowest organization in the urban area, and Lurah, the chief of the Kelurahan, is responsible to the Bupati/Walikota/Dati II via the Camat.

Ministry of Public Works

The Ministry of Public Works in the Central Government was set up under Presidential Decree No. 44/1974. The organizational structure was later modified by Presidential Decree No. 15/1984 regarding the organization of Ministries (see Fig. 3-2). The Decree of the Minister No. 211/1984 covers the basic tasks and functions of the Ministry as a governmental organization to undertake development projects. The tasks cover three fields as follows:

- (a) The administration and development of water resources are carried out by the Directorate General of Water Resources Development (DGWRD).
- (b) The administration and development of roads, bridges and highways are carried out by the Directorate General of Highways (DGH).
- (c) The administration and development of human settlement, sanitation, water supply and environment are carried out by the Directorate General of Cipta Karya (DGCK).

The Directorate General of Cipta Karya has common duties on regulation, control and development, that is,

- (a) Regulation (Pengaturan) is interpreted to cover all activities related to planning, creation, implementation and enforcement of the laws and regulations.
- (b) Control (Pembinaan) is interpreted to control on public structures and facilities to meet the public needs so as to give sufficient legal basis.
- (c) Development (Pembangunan) is interpreted to develop structures and other public facilities which could be exploited and maintained to become more effective and efficient.

The composition and functions of offices under the Ministry of Public Works are as follows.

(1) Directorate General of Water Resources Development (DGWRD)

According to the Decree of the Minister No. 211/1974, the organization of DGWRD is composed of one Director General, one Secretariat and six Directorates; Directorate of Planning and Programming, Directorate of Irrigation 1, Directorate of Irrigation 2, Directorate of Rivers, Directorate of Swamp, and Directorate of Equipment and Stocks. The functions of the DGWRD are:

- (a) to formulate technical policy and legislation, and to issue licenses in accordance with the Minister's policy based on the prevailing regulation;
- (b) to implement legislation, control and development of water resources according to the policy of the Government; and
- (c) to execute technical security within the framework of the main task of the DGWRD based upon the Minister's policy and the prevailing legislation.

The DGWRD has two directorates, the Directorate of Planning and Programming and the Directorate of Rivers. The Directorate of Planning and Programming has special tasks on:

- (a) development programme of water resources and river basins;
- (b) project evaluation;
- (c) coordination for intersectoral programs;
- (d) Administration of foreign funds; and
- (e) Planning for water resources development projects.

Development programmes of water resources and river basins fall under the responsibility of the Sub-Directorate of River Basin Development Planning which consists of a Survey Section and three regional sections. The main tasks of this Sub-Directorate is to carry out master plan and feasibility studies on river basins including groundwater exploitation and flood protection studies.

The Directorate of Rivers directly concerns with river development, and the specific tasks of the Directorate are technical planning and designing, implementation of works, and operation and maintenance of river facilities. Further, the Directorate of Rivers also carry out feasibility studies on river basin development including flood control projects.

(2) Directorate General of Cipta Karya (DGCK)

The Directorate General of Cipta Karya is composed of one Director General, one Secretariat and the following six Directorates:

- (a) Directorate of Planning and Programming
- (b) Directorate of City and Regional Planning
- (c) Directorate of Housing
- (d) Directorate of Building

- (e) Directorate of Environmental Sanitation
- (f) Directorate of Drinking Water

The Directorate of Drinking Water consists of five Sub-Directorates; namely,

- (a) Sub-Directorate of Technical Planning and Design, which formulates drinking water projects;
- (b) Two Sub-Directorates, which execute water supply projects in regions concerned;
- (c) Sub-Directorate of Equipment and Stock, which deals with financing including foreign currency; and
- (d) Sub-Directorate of Legislation, which deals with the preparation of laws, government regulations and ministerial decrees for water supply.

3.2 Laws and Regulations on Water

Law No. 11/1974 on Water Management

This Law gives the general prescription on Water Resources Development, and is based on the following considerations:

- (a) Water and water resources have a social function and shall be utilized for the welfare and prosperity of people.
- (b) In view of their beneficial character, water and water resources shall be controlled by the state. The control shall be executed by both central and local governments.

The Law prescribes the management of water and water resources as follows:

- (a) The Government's power to control water and water resources may be delegated to corporate bodies in accordance with conditions and procedures specified by the Government.
- (b) The water resources management includes the following categories:
 - Irrigation; use of surface and ground water for agricultural purposes.
 - Swamp area development; use for agriculture.
 - Flood control and river improvement.
 - Domestic water supply and water pollution control.
- (c) Delegation of powers to specific corporate bodies intends to encourage the community to participate in conservation, development and utilization of water and water resources.

- (d) The Minister in charge of water affairs shall be responsible and empowered to coordinate all matters relating to planning, technical design, supervision, exploitation, maintenance, and conservation of water and water resources, subject to the interests of other ministries and agencies concerned.
- (e) The government shall establish the specific water management policy with respect to management of rivers and irrigation. The minister may delegate the authority to the local governments for rivers in their own regions.
- (f) Water may be used without permit for daily purpose of people, but the permit is required for all other uses.
- (g) Operation and maintenance cost (O&M cost) of water structures for the purpose of public safety and welfare such as flood protection shall be borne by:
 - Local Government concerned, if the water structure is located within the territory of the local government.
 - Central Government, if the water structure is under the jurisdiction of the Central Government.
- (h) The O&M cost of water structures, which give direct benefit to the public and were constructed by the central and local governments and other public authorities, shall be borne by the community which receive the benefit.
- (i) The O&M cost of water structures constructed by the community, shall be borne by the community.
- (j) The construction cost of water works and structures, for the purpose of public safety and welfare and for direct benefit to a certain community, shall be borne by the central government and/or the local government in accordance with their responsibilities.
- (k) The community may participate in the development within their interest and capability. The central government may also give assistance to the community to cover the development cost for industrial, municipal and drinking water supplies.
- (l) Construction works of water facilities shall be provided as follows:
 - In the case of a particular purpose of a community, corporation, association or beneficiaries, these shall participate in the works.
 - In the case of purposes related to public safety and welfare, the works shall be undertaken by the central or local government.

- (m) Water, water resources, water works and structures shall be permanently conserved and protected in order to maintain their social functions.
- (n) Communities benefited directly from the existing water works and structures may be required to share the management costs.

Government Regulation No. 22/1982 on Water Management

This regulation prescribes the management of river water and basin as follows:

- (a) Control of the state on river basins in the region may be delegated to the regional government in the form of co-management concept, but remains under ministerial responsibility where the river basin covers more than one region.
- (b) The Minister of Public Works is obliged:
 - to regulate the utilization of water and water resources;
 - to operate the water construction works;
 - to collect data on quality and quantity of water and water resources; and
 - to formulate water resources development plans and waste water regulations.
- (c) The Minister may delegate the jurisdiction to the regional government for rivers in the region.

Government Regulation No. 14/1987 on Water Management

This Regulation prescribes the transfer of a part of water management from the central government to the regional level. Public works affairs in the field of water resources management can be transferred to Regional Level I and Level II. The transfers to the Regional Levels I and II are on irrigation and the establishment of the Water Users Association, respectively.

The transferred functions to Regional Level I are to formulate the irrigation water plans to meet the needs of the region, under approval of the Minister of Public Works, and to give permits for the use of irrigation water.

The transferred functions to Regional Level II are to establish and to develop the Water Users Association which is entrusted organizationally, technically and financially with the capacity and obligation to develop, rehabilitate, operate and maintain irrigation systems within its territory.

Ministerial Regulation No. 39/1989 and Other Regulations on Rivers

Ministerial Regulation No. 38/1989 and the other regulations pertain to rivers including river classification as follows:

- (a) It is necessary to establish a river basin classification, in order to guarantee the conservation, development and utilization of river water in one region or more for obtaining the maximum benefit for the general public.
- (b) The criteria for determining the classification of rivers are based on hydrologic, government administrative and planning conditions.
- (c) The 90 river basins in Indonesia can be reclassified if necessary.
- (d) The river as a water source has multipurpose functions and is under the jurisdiction of the Ministry of Public Works. A river flowing across more than one Region of Tingkat I Level is classified as Class A, and rivers flowing in one region of Tingkat I Level are dealt with as Class B, unless such rivers are of national interest.
- (e) The development of river basin in one province is delegated to the Provincial Government under a co-management concept, while the development of a river basin extending in more than one province is under the responsibility of the Central Government assisted by a technical executive body. Nevertheless, the development of river basin can be delegated to a certain legal body in either Class A or B.

Government Regulation on Drinking Water Supply

Drinking water supply is one of the responsibilities of the Directorate General of Cipta Karya (DGCK) and handled by the Directorate of Water Supply in the DGCK, under the Decree of the Minister of Public Work No. 211/1984. The tasks of the Directorate of Water Supply are as follows:

- (a) Formulation of Water supply plan;
- (b) Implementation and supervision of water supply works;
- (c) Procurement of Equipment; and
- (d) Proposal of Water supply regulations.

For the drinking water demand of inhabitants in the region, the Bupati/Walikota/Dati II sends the project proposal to the DGCK, and copies of the proposal are sent to the Minister of Home Affairs and to the Governor of the Province Dati I.

The drinking water supply project is managed and financed by the Central Government, and after completion of the project the Badan Pengelola Air Minum (BPAM) will temporarily manage the water supply within five years until the revenue from the project is able to cover the O&M cost. The BPAM, which reaches its capacity of providing funds for the O&M cost, could transfer the tasks of development and staff training to the Kabupaten/Kotamadya. After that time, the Bupati or Walikota/Dati II will establish Perusahaan Daerah Air Minum (PDAM) or a drinking water company owned by the Regional Government as one of the BUMD (Badan Usaha Milik Daerah) in the Kabupaten/Kotamadya.

The water supply administration is basically prescribed by the Joint Decree of the Minister of Home Affairs and the Minister of Public Works and the Decree of the Minister of Public Works, as follows:

- (a) The Joint Decree, No. 3/1984, No. 26/KPTS/1984 on Procedures to propose the Water Supply Installation, to carry out the Temporary Management and to transfer the Management to the Regional Government.
- (b) The Joint Decree, No. 4/1984, No. 27/KPTS/1984, on Establishment of the Regional Water Supply Enterprises (PDAM).
- (c) The Joint Decree, No. 5/1984, No. 28/KPTS/1984, on Guidelines of Organization, Accounting System, Operation and Maintenance Techniques, Structure and Calculation of Water Supply Tariff, Water Supply Services to Customers, Water Supply Management in Kecamatan Capital and Public Water Tap Management, for the PDAM and the BPAM.
- (d) The Decree, No. 269/KPTS/1984, on the Establishment of Water Supply Agency (BPAM).

TABLES

Table 1-1 CENSUS POPULATION IN THE STUDY AREA,
NORTH SUMATRA PROVINCE AND INDONESIA

(Unit : 1,000 persons)

Administrative Units	Population				Average Annual Growth Rate (%)		
	1961	1971	1980	1990	1961- 1971	1971- 1980	1980- 1990
Indonesia	97,085	118,368	147,490	179,322	2.10	2.32	1.97
North Sumatra Province	4,965	6,622	8,361	10,256	2.95	2.60	2.06
Study Area	-	2,233	2,870	3,629	-	2.83	2.37
Kab. Deli Serdang	972	1,431	1,241	1,603	3.99	-1.55	2.59
Kab. Simalungun *1	-	136	158	178	-	1.68	1.23
Kodya Medan	479	636	1,379	1,731	2.90	12.99	2.30
Kodya Tebing Tinggi	26	30	92	117	1.47	2.69	2.40

Sources: - Hasil Sensus Penduduk 1990, Indonesia, Sumatera Utara,
Kab. Deli Serdang, Kodya. Medan and Kodya. Tebing Tinggi.
- Statistical Year Book of Indonesia, 1990, Biro Pusat Statistik.

Note : *1 Seven Kecamatan in the Study Area.

Table 1-2 AREA, POPULATION, POPULATION DENSITY, NUMBER OF HOUSEHOLD AND HOUSEHOLD SIZE ACCORDING TO THE 1980 AND 1990 CENSUSES OF INDONESIA, NORTH SUMATRA PROVINCE AND THE STUDY AREA

Region	Area (km ²)	Population ('000)		Population Density (Persons/km ²)		Number of Household ('000)		Average Household Size (Person/HH)	
		1980	1990	1980	1990	1980	1990	1980	1990
Indonesia	1,948,732	147,490	179,322	76	92	30,372	39,689	4.9	4.5
North Sumatra Province	71,680	8,361	10,256	117	143	1,548	2,023	5.4	5.1
Study Area	6,254	2,870	3,629	459	580	508	700	5.6	5.2
Kab. Deli Serdang	4,398	1,241	1,603	282	364	229	317	5.4	5.1
Kab. Simalungun *1	1,553	158	178	102	115	30	37	5.3	4.8
Kodya, Medan	265	1,379	1,731	5,204	6,532	233	324	5.9	5.3
Kodya Tebing Tinggi	38	92	117	2,421	3,079	16	22	5.8	5.3

Sources : Hasil Sensus Penduduk 1990, Indonesia, Sumatera Utara, Kab. Deli Serdang, Kodya. Medan and Kodya. Tebing Tinggi.

Note : *1: Seven Kecamatan in the Study Area.

Table 1-3 POPULATION AND NUMBER OF HOUSEHOLD BY
KECAMATAN IN THE STUDY AREA, 1990

Name of Kecamatan	Area (km ²)	Population	Population Density (Persons/km ²)	Number of Household	Average Size of Household	Number of Desa	
1. Kodya Medan							
1.1	Medan Kota	10	228,428	22,843	41,594	5.49	26
1.2	Medan Tuntungan	30	59,555	1,985	11,260	5.29	11
1.3	Medan Timur	12	214,023	17,835	41,090	5.21	18
1.4	Medan Sunggal	29	211,318	7,287	39,529	5.35	14
1.5	Medan Labuhan	78	106,579	1,366	20,030	5.32	7
1.6	Medan Deli	21	108,082	5,147	20,394	5.30	6
1.7	Medan Baru	18	159,565	8,865	30,809	5.18	18
1.8	Medan Denai	18	232,775	12,932	42,584	5.47	14
1.9	Medan Johor	28	159,382	5,692	30,318	5.26	11
1.10	Medan Barat	11	167,154	15,196	31,443	5.31	13
1.11	Medan Belawan	10	83,891	8,389	15,033	5.57	6
	Total	265	1,730,752	6,531	324,084	5.34	144
2. Kodya Tebing Tinggi							
2.1	Padang Hulu	12	41,883	3,470	7,890	5.31	7
2.2	Padang Hilir	13	31,526	2,494	5,767	5.47	5
2.3	Rambutan	13	43,340	3,302	8,239	5.26	5
	Total	38	116,749	3,085	21,896	5.33	17
3. Kab. Deli Serdang							
3.1	Gunung Meriah	77	3,094	41	697	4.44	12
3.2	STM. Hulu	223	8,699	37	1,908	4.56	20
3.3	Sibolangit	175	17,971	99	3,938	4.56	70
3.4	Kutalimbaru	180	23,362	127	5,027	4.65	80
3.5	Pancurbatu	123	47,961	348	9,793	4.90	59
3.6	Namorambe	62	17,444	251	3,577	4.88	36
3.7	Biru - biru	90	22,879	251	4,794	4.77	66
3.8	STM. Hilir	190	24,282	131	5,408	4.49	38
3.9	Bangun Purba	185	27,409	155	5,763	4.76	33
3.10	Kotarih	161	17,321	110	3,540	4.89	30
3.11	Dolok Masihul	198	50,216	256	10,211	4.92	29
3.12	Sipispis	223	35,000	162	7,173	4.88	20
3.13	Dolok Merawan	108	18,379	174	3,820	4.81	17
3.14	Tebing Tinggi	325	69,620	203	13,917	5.00	24
3.15	Bandar Khalifah	72	24,137	360	4,788	5.04	5
3.16	Tanjung Beringin	65	29,953	424	5,748	5.21	8
3.17	Teluk Mengkudu	80	33,091	375	6,548	5.05	12
3.18	Sei Rampah	278	95,793	322	19,463	4.92	27
3.19	Galang	187	71,869	364	14,650	4.91	38
3.20	Tanjung Morawa	132	111,349	666	21,383	5.21	23
3.21	Patumbak	47	34,522	578	6,612	5.22	8
3.22	Deli Tua	9	32,806	2,713	6,499	5.05	2
3.23	Sunggal	92	120,684	1,041	22,868	5.28	17
3.24	Hamparan Perak	230	98,153	399	19,025	5.16	20
3.25	Labuhan Deli	127	36,773	226	7,198	5.11	4
3.26	Percut Sei Tuan	191	197,193	865	37,304	5.29	19
3.27	Batang Kuis	40	30,035	633	5,921	5.07	11
3.28	Lubuk Pakam	31	65,100	1,779	12,277	5.30	13
3.29	Perbaungan	212	105,642	465	20,746	5.09	41
3.30	Pantai Cermin	87	33,432	345	6,566	5.09	12
3.31	Pagar Merbau	63	26,491	403	5,405	4.90	16
3.32	Beringin	53	39,265	692	8,087	4.86	11
3.33	Pantai Labu	82	32,224	377	6,221	5.18	19
	Total	4,398	1,602,149	364	316,875	5.06	840
4. Kab. Simalungun							
4.1	Dolok. Batu Nanggar	126	66,823	354	13,105	5.10	17
4.2	Purba	210	21,036	102	4,486	4.69	10
4.3	Raya	336	31,705	88	6,637	4.78	8
4.4	Silimakuta	146	16,235	111	3,430	4.73	7
4.5	Dolok Silau	288	9,746	38	2,302	4.23	6
4.6	Silau Kahean	221	15,417	67	3,318	4.65	5
4.7	Raya Kahean	226	17,292	72	3,319	5.21	5
	Total	1,553	178,254	115	36,597	4.87	58

Source : Hasil Sensus Penduduk 1990, Sumatera Utara,
Kab. Deli Serdang, Kodya. Medan and Kodya. Tebing Tinggi.

Table 1-4 POPULATION OF 10 YEARS AND OVER BY AGE GROUP AND LABOUR FORCE IN INDONESIA AND NORTH SUMATRA PROVINCE, 1989

Group	Ten Years and over	Active Economically			Not Active Economically			Labour Force	
		Working	Looking for Work	Total	School & House Keeping	Others	Total	Rate (%)	Non-job Population (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(6)=(5)/(2)	(7)=[(4)+(7)]/(2)
I. Indonesia									
10 - 14	22,609,020	2,921,946	33,572	2,955,518	18,925,292	727,210	19,653,502	13.07	3.36
15 - 19	19,429,946	7,403,548	465,193	7,868,741	10,185,563	1,375,642	11,561,205	40.50	9.47
20 - 24	13,626,774	7,803,787	1,060,381	8,864,168	3,906,259	856,347	4,762,606	65.05	14.07
25 - 29	12,791,042	9,107,260	337,883	9,445,143	3,058,854	287,045	3,345,899	73.84	4.89
30 - 34	12,225,004	9,290,798	114,772	9,405,570	2,657,311	162,123	2,819,434	76.94	2.26
35 - 39	10,917,397	8,844,603	60,275	8,904,878	1,933,648	78,871	2,012,519	81.57	1.27
40 - 44	8,703,636	6,915,606	35,161	6,950,767	1,635,291	117,578	1,752,869	79.86	1.75
45 - 49	8,663,876	6,976,490	29,902	7,006,392	1,472,027	185,457	1,657,484	80.87	2.49
50 - 54	7,105,783	5,475,030	16,357	5,491,387	1,242,666	371,730	1,614,396	77.28	5.46
55 - 59	5,170,051	3,861,987	9,898	3,871,885	840,536	457,630	1,298,166	74.89	9.04
60 - 64	4,246,875	2,721,269	17,158	2,738,427	645,632	862,816	1,508,448	64.48	20.72
65 over	6,159,353	2,582,184	0	2,582,184	663,413	2,913,756	3,577,169	41.92	47.31
Not stated	17,698	3,696	0	3,696	0	14,002	14,002	20.88	79.12
Total	131,666,455	73,908,204	2,180,552	76,088,756	47,167,492	8,410,207	55,577,699	57.79	8.04
II. North Sumatra Province									
	7,175,448	4,022,502	97,723	4,120,225	2,707,794	347,429	3,055,223	57.42	6.20

Source : Statistical Year Book of Indonesia, 1990, Biro Pusat Statistik.

Table 1-5 POPULATION PROJECTIONS FOR THE PERIOD 1995-2010

Region	Population ('000) 1995			Annual Growth Rate (%) 1990-1995		
	Case-1	Case-2	Case-3	Case-1	Case-2	Case-3
Study A.	4,070	4,082	4,048	2.32	2.38	2.21
D+M	3,753	3,761	3,730	2.40	2.44	2.27
Deli S.	1,818	1,821	1,806	2.55	2.59	2.42
Medan	1,935	1,939	1,923	2.26	2.30	2.13
Tebing T.	130	132	131	2.19	2.40	2.23
Simal.	186	189	188	0.93	1.23	1.06

Region	2000			1995-2000		
	Case-1	Case-2	Case-3	Case-1	Case-2	Case-3
Study A.	4,556	4,591	4,471	2.28	2.38	2.01
D+M	4,218	4,242	4,131	2.37	2.44	2.07
Deli S.	2,058	2,069	2,016	2.52	2.59	2.22
Medan	2,160	2,172	2,116	2.22	2.30	1.93
Tebing T.	144	148	144	2.05	2.39	2.02
Simal.	193	201	196	0.73	1.22	0.85

Region	2005			2000-2005		
	Case-1	Case-2	Case-3	Case-1	Case-2	Case-3
Study A.	5,092	5,165	4,892	2.25	2.38	1.81
D+M	4,735	4,784	4,531	2.34	2.44	1.87
Deli S.	2,327	2,351	2,227	2.48	2.58	2.01
Medan	2,408	2,433	2,304	2.19	2.29	1.72
Tebing T.	159	167	158	1.91	2.39	1.82
Simal.	199	214	202	0.53	1.22	0.65

Region	2010			2005-2010		
	Case-1	Case-2	Case-3	Case-1	Case-2	Case-3
Study A.	5,681	5,811	5,300	2.21	2.38	1.62
D+M	5,306	5,396	4,922	2.31	2.44	1.67
Deli S.	2,626	2,671	2,436	2.45	2.58	1.81
Medan	2,680	2,725	2,485	2.16	2.29	1.52
Tebing T.	173	188	171	1.77	2.39	1.62
Simal.	202	227	207	0.33	1.22	0.45

Note : Study A. : Study Area
D+M : Kab. Deli Serdang and Kodya. Medan
Deli S. : Kab. Deli Serdang
Medan : Kodya. Medan
Tebing T. : Kodya. Tebing Tinggi
Simal. : Seven Kecamatan in Kab. Simalungun shown
in Note of Table 2.2.1

Table 1-6 POPULATION PROJECTION, 2040

Region	Population ('000) 2040			Annual Growth Rate (%) 2010-2040		
	Case-1	Case-2	Case-3	Case-1	Case-2	Case-3
Study A.	11,009	11,808	8,587	2.23	2.39	1.62
D+M	10,495	11,102	8,075	2.30	2.43	1.66
Deli S.	5,418	5,730	4,170	2.44	2.58	1.81
Medan	5,077	5,371	3,905	2.15	2.29	1.52
Tebing T.	292	380	277	1.75	2.38	1.61
Simal.	222	326	236	0.31	1.21	0.44

Table 2-1 TREND OF EXTERNAL TRADE OF INDONESIA,
1980-1990

(Unit : Million US\$)

Year	Including Petroleum and Gas			Excluding Petroleum and Gas		
	Exports (2)	Import (3)	Balance (4)=(2)-(3)	Exports (5)	Import (6)	Balance (7)=(5)-(6)
1980	23,950.4	10,834.4	13,116.0	6,168.8	9,085.9	(2,917.1)
1981	25,164.5	13,272.1	11,892.4	4,501.3	11,550.4	(7,049.1)
1982	22,328.3	16,858.9	5,469.4	3,929.2	13,314.1	(9,384.9)
1983	21,145.9	16,351.8	4,794.1	5,005.3	12,207.0	(7,201.7)
1984	21,887.8	13,882.1	8,005.7	5,869.7	11,185.3	(5,315.6)
1985	18,586.7	10,259.1	8,327.6	5,868.8	8,987.5	(3,118.7)
1986	14,805.0	10,718.4	4,086.6	6,528.4	9,632.0	(3,103.6)
1987	17,135.6	12,370.3	4,765.3	8,579.5	11,302.3	(2,722.8)
1988	19,218.5	13,248.5	5,970.0	11,536.9	12,339.4	(802.5)
1989	22,158.9	16,359.6	5,799.3	13,480.1	15,164.4	(1,684.3)
1990	25,801.2	20,103.8	5,697.4	14,679.3	18,696.5	(4,017.2)

Source : Statistical Year Book of Indonesia, 1990, Biro Pusat Statistik

Note : Figure in parentheses indicate a negative value.

Table 2-2 EXPORTS BY COMMODITY GROUP, INDONESIA

(Unit : Million US\$)

Commodity Group	1985	1986	1987	1988	1989	1990
1. Food stuff & live animals	1,383.1	1,773.8	1,683.8	2,000.6	2,078.2	2,167.4
2. Beverages & tobacco	48.7	68.7	71.9	69.2	114.6	123.5
3. Raw materials in edible	1,403.1	1,473.1	1,925.9	2,660.9	2,796.5	2,046.7
4. Mineral fuels, lubricants & related materials	12,757.3	8,309.6	8,581.9	7,723.2	8,760.1	11,703.5
5. Animals & vegetable oils & fats	414.1	165.7	290.2	539.4	456.6	355.0
6. Chemicals	210.0	260.3	251.0	345.7	499.4	590.3
7. Manufactured goods	1,804.4	1,984.4	3,267.2	4,281.0	5,112.8	5,486.6
8. Machinery & transport equipment	98.0	62.6	57.1	126.2	202.0	359.1
9. Miscellaneous articles manufactured	437.1	678.0	731.8	1,154.3	1,882.6	2,823.9
10. Commodities not classified	30.9	28.8	274.8	318.0	256.1	145.2
Total	18,586.7	14,805.0	17,135.6	19,218.5	22,158.9	25,801.2

source : Statistical Year Book of Indonesia, 1990, Biro Pusat Statistik

Table 2-3 IMPORTS BY COMMODITY GROUP, INDONESIA

(Unit : Million US\$)

Commodity Group	1985	1986	1987	1988	1989	1990
1. Food stuff & live animals	556.1	610.0	623.8	642.0	910.9	963.4
2. Beverages & tobacco	20.9	28.1	32.6	34.4	33.6	54.8
3. Raw materials in edible	729.0	830.1	990.6	1,205.0	1,673.9	1,967.7
4. Mineral fuels, lubricants & related materials	1,287.7	1,106.9	1,144.0	959.0	1,252.6	1,227.4
5. Animals & vegetable oils & fats	35.5	17.9	96.9	176.7	150.5	29.4
6. Chemicals	1,916.6	1,909.7	2,325.9	2,541.2	2,873.4	3,448.6
7. Manufactured goods	1,717.9	1,668.3	1,784.9	2,061.8	2,638.0	3,266.7
8. Machinery & transport equipment	3,617.0	4,117.5	4,818.7	5,096.0	6,181.9	8,374.9
9. Miscellaneous articles manufactured	331.9	389.3	469.6	451.4	633.6	769.8
10. Commodities not classified	46.5	40.6	83.3	81.0	11.2	1.1
Total	10,259.1	10,718.4	12,370.3	13,248.5	16,359.6	20,103.8

Source : Statistical Year Book of Indonesia, 1990, Biro Pusat Statistik

Table 2-4 GROSS DOMESTIC PRODUCT (GDP) AT CURRENT MARKET PRICES
BY INDUSTRIAL ORIGIN, INDONESIA

(Unit : Rp Billion)

Industrial Origin	Year					Average Annual Growth Rate (%) (1985-1989)
	1985	1986	1987	1988	1989	
1. Agriculture, Forestry & Fishery	22,413.2 (23.7)	24,750.5 (24.1)	29,116.0 (23.3)	34,193.4 (24.1)	38,998.4 (23.4)	14.9
2. Mining & Quarrying	15,403.6 (16.3)	11,502.8 (11.2)	17,266.8 (13.8)	17,161.8 (12.1)	21,729.6 (13.1)	9.0
3. Manufacturing Industries	12,903.8 (13.6)	17,184.7 (16.8)	21,150.4 (16.9)	26,252.4 (18.5)	30,573.3 (18.4)	24.1
4. Electricity, Gas & Water Supply	781.3 (0.8)	647.1 (0.6)	746.9 (0.6)	869.0 (0.6)	1,008.3 (0.6)	6.6
5. Construction	5,301.8 (5.6)	5,313.8 (5.2)	6,087.4 (4.9)	7,169.2 (5.0)	8,884.2 (5.3)	13.8
6. Trade, Hotel & Restaurant	14,697.5 (15.5)	17,083.4 (16.7)	21,048.3 (16.9)	24,379.2 (17.2)	28,314.1 (17.0)	17.8
7. Transportation & Communication	6,050.5 (6.4)	6,406.9 (6.2)	7,442.6 (6.0)	8,139.6 (5.7)	9,085.0 (5.5)	10.7
8. Banking & Other Financial Intermediaries	2,802.4 (3.0)	4,058.8 (4.0)	4,795.1 (3.8)	5,322.4 (3.7)	6,550.8 (3.9)	23.6
9. Ownership of Dwelling	2,443.0 (2.6)	2,976.0 (2.9)	3,349.1 (2.7)	3,736.0 (2.6)	4,154.9 (2.5)	14.2
10. Public Administration & Defence	7,925.1 (8.4)	8,307.3 (8.1)	8,911.8 (7.1)	9,446.2 (6.7)	11,174.2 (6.7)	9.0
11. Services	3,998.6 (4.2)	4,314.6 (4.2)	4,902.5 (3.9)	5,351.1 (3.8)	5,856.7 (3.5)	10.0
G D P	94,720.8 (100)	102,545.9 (100)	124,816.9 (100)	142,020.3 (100)	166,329.5 (100)	15.1

Source : Statistical Year Book of Indonesia, 1988 & 1989, Biro Pusat Statistik.

Note : Figures in Parenthesis indicate distribution in percent.

Table 2-5 REALIZED BUDGET OF CENTRAL GOVERNMENT,
INDONESIA

(Unit : Rp Billion)

Year	Receipt			Expenditure		
	Routine	Development	Total	Routine	Development	Total
1985/86	19,252	3,572	22,824	11,951	10,873	22,824
1986/87	16,141	5,752	21,893	13,559	8,332	21,891
1987/88	20,803	6,158	26,961	17,482	9,477	26,959
1988/89	23,004	9,991	32,995	20,739	12,251	32,990
1989/90	28,740	9,429	38,169	24,331	13,834	38,165
Average Annual Growth Rate (%)	10.54	27.46	13.72	19.45	6.21	13.72

Source : Statistical Year Book of Indonesia, 1989 & 1990, Biro Pusat Statistik.

Table 2-6 GROSS REGIONAL DOMESTIC PRODUCT (GRDP) OF NORTH SUMATRA PROVINCE BY INDUSTRIAL ORIGIN AT CURRENT MARKET PRICES

(Unit : Rp Million)

Industrial Origin	Year						Average Annual Growth Rate (%) 1983-1988
	1983	1984	1985	1986	1987	1988	
1. Agriculture, Forestry & Fishery	1,135.2 (32.7)	1,407.0 (32.3)	1,580.0 (33.6)	1,790.9 (34.6)	2,311.4 (35.9)	2,779.2 (36.6)	19.6
2. Mining & Quarrying	187.8 (5.4)	277.8 (6.4)	240.7 (5.1)	181.4 (3.5)	206.2 (3.2)	196.5 (2.6)	0.9
3. Manufacturing Industries	466.2 (13.4)	636.5 (14.6)	700.9 (14.9)	803.9 (15.5)	999.4 (15.5)	1,220.3 (16.1)	21.2
4. Electricity, Gas & Water Suplay	25.0 (0.7)	35.8 (0.8)	46.3 (1.0)	55.1 (1.1)	63.7 (1.0)	76.6 (1.0)	25.1
5. Construction	158.9 (4.6)	172.2 (3.9)	174.9 (3.7)	179.6 (3.5)	194.9 (3.0)	225.0 (3.0)	7.2
6. Trade, Hotel & Restaurant	538.2 (15.5)	638.1 (14.6)	663.3 (14.1)	745.7 (14.4)	1,055.2 (16.4)	1,256.9 (16.6)	18.5
7. Transportation & Communication	371.3 (10.7)	456.4 (10.5)	498.7 (10.6)	530.7 (10.2)	590.3 (9.2)	689.5 (9.1)	13.2
8. Financial Inter- mediaries, Ownership of Dwelling and Business Services	211.6 (6.1)	256.1 (5.9)	288.8 (6.1)	322.9 (6.2)	392.2 (6.1)	451.3 (5.9)	16.4
9. Social Community & Personal Services	379.4 (10.9)	482.2 (11.1)	508.2 (10.8)	571.8 (11.0)	626.6 (9.7)	696.9 (9.2)	12.9
GRDP	3,473.6 (100.0)	4,362.1 (100.0)	4,701.8 (100.0)	5,182.0 (100.0)	6,439.9 (100.0)	7,592.2 (100.0)	17.1

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.

Note : Figures in parenthesis indicate distribution in percent.

Table 2-7 GDP OF INDONESIA, AND GRDP OF NORTH SUMATRA PROVINCE AND THE STUDY AREA

(Unit : Rp Billion)

Region	Year						Average Annual Growth Rate(%) (1983-1988)
	1983	1984	1985	1986	1987	1988	
I. At Current Prices							
Indonesia	-	87,054.8	94,720.8	102,545.9	124,816.9	142,020.3	13.1
		(-)	(8.8)	(8.3)	(21.7)	(13.8)	
North Sumatra Prov.	3,473.7	4,362.1	4,701.8	5,182.1	6,439.9	7,592.3	17.1
	(-)	(25.6)	(7.8)	(10.2)	(24.3)	(17.9)	
Study Area	1,294.8	1,583.8	1,717.1	1,917.1	2,384.0	2,765.1	16.5
	(-)	(22.3)	(8.4)	(11.6)	(24.4)	(16.0)	
Kab. Deli Serdang	379.8	487.4	546.4	614.6	774.1	893.7	18.9
	(-)	(28.3)	(12.1)	(12.5)	(26.0)	(15.5)	
Kodya. Medan	871.3	1,041.9	1,110.4	1,236.4	1,533.2	1,782.8	15.6
	(-)	(19.6)	(6.6)	(11.3)	(24.0)	(16.3)	
Kodya. tebing Tinggi	43.7	54.5	60.3	66.1	76.7	88.6	15.3
	(-)	(24.7)	(10.6)	(9.6)	(16.0)	(15.5)	
II. At 1983 Constant Prices							
Indonesia	-	78,144.4	80,119.6	90,013.6	94,517.8	99,936.0	6.4
		(-)	(2.5)	(12.3)	(5.0)	(5.7)	
North Sumatra Prov.	3,473.7	3,734.7	3,886.5	4,131.7	4,439.4	4,759.8	6.5
	(-)	(7.5)	(4.1)	(6.3)	(7.4)	(7.2)	
Study Area	1,294.8	1,377.2	1,428.7	1,524.3	1,654.2	1,756.0	6.3
	(-)	(6.4)	(3.7)	(6.7)	(8.5)	(6.2)	
Kab. Deli Serdang	379.8	422.2	453.9	496.9	536.6	562.7	8.2
	(-)	(11.2)	(7.5)	(9.5)	(8.0)	(4.9)	
Kodya. Medan	871.3	907.7	924.7	974.6	1,062.8	1,135.3	5.5
	(-)	(4.2)	(1.9)	(5.4)	(9.0)	(6.8)	
Kodya. Tebing Tinggi	43.7	47.3	50.1	52.8	54.8	58.0	5.8
	(-)	(8.2)	(5.9)	(5.4)	(3.8)	(5.8)	

Sources : Statistical Year Book of Indonesia, 1989 & 1990, Biro Pusat Statistik.
North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.

Note : Figures in parenthesis indicate a growth rate in percent every year.

Table 2-8 PER CAPITA GDP OF INDONESIA, PER CAPITA GRDP OF NORTH SUMATRA PROVINCE AND THE STUDY AREA

(Unit : Rp Thousand)

Region	Year					Average Annual	
	1983	1984	1985	1986	1987	1988	Growth Rate(%) 1983-1988
I. At Current Prices							
Indonesia	-	545.9	581.5	616.4	734.9	819.0	10.8
		(-)	(6.5)	(6.0)	(19.2)	(11.4)	
North Sumatra Prov.	389.8	478.0	503.1	541.7	657.8	758.6	12.4
	(-)	(22.6)	(5.3)	(7.7)	(21.4)	(15.3)	
Study Area							
Kab. Deli Serdang	281.7	352.9	386.4	422.0	526.1	590.5	13.9
	(-)	(25.3)	(9.5)	(9.2)	(24.7)	(12.2)	
Kodya. Medan	566.4	661.4	688.3	740.1	886.0	996.8	11.0
	(-)	(16.8)	(4.1)	(7.5)	(19.7)	(12.5)	
Kodya. Tebing Tinggi	471.6	575.2	620.7	675.3	775.7	894.5	11.7
	(-)	(22.0)	(7.9)	(8.8)	(14.9)	(15.3)	
II. At 1983 Contans Prices							
Indonesia	-	490.0	491.8	541.0	556.5	576.3	4.2
		(-)	(0.4)	(10.0)	(2.9)	(3.6)	
North Sumatra Prov.	389.8	409.3	415.9	431.9	453.5	475.6	3.8
	(-)	(5.0)	(1.6)	(3.8)	(5.0)	(4.9)	
Study Area							
Kab. Deli Serdang	281.7	305.7	321.0	341.2	364.7	371.8	5.0
	(-)	(8.5)	(5.0)	(6.3)	(6.9)	(1.9)	
Kodya. Medan	566.4	576.2	573.2	583.4	614.2	634.8	2.5
	(-)	(1.7)	0.5	(1.8)	(5.3)	(3.4)	
Kodya. Tebing Tinggi	471.6	498.6	516.2	540.1	553.9	585.3	4.1
	(-)	(5.7)	(3.5)	(4.6)	(2.6)	(5.7)	

Sources : - Statistical Year Book of Indonesia, 1989 & 1990, Biro Pusat Statistik.
 - North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.
 - Deli Serdang Dalam Angka, 1988 & 1989, Kantor Statistik Kab. Deli Serdang.
 - Kotamadya Medan Dalam Angka, 1988 & 1989, Kantor Statistik Kotamadya Medan.
 - Tebing Tinggi Dalam Angka, 1989, Kantor Statistik Kodya Tebing Tinggi.

Note : Figures in parenthesis indicate a growth rate in percent every year.

Table 2-9 AREA HARVESTED, PRODUCTION AND YIELD RATE OF
MAJOR FOOD CROPS IN NORTH SUMATRA PROVINCE

Crops	1984	1985	1986	1987	1988	1989
1. Paddy						
Area harvested(1.000 ha)	583.06	612.35	582.46	656.65	672.89	679.42
Production (1.000 tons)	2,022.00	2,148.92	2,067.88	2,319.19	2,482.94	2,540.87
Yield rate(tons/ha)	3.47	3.51	3.55	3.53	3.89	3.74
2. Wet land Paddy						
Area harvested(1.000 ha)	496.25	525.43	505.83	569.45	592.78	599.52
Production (1.000 tons)	1,843.08	1,977.87	1,913.33	2,152.15	2,318.14	2,369.84
Yield rate(tons/ha)	3.71	3.76	3.78	3.78	3.91	3.95
3. Dray land Paddy						
Area harvested(1.000 ha)	86.81	86.92	76.52	87.20	80.11	79.90
Production (1.000 tons)	178.92	171.06	154.50	167.05	164.80	171.03
Yield rate(tons/ha)	2.06	1.97	2.02	1.92	2.06	2.14
4. Maize						
Area harvested(1.000 ha)	33.85	46.91	58.87	63.79	82.76	86.82
Production (1.000 tons)	64.35	90.68	109.37	140.68	168.28	175.99
Yield rate(tons/ha)	1.90	1.93	1.86	2.21	2.03	2.03
5. Cassava						
Area harvested(1.000 ha)	21.88	19.02	19.79	20.82	26.77	37.88
Production (1.000 tons)	255.96	230.12	247.36	245.17	327.66	488.69
Yield rate(tons/ha)	11.70	12.10	12.50	11.80	12.24	12.90
6. Sweet potatoes						
Area harvested(1.000 ha)	15.86	14.84	14.34	13.66	16.00	18.61
Production (1.000 tons)	147.53	137.99	131.88	129.79	155.44	182.94
Yield rate(tons/ha)	9.30	9.30	9.20	9.50	9.71	9.83
7. Peanuts						
Area harvested(1.000 ha)	11.84	13.08	12.24	18.97	24.64	26.81
Production (1.000 tons)	13.23	15.45	14.96	20.13	28.50	31.30
Yield rate(tons/ha)	1.12	1.18	1.22	1.06	1.16	1.17
8. Soyabeans						
Area harvested(1.000 ha)	8.05	11.40	21.97	26.01	29.96	24.21
Production (1.000 tons)	6.77	10.13	20.27	27.99	29.98	24.76
Yield rate(tons/ha)	0.84	0.89	0.92	1.08	1.00	1.02

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province

Table 2-10 AREA HARVESTED, PRODUCTION AND YIELD RATE OF MAJOR FOOD CROPS IN THE STUDY AREA, 1988 AND 1989

Crops	Kab. Deli Serdang		Kab. Simalungun		Kodya. Medan	
	1988	1989	1988	1989	1988	1989
1. Paddy						
Area harvested(1.000 ha)	134.3	137.9	82.7	94.2	5.7	5.8
Production (1.000 tons)	535.2	567.2	307.1	352.5	23.2	24.1
Yield rate(tons/ha)	3.99	4.12	3.71	3.74	4.07	4.18
2. Wet land Paddy						
Area harvested(1.000 ha)	128.6	134.2	67.3	73.2	5.7	5.8
Production (1.000 tons)	523.6	559.5	276.4	308.6	23.2	24.1
Yield rate(tons/ha)	4.07	4.17	4.11	4.22	4.07	4.18
3. Dray land Paddy						
Area harvested(1.000 ha)	5.7	3.6	15.4	21.0	-	-
Production (1.000 tons)	11.6	7.7	30.7	44.0	-	-
Yield rate(tons/ha)	2.04	2.12	2.00	2.10	-	-
4. Maize						
Area harvested(1.000 ha)	8.3	9.4	30.2	38.6	0.17	0.25
Production (1.000 tons)	14.9	17.0	67.6	86.5	0.30	0.46
Yield rate(tons/ha)	1.79	1.81	2.24	2.25	1.79	1.81
5. Cassava						
Area harvested(1.000 ha)	6.6	10.9	3.6	7.0	0.27	0.43
Production (1.000 tons)	93.0	154.8	58.9	119.5	3.83	6.08
Yield rate(tons/ha)	14.07	14.22	16.42	17.05	14.13	14.17
6. Sweet potatoes						
Area harvested(1.000 ha)	1.4	1.7	1.9	1.9	0.18	0.25
Production (1.000 tons)	14.8	18.7	28.8	29.8	2.03	2.69
Yield rate(tons/ha)	10.98	11.00	15.53	15.66	11.02	10.99
7. Peanuts						
Area harvested(1.000 ha)	2.3	2.1	7.4	8.8	0.18	0.21
Production (1.000 tons)	2.7	2.7	8.2	9.9	0.21	0.28
Yield rate(tons/ha)	1.18	1.31	1.10	1.13	1.16	1.32
8. Soyabeans						
Area harvested(1.000 ha)	1.8	2.0	4.7	3.5	0.07	0.12
Production (1.000 tons)	2.2	2.6	5.6	4.3	0.09	0.15
Yield rate(tons/ha)	1.21	1.28	1.20	1.24	1.18	1.27

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.

Table 2-11 PLANTED AREA, PRODUCTION AND YIELD RATE OF RUBBER AND PALM OIL IN NORTH SUMATRA PROVINCE, 1988 -1989

Holders	Rubber				Palm Oil											
	Planted Area(ha)*1		Production (tons)		Yield Rate (kg/ha)		Production (tons)		Yield Rate (kg/ha)							
	1988	1989	1988	1989	1988	1989	1988	1989	MS *2	IS *3						
Small Holders	310,293	325,540	117,261	120,227	378	369	58,299	66,893	90,925	74,704	12,562	9,950	1,560	1,117	215	149
Private Estates	103,814	208,634	-	114,974	-	551	147,914	172,582	-	346,022	-	47,166	-	2,005	-	273
Estate Enterprises	107,490	112,894	99,975	100,043	930	896	333,072	330,396	853,903	891,476	188,538	121,566	2,564	2,898	566	368
Total	521,597	647,068	-	335,144	-	518	539,285	569,871	-	1,312,202	-	178,682	-	2,303	-	314

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.

Note : *1 includes non - productive areas.

*2 MS means crude palm oil.

*3 IS means palm kernel.

Table 2-12 PLANTED AREA, PRODUCTION AND YIELD RATE OF RUBBER AND PALM OIL OF ESTATE ENTERPRISES II-IX IN NORTH SUMATRA PROVINCE

Crops	1983	1984	1985	1986	1987	1988	1989	Average Annual Growth Rate (%)
Rubber								
Planted area (ha)*1	97,703	103,737	86,244	99,413	104,185	107,490	112,897	2.44
Production (tons)	106,547	107,703	103,998	99,154	95,729	99,975	100,043	(1.04)
Yield rate (kg/ha)	1,091	1,038	1,206	997	919	930	886	(3.40)
Palm Oil								
Planted area (ha)*1	217,147	251,750	250,557	260,189	320,948	333,072	330,396	7.25
Production (tons)	571,210	720,950	804,209	805,350	227,488	853,903	891,476	7.70
Yield rate (kg/ha)	2,631	2,864	3,210	3,095	709	2,564	2,698	0.42
Palm Kernel								
Planted area (ha)*1	217,147	251,750	250,557	260,189	320,948	333,072	330,396	7.25
Production (tons)	108,165	161,009	167,999	177,323	51,710	188,538	121,566	1.97
Yield rate (kg/ha)	498	640	671	682	161	566	368	(4.92)

Source : North Sumatra in Figur, 1989, Statistical Office of North Sumatra Province.

Note : *1 includes non-productive area.
: Figures in Parenthesis indicate negative.

Table 2-13 PLANTED AREA, PRODUCTION AND YIELD RATE OF RUBBER AND OIL PALM
OF SMALL HOLDERS IN NORTH SUMATRA PROVINCE AND STUDY AREA

Province / District	Rubber						Oil Palm									
	Planted Area(ha)*1		Production (tons)		Yield Rate (kg/ha)		Planted Area(ha)*1		Production(tons)		Yield Rate (kg/ha)					
	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989				
North Sumatra	310,293	325,540	117,261	120,227	378	369	58,299	66,893	90,925	74,704	12,562	9,950	1,560	1,117	215	149
Kab. Deli Serdang	27,601	28,115	14,216	13,721	515	488	550	766	732	1,245	257	383	1,331	1,625	467	500
Kab. Simalungun *4	9,884	15,171	3,785	8,335	383	549	5,900	7,929	20,729	10,556	2,826	1,378	3,513	1,331	479	174

Source : North Sumatra in Figures, 1989, Statistical Office of North Sumatra Province.

Note : *1 includes non - productive areas.

*2 MS means crude palm oil.

*3 IS means palm kernel

*4 Kab. Simalungun as a whole.

Table 2-14 NUMBERS OF ESTABLISHMENTS AND EMPLOYEES BY INDUSTRIAL ORIGIN
IN NORTH SUMATRA PROVINCE AND THE STUDY AREA, 1986

Industrial Origin	Numbers of Establishments				Numbers of Employees					
	North Sumatra	Study Area			North Sumatra	Study Area				
		Deli Serdang	Medan	Tebing Tinggi		Total	Deli Serdang	Medan	Tebing Tinggi	Total
1 Mining & Quarrying	1,581	195	13	7	215	5,885	822	101	66	989
2 Manufacturing Industry	30,994	4,572	5,523	296	10,391	164,861	32,864	40,939	3,581	77,384
3 Electricity, gas & water supply	2,787	498	13	6	517	8,789	763	3,659	43	4,465
4 Construction	4,144	292	1,101	164	1,557	18,032	1,422	6,567	474	8,463
5 Trade, hotel & Restaurant	208,711	30,755	53,605	3,988	88,348	310,147	42,061	92,651	5,686	140,398
6 Transport & communication	31,984	2,926	13,194	1,288	17,408	51,639	4,564	20,795	1,590	26,949
7 Banking & Financial intermediaries	4,044	336	1,677	38	2,051	14,836	506	8,592	214	9,312
8 Services	42,594	6,031	13,823	932	20,786	101,324	14,171	39,138	2,663	55,972
Total	326,839	45,605	88,949	6,719	141,273	675,513	97,173	212,442	14,317	323,932

Source : North Sumatra in Figures, 1989, Statistical Office of North Sumatra Province.

Table 2-15 LENGTH OF NATIONAL, PROVINCIAL, KABUPATEN AND KOTAMADYA
ROADS IN NORTH SUMATRA PROVINCE AND THE STUDY AREA, 1989

(Unit : Km)

Region	National Road		Provincial Road		Kabupaten/Kotamadya Roads		Total				
	Asphalt Gravel/ Earth	Total	Asphalt Gravel/ Earth	Total	Asphalt Gravel/ Earth	Total	Asphalt Gravel/ Earth	Total			
North Sumatra	846	0	2,223	388	2,611	6,380	11,613	17,993	9,449	12,001	21,450
Study Area	156	0	252	0	252	1,736	2,944	4,680	2,144	2,944	5,088
Kab. Deli Serdang	156	0	252	0	252	565	1,983	2,548	973	1,983	2,956
Kodya. Medan	-	-	-	-	-	1,092	782	1,874	1,092	782	1,874
Kodya. Tebing Tinggi	-	-	-	-	-	79	179	258	79	179	258

Source : North Sumatra in Figures, 1989, Statistical Office of North Sumatra Province.

Table 2-16 PASSENGER AND CARGO TRANSPORTATION
BY TRAIN IN NORTH SUMATRA PROVINCE

Year	Passenger (Million Person-km)	Cargo (Million Ton-km)			
		Plantation Products	Oil	Others	Total
		(%)	(%)	(%)	(%)
1984	180.3	69.2 (70.5)	18.9 (19.3)	10.0 (10.2)	98.1 (100)
1985	191.8	83.2 (74.7)	20.4 (18.3)	7.8 (7.0)	111.4 (100)
1986	184.5	95.1 (79.8)	17.9 (15.0)	6.2 (5.2)	119.2 (100)
1987	191.6	88.4 (74.5)	22.9 (19.3)	7.3 (6.2)	118.6 (100)
1988	178.6	101.3 (68.0)	29.7 (19.9)	18.0 (12.1)	149.0 (100)
1989	185.6	117.1 (76.0)	21.9 (14.2)	15.0 (9.7)	154.0 (100)
Average Annual Growth Rate (%)	0.58	11.09	2.99	8.45	9.44

Source : North Sumatra in Figures, 1988 & 1989,
Statistical Office of North Sumatra Province.
(Original data : State Railway Enterprise of North Sumatra Province)

Table 2-17 EXPORT AND IMPORT AT BELAWAN PORT, 1985-1990

Quantity/Value	1985	1986	1987	1988	1989	Average Annual 1990 Growth Rate (%)	
Quantity (thousand tons)							
Export	1,737.9	1,850.5	1,891.2	2,306.5	2,341.9	2,373.6	6.43
Import	893.4	702.0	809.7	701.8	1,049.4	1,169.0	5.52
Total	2,631.3	2,552.5	2,700.9	3,008.3	3,391.3	3,542.6	6.13
Value (million US \$)							
Export	848.1	824.7	999.0	1,418.5	1,280.0	1,371.7	10.09
Import	371.2	325.9	472.4	485.6	517.7	657.7	12.12
Total	1,219.3	1,150.6	1,471.4	1,904.1	1,797.7	2,029.4	10.73

Source : Statistical Year Book of Indonesia, 1990, Biro Pusat Statistik.

Table 2-18 RECEIPT AND EXPENDITURE OF NORTH SUMATRA
AUTONOMY GOVERNMENT, 1980/81-1988/89

(Unit : Rp Million)

Year	R e c e i p t			Expenditure		
	Routine	Development	Total	Routine	Development	Total
1980/81	73,320	20,429	93,749	66,209	21,600	87,809
1981/82	93,467	16,823	110,290	83,184	20,985	104,169
1982/83	106,004	12,452	118,456	96,779	23,172	119,951
1983/84	127,085	13,554	140,639	112,955	21,210	134,165
1984/85	128,785	13,300	142,085	109,581	20,008	129,589
1985/86	169,015	14,463	183,478	147,014	26,220	173,234
1986/87	180,030	16,691	196,721	155,427	31,037	186,464
1987/88	199,140	18,935	218,075	168,853	36,348	205,201
1988/89	279,702	23,133	302,835	245,681	44,674	290,356
Average Annual Growth Rate (%)	18.22	1.57	15.79	17.81	9.51	16.12

Source : North Sumatra in Figures, 198s, 1989, Statistical
Office of North Sumatra Province.

Table 2-19 CONSUMER PRICE INDEXES IN MEDAN AND JAKARTA
(Base: April 1978 - March 1979 = 100)

Sector	Medan										J a k a r t a					Average Annual Rise Rate (%) 1984-1989
	1984	1985	1986	1987	1988	1989	1984	1985	1986	1987	1988	1989	MDS*1	JKT*2		
General	231.6	240.5	256.7	289.4	309.3	338.4	219.2	229.9	242.5	264.3	283.8	301.0	7.9	6.5		
Food	212.4	213.5	237.5	268.1	312.8	346.0	201.2	206.2	224.0	246.3	277.3	300.9	10.3	8.4		
Housing	262.6	273.6	283.7	301.9	321.1	355.7	251.8	268.7	278.5	293.2	308.1	324.2	6.3	5.2		
Clothing	221.9	233.6	242.5	254.3	268.7	282.5	190.3	193.3	201.2	221.7	229.6	240.0	4.9	4.8		
Miscellaneous	241.3	262.9	272.6	293.7	307.5	328.4	223.7	240.1	249.0	279.7	289.5	299.6	6.4	6.0		

Source : Statistic Year Book of Indonesia, 1989 and 1990,
Biro Pusat Statistik.

Table 2-20 RETAIL PRICE OF COMMODITIES AT THE MEDAN MARKET

(Unit : Rupiah)

Commodities	Unit	1984	1985	1986	1987	1988	1989	Average Annual Rise Rate (%) 1984-1989
Rice	kg	303.7	315.5	349.2	396.9	527.9	570.9	13.5
Salted Fish	kg	1,712.0	1,900.0	2,156.2	2,456.7	2,840.8	2,856.7	10.8
Cooking Oil	Bottle	600.3	519.4	468.8	551.0	617.6	699.8	3.1
Sugar	kg	614.1	646.6	657.9	698.2	780.5	883.8	7.6
Salt	kg	110.0	121.2	132.5	150.0	184.4	200.0	12.7
Kerosene	bottle	123.7	130.4	140.0	140.0	140.0	190.0	9.0
Washing Soap	piece	113.6	110.0	100.0	100.0	119.3	169.8	8.4
Textile	meter	503.2	525.0	525.0	774.0	1,068.8	1,000.0	14.7
Wheat Flour	kg	382.4	436.2	460.2	539.6	612.0	670.9	11.9
Cement	zak(pack)	2,888.5	3,271.0	3,442.7	3,581.2	3,783.3	4,240.8	8.0
White Cabbage	kg	125.8	112.5	191.6	247.6	237.5	149.3	3.5
Potatoes	kg	250.0	175.7	319.1	306.9	372.9	329.2	5.7
Red Chili	kg	1,183.3	1,169.4	1,392.4	1,198.6	1,693.1	1,763.2	8.3
Tomatoes	kg	325.9	262.5	350.4	392.4	586.1	666.0	15.4
Cucumber	kg	105.8	184.2	161.1	136.8	207.1	208.3	14.5
Banana	bunch	258.3	258.3	329.4	328.5	429.2	450.0	11.7
Papaya	piece	216.7	237.6	258.3	300.7	425.0	450.0	15.7
Orange	kg	1,128.2	919.4	933.3	1,152.8	1,795.0	1,916.7	11.2
Pineapple	kg	211.1	179.9	200.0	204.2	273.6	266.7	4.8

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.

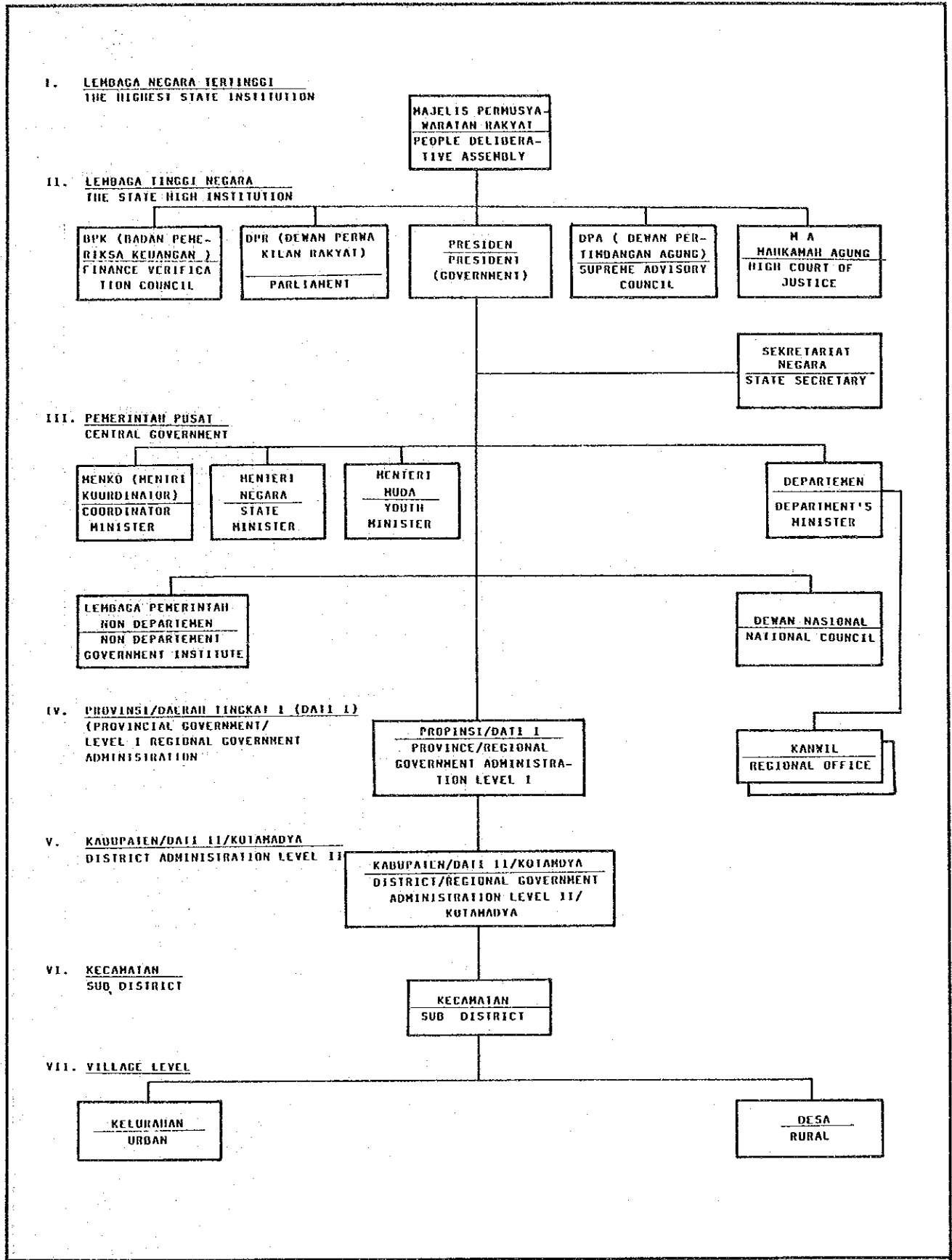
Table 2-21 PRODUCER PRICES OF CEREALS, SECONDARY FOOD CROPS
AND VEGETABLES IN NORTH SUMATRA PROVINCE, 1984-1989

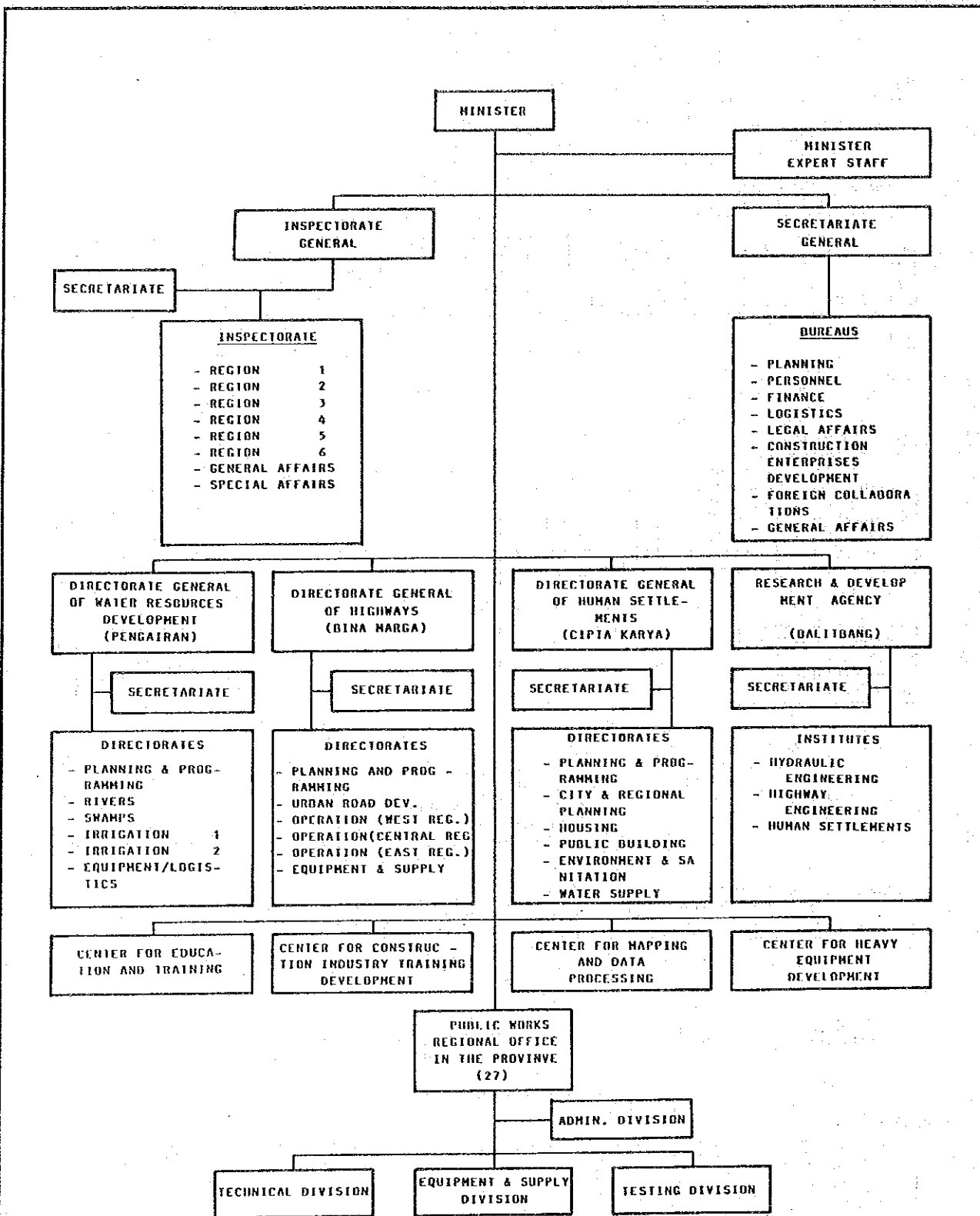
(Unit : Rp/100 kg)

Commodities	1984	1985	1986	1987	1988	1989	Average Annual Rise Rate(%) 1984 - 1989
Dried Paddy	16,921.9	18,728.5	19,324.5	21,138.9	25,321.8	28,406.9	10.9
Dried Glutinous Paddy	21,920.9	19,349.5	21,028.9	23,544.6	29,033.3	30,893.8	7.1
Yellow Maize	12,295.3	14,049.8	14,894.8	17,229.2	18,801.7	20,594.8	10.9
Cassava	4,592.2	5,038.6	6,030.2	6,562.7	7,003.3	7,027.4	8.9
Peanuts	40,273.2	38,016.6	44,130.8	52,729.2	59,477.5	62,774.3	9.3
Soyabeans	45,156.6	38,181.8	50,668.2	58,086.1	56,861.1	59,895.8	5.8
Potatoes	26,484.3	19,349.4	22,252.0	24,002.6	27,770.3	34,188.9	5.2
Cucumber	14,164.1	12,835.4	16,237.1	18,206.3	20,636.8	20,316.9	7.5
Cabbage	10,046.3	11,892.8	9,664.8	13,240.5	13,809.2	12,201.7	4.0
Chili(Red)	115,040.8	95,534.4	109,014.8	125,999.1	179,631.4	177,187.9	9.0
Tomatoes	29,092.8	27,137.2	32,362.0	32,696.2	39,763.2	38,250.0	5.6
Green Leaves Vegetables	9,476.0	10,777.9	10,866.7	12,070.9	13,474.0	15,898.0	10.9
Papaya	9,676.4	5,165.1	7,350.7	11,186.6	11,946.5	14,326.8	8.2
Onion	59,776.2	61,583.1	60,701.5	75,503.3	99,590.3	115,673.6	14.1

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.

FIGURES





Source: Decree of the Minister of Public Works No 211/KPTS/1984
 (Organization Structure and Work Systems of MPW)

ER
ENVIRONMENT AND
REGIONAL DEVELOPMENT

**STUDY ON BELAWAN-PADANG
INTEGRATED RIVER BASIN DEVELOPMENT**

SUPPORTING REPORT

ENVIRONMENT AND REGIONAL DEVELOPMENT

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SUPPORTING REPORT

ENVIRONMENT AND REGIONAL DEVELOPMENT

1. INTRODUCTION

This supporting report is compiled to present the detailed data, information and analyses concerning Environment and Regional Development.

In this Study, a water quality survey was carried out by sampling surface water of rivers and groundwater of wells during the master plan study stage. An environmental impact study was also carried out for urgent project areas. The results of the survey and study are also compiled in this supporting report.

2. ENVIRONMENTAL CONDITION

2.1 Environmental Policy in Indonesia

Legislation

Laws, regulations and decisions on environmental protection and management in Indonesia are based on its 1945 Constitution. This was strengthened by the "Environmental Management Act (EMA), 1982", which recognizes the right of every person to a good, healthy living environment. The Act serves as the basis for the evaluation and adjustment of all legislations containing provisions related to aspects of the living environment heretofore valid, e.g., legislation regarding irrigation, mining, energy, forestry, protection and conservation of nature, industry, settlements, land use, etc. Another provision of the EMA is the requirement for an environmental impact assessment (EIA), for projects likely to have a significant impact on the environment.

Laws and regulations relevant to the environment are classified by the sectors which they cover, as shown in Table 2-1. A detailed description of an EIA will be given in the following section.

Administration

Environmental management policies and their coordination in Indonesia is handled by the Minister of State for Population and Environment principally in the areas subject to EIA, hazardous substances and waste, and environmental quality guidelines. Other functions and responsibilities concerning the environment are distributed among the different ministries and agencies.

Environmental Impact Assessment

Environmental Impact Assessment (EIA) is implemented under Government Regulation No. 29/1986 which came into effect on June 5, 1987 on the basis of the Environmental Management Act (1982). Working procedures for EIA are given in Fig. 2-1. In planning a certain project, these procedures include the following:

- (a) If significant effects are estimated in the preliminary proponent's judgment, the Environmental Impact Assessment (EIA) is implemented immediately.
- (b) If significant effects are not expected, a research for Preliminary Environmental Information (PEIR) is conducted.
- (c) The PEIR report is submitted to an authorized government agency (AGA).
- (d) The PEIR report is evaluated by the Commission. Taking its evaluation into account, the AGA judges the necessity of an EIA for the project.
- (e) For the EIA, Terms of Reference (TOR) are set up by the Proponent and the AGA.

- (f) Then the Commission decides on the propriety of the TOR.
- (g) The EIA report is prepared and submitted to the AGA.
- (h) The EIA report is evaluated by the Commission. Taking its evaluation into account, the AGA determines whether the EIA was conducted satisfactorily.
- (i) After the EIA is implemented, an Environmental Management Plan (EMAP) and Environmental Monitoring Plan (EMOP) are formulated.

As shown in the procedures above, the EIA in Indonesia is characterized by functioning to ensure objectivity through distinct separation of each responsibility, i.e., report preparation (Proponent), technical assistance (AGA), and evaluation (Commission) for EIA.

On the other hand, the Ministry of Public Works (MPW) had prepared an EIA manual for conducting an effective Environmental Impact Assessment for projects with which they are concerned, under Government Regulation No. 29/1986. Its contents are as follows:

- (a) Working Procedures in the MPW for ANDAL (EIA)
- (b) Screening and Scoping
- (c) Technical Guidelines
- (d) ANDAL for Existing Project
- (e) Evaluation of ANDAL
- (f) Provincial Referral System

Hereafter, the "Working Procedures" and "Technical Guidelines" of the above items will be discussed to grasp the conditions of the EIA in the MPW.

(1) Working Procedures for an EIA

Although the basic procedures in the manual by the MPW are in accordance with Government Regulation No. 29/1986, they are specified more concretely and explicitly. These procedures are given in Fig. 2-2.

The Technical Committee in this manual corresponds to the AGA mentioned above. The manual provides that it is composed of staff in a neutral position from the Bureau of Planning, Bina Directorates, Research and Development staff, and the Inspectorate General.

The Commission was established by the MPW in accordance with the provision of Article 23 of Government Regulation 29/1986. It is made up of representatives of the Ministry of Public Works, the Ministry of Home Affairs, the Ministry of State for Population and Environment, and outside experts.

(2) Technical Guidelines

The manual gives items shown in Table 2-2 as environmental effects which should be considered in the screening phase to examine whether PEIR or EIA should be applied.

Furthermore, it presents investigation items necessary for environmental surveys during the prefeasibility study and the feasibility study.

2.2 Environmental Condition of the Study Area

Natural Environment

(1) Nature Conservation Area

The study area includes areas under legal regulations for nature conservation, i.e., a Nature Reserve Area (designated by the Protection Nature and Environmental Board) and a Forest Reserve Area, as presented in Fig. 2-3. These conservation areas are designated, centering around ranges of mangrove and lowland forest along the seashore.

(2) Vegetation

Compared with Java, Sulawesi and other small islands, Sumatra as a whole has much more abundant and various vegetation. Table 2-3 shows major vegetation types in Sumatra. The study area, however, has a small range of vegetation since a large area was cleared for oil palm and rubber cultivation. As presented in Fig. 2-4, mangrove forests and swamp forests are distributed along the seaside, while lowland forests occupy the mountainous districts and hilly areas.

(3) Wildlife

Generally, Sumatra provides an excellent living environment for wild animals, and is a habitat for a number of species including 196 mammals and 580 different species of birds. In the study area, animals such as monkeys live primarily in the forests. Although tigers and orangutans are seen on rare occasions in wooded regions of the upper reaches of Percut, Deli, and Belawan rivers, they come from Aceh Province and do not normally inhabit the study area.

Social Environment

(1) Population and Ethnic Groups

The population is concentrated mainly in urban areas such as Medan and Tebing Tinggi. Other than these urban areas, communities are located linearly along principal roads. Although these communities are limited to areas parallel to such roads, they are distributed in small numbers over the study area and exist even in the upper reaches of river basins.

The population is classified by religion in the study area and is shown in Table 2-4. The study area has a large number of Christians compared with Indonesia as a whole; however, the proportion in this area is not so unusually large for North Sumatra Province.

The study area is composed of several ethnic groups as shown in Table 2-5. The Javanese have the largest proportion of population at 39% and the Bataks including Karos occupy the second largest at 25%. Originally, the Melayu was dominant in number for the study area. With the progress of socioeconomic development, other ethnic groups have moved in and settled within this region.

(2) Historical and Cultural Assets

The study area has a number of historical and cultural attractions, as detailed in Table 2-6. There are structures such as mosques and the old town, places related to religion such as cemeteries and holy places, and other cultural assets. These assets are located in the lower reaches of river basins, as presented in Fig. 2-5.

(3) Custom, Tradition and Community Instruction

The customs of the people living in the rural areas of the study area are still relatively unchanged. In urban areas, however, it seems that traditional customs such as marriage, funeral, folk art, and dance are falling by the wayside.

Traditionally, water for bathing, washing and toiletry is provided by a well in a village or by a small stream nearby. People often live along small streams, into which domestic refuse is thrown. Therefore, the water quality of rivers in the study area is affected by the population and such customs. People seem not fully aware of the environment surrounding them.

Systems such as religion, cooperative work, and exchange of goods and money, as well as customs, which form the basis of a communal society, still remain in their original condition. Decision making, however, is exercised by leaders in a particular community. As a result, the environment of communities are often not managed appropriately.

(4) Hygiene and Health

Table 2-7 shows the situation of health care in the study area in terms of number of facilities such as hospitals and beds (Statistik Indonesia, 1988). It indicates that the facility level for the number of hospitals and beds in the study area is higher than that found in the whole North Sumatra Province. Furthermore, the province maintains a higher level compared with the national average. Table 2-8 gives the number of sufferers of diseases in the study area.

2.3 Water Quality Survey

Sampling and Test Procedure

Water quality survey was conducted to examine the potability of river surface water and groundwater in the study area. The water sampling points are shown in Fig. 2-6. Sampling was conducted three (3) times at each point to grasp the change by climate and other conditions.

The testing procedures of the American Water and Wastewater Association, Water Pollution Control Federation (AWWA-WPCF) are applied for the water quality test. Totally, 35 items are selected for the test.

Water Quality and Standards

Results of sampling and test are given in Table 2-9. Summarizing the results, groundwater sampled from either deep or shallow wells in Tebing Tinggi show higher concentration of manganese and sulfate ions than in Medan. Generally, river water and shallow well water include a high content of coliform bacteria. Deep wells in Medan keep good water quality suitable for potable use.

Table 2-10 gives the newly established water quality standards for drinking water, industrial water and irrigation water in Indonesia.

3. ENVIRONMENTAL IMPACT STUDY

3.1 Environmental Investigation

The proposed projects subject to environmental impact analysis are as follows, and their areas are shown in Fig. 3-1.

- (a) Lausimeme Dam and its Reservoir
- (b) Floodway (Medan Floodway)
- (c) River Improvement of Deli, Percut, and Padang Rivers

Survey Items

Survey items are categorized under three (3) aspects, namely physical and chemical, biological, and socio-economic and socio-cultural impacts, as follows:

(1) Physical and Chemical Aspects

- (a) Climate
- (b) Topographic, physiographic and geological features
- (c) Atmosphere
- (d) Ground and surface water
- (e) Hydrology
- (f) Sedimentation and erosion

(2) Biological Aspects

- (a) Terrestrial vegetation
- (b) Aquatic vegetation including plankton, etc.
- (c) Terrestrial vegetation
- (d) Terrestrial fauna
- (e) Aquatic fauna
- (f) Birds

(3) Socio-Economic and Socio-Cultural Aspects

- (a) Economy
- (b) Income
- (c) Employment
- (d) Public health
- (e) Education
- (f) Housing facilities
- (g) Population density

Study Method

There are two types of data used to predict and analyze the impacts. The primary data are collected by measurement, observation and interview in the field, while the secondary data are obtained from the related agencies.

(1) Physical and Chemical Investigation

Sampling and laboratory tests were carried out for physical and chemical properties of river water at various sites of the project totaling 17 points along the Deli, Percut and Padang rivers. Air condition was also investigated at a total of 11 points, with its physical properties and chemical composition such as dust, noise, compound, etc.

The sampling sites are plotted in Fig. 3-2. Results of water and air quality analyses are presented in Tables 3-1 and 3-2, respectively.

(2) Biological Investigation

Vegetation, fauna and flora are investigated through field visits and samplings (refer to Fig. 3-2 for sampling sites), and planktons, benthos and bacteria are analyzed, together with the said water quality tests, by means of cultivation in test tubes.

Planktons were evaluated by the Shanon Diversity Index expressed by the following formula, and results are shown in Table 3-3.

$$H = - \sum \frac{n_i}{N} \text{Log} \frac{n_i}{N}$$

where,

H : diversity index

n_i : number of individuals in one species

N : total number of individuals in one location

The Wirjaharda and Pancho (1975) Method is applied for vegetation data, with the following parameters:

- (a) Frequency (F) : number of plots in which species occur divided by the total number of plots
- (b) Density (D) : actual number of plants per sampled area
- (c) Dominance (K) : total of basal area, coverage or biomass

- (d) Relative Frequency (FR) : frequency for species per total of frequencies for all species (%)
- (e) Relative Density (DR) : density for a species divided by the total density for all species (%)
- (f) Relative Dominance (KR) : dominance of a species divided by the dominance for all species (%)
- (g) Important Value (IV) : relative density plus relative frequency and relative dominance
- (h) Summed Dominance Ratio (SDR) : equivalent to $IV/3$

The number of vegetation and their analyses in the project area are presented in Table 3-4. As for wild animals, the types identified and if they are protected under the government regulations are presented in Table 3-5.

(3) Socio-Economic and Socio-Cultural Investigation

There are two kinds of data obtained, primary and secondary data on socio-economy and socio-culture in and around the project area. The former is collected by interviewing the people living in the area, and the latter is taken from statistical data which are maintained by the governmental agencies.

The number of respondents and locations of sampling sites are given in Table 3-6 and Fig. 3-3, and the results are summarized in Table 3-7.

3.2 Environmental Impact Analysis

Method of Impact Analysis

The collected data of either primary or secondary are tabulated and analyzed using the matrix (Fisher and Davis Matrix) and flow chart method. Three types of matrix were formed in the following three (3) steps:

- Step One : Matrix on basic environmental evaluation at the time of study or before the project started. This evaluation is made by giving a priority scale to the important resources, environmental conditions during study and the level of susceptibility of management for each environmental component.
- Step Two : Compatibility matrix of environmental components with the development activities. Every component of the environment supposed to be affected by the project elements are included in this matrix.

Step Three: Decision making matrix of both environmental components and project elements to examine the change of environmental condition as a whole for decision making for project realization.

In constructing the matrix, environmental quality is quantified in accordance with the guideline prepared for the ANDAL study (Laporan Lokakarya Prosedur Pemantauan Lingkungan, March 1986), as shown in Table 3-8. Based on the criteria determined, basic environmental component for the urgent project area is evaluated as the existing environmental beauty, as shown in Table 3-9.

Through the matrix analysis which compress the basic environmental components and project activities, it is recognized that any changes in environmental quality occur with the implementation and operation of the project. With a model of flow diagram of each activity in the project implementation, direct and indirect impacts are identified so as to minimize the negative impacts and to maximize the positive impacts.

3.3 Results of Analysis

Dam Construction

According to the environmental impact analysis, the main subjects regarding dam construction are biological aspects. Main environmental features and their impact analyses are summarized in the matrix as shown in Table 3-10 and described as follows.

(1) Construction Period

(a) Physical and Chemical Aspects

The negative important impact on water quality which is mainly the turbidity, will be brought by excavation and embankment of dam body materials, but such impact is anticipated only during the construction work.

(b) Biological Aspects

Noise disturbance and decrease of vegetation to be caused by felling trees and construction works will force fauna to migrate to other locations. Fishes in the up and downstreams will also migrate.

(c) Socio-Economic and Socio-Cultural Aspects

The construction of dam will provide more employment opportunities and increase of household incomes.

(2) Post Construction Period

(a) Physical and Chemical Aspects

Since the flow will decrease in the dry season due to the limit of water released from the dam, water quality of the river downstream will be worse from wastes of factories due to lack of flushing flow from the upstream.

(b) Biological Aspects

The negative important impact is the reduction of flora and fauna in the project area due to the inundation area of about 2 km² by filling water. The migration of fauna to other locations or reduction of the number of flora cannot be avoided.

(c) Socio-Economic and Socio-Cultural Aspects

The positive important impact is the possible development of freshwater fishery in the reservoir area. The impounding of water will facilitate the growth of phyto- and zoo-planktons, becoming the source of food for fishes. This will develop fishery in the project area resulting in the increase of income.

Since the dam site is located near Medan City, the dam, reservoir and other facilities will be new objects of tourism. Access road and other construction roads will develop a transportation system if they could be used even after the construction works. The development will promote economic activities in and around the project area, resulting in an increase of household and government earnings.

Floodway Construction

The main subjects in the environmental impact by the floodway, as summarized in the matrix analysis in Table 3-11, will arise after the construction.

(1) Construction Period

(a) Biological Aspects

The impact is relatively small since the route of floodway is almost covered by rice paddy and bush.

(b) Socio-Economic and Socio-Cultural Aspects

Construction of the floodway will require a land acquisition of about 20 ha and house evacuation of about 100 households, where houses are built as permanent (42.3%), semi-permanent (50%) and temporary (7.6%). On the other hand, the construction works will absorb unemployed local people.

(2) Post Construction Period

In the dry season, the floodway may become a dumping site for solid waste or household garbage if not properly managed. This will develop foul smell and give an adverse effect to public hygiene.

River Improvement

The main subjects in the environmental impact of river improvement for Deli, Percut and Padang are the aquatic flora and fauna, house evacuation and land acquisition. This is clearly presented in Table 3-12. The main environmental features and impacts are as follows:

(1) Construction Period

(a) Biological Aspects

The negative impact on the flora and fauna due to land acquisition will be small because the area to be compensated is only about 50 m wide at either side of the river. Dredging and excavation of river channels may disturb the habitat of aquatic flora and fauna.

(b) Socio-Economic and Socio-Cultural Aspects.

Land acquisition and house evacuation will cause some social nuisance if compensation could not be properly managed. At present, the required house evacuation is estimated at 762 houses for Deli River, 409 houses for Percut River and 252 houses for Padang River. In and around the project area, houses are built as permanent (30%), semi-permanent (35%) and temporary (35%).

The positive important impact of river improvement is the increase in employment opportunities and hence the rise of income. A negative important impact may arise in the interaction between the project workers and local people due to the difference in their cultural background.

(2) Post Construction Period

The dredging and excavation of river channels will increase the water depth. The positive important impact is the improvement of water quality in the river.

Conclusion

The conclusion for only the dam construction is summarized in the following table.

Environmental Impact Analysis

Project	Basic Evaluation on Environment			Change of Environmental Beauty
	Importance of Resources	Environment Condition	Sensitivity of Management	
Dam	very high scale of 5	very good scale of 5	medium scale of 3	-1 (-15%)
Floodway	very high scale of 5	good scale of 4	medium scale of 3	-1 (-12%)
Deli River Improvement	very high scale of 5	good scale of 4	medium scale of 3	-1 (-19%)
Percut River Improvement	very high scale of 5	good scale of 4	medium scale of 3	-1 (-14%)
Padang River Improvement	high scale of 5	good scale of 4	medium scale of 3	-1 (-17%)

The results of the environmental impact study was submitted to KOMPUS AMDAL-PU (the Central Commission of Environmental Impact Assessment, Ministry of Public Works) on February 10, 1992, for its perusal. Then, a meeting among representatives of KOMPUS AMDAL-PU, P3SA of DPUP North Sumatra and LATMI-USU, the firm which conducted the environmental impact study under subcontract with JICA, was held in Jakarta on February 15, 1992. Although some comments were made indicating the necessity of other relevant information, the necessary steps will be undertaken by the Project Proponent, DGWRD, to realize project implementation as soon as possible.

4. LAND USE AND REGIONAL DEVELOPMENT

4.1 Land Use

Present Land Use in North Sumatra

Land use in North Sumatra Province has shown a drastic change. More than 40% of the permanent forest area has already been converted into other land utilization such as plantation, paddy, etc. The province is generally under a tight condition in land use, therefore, a more effective land management program is required.

It was noted in the Report on North Sumatra Regional Development that land development needs:

- (a) to put high priority on forest conservation and afforestation programs in the east coast and the Karo highland; and
- (b) to put higher priority on land use intensification in Medan City and the east coast, because these areas have a relatively high intensity of land use and there is little room for land use expansion.

Land Use and Change in the Study Area

Land use in the study area is dominated by plantations/estates of rubber, oil palm, coconut, etc., and paddy fields occupy approximately 90,000 ha which correspond to 17% of the study area. Land use in 1976 and 1985 is presented in Table 4-1 and that of 1990 is mapped out in Fig. 4-1.

In the upper reaches of the rivers, land is covered by bush, shifting cultivation, mixed cultivation, upland crop and forest designated as the National Conservative Forest. In the middle reaches, the dominant land covers are plantations of rubber, oil palm, coconut, tobacco, scrubs and rainfed paddy fields. In the lowland area coming down to the coastal line, land cover consists of wetland paddy field, rubber plantation, oil palm, cacao plantation, nipah/palm forest and mangrove.

Land Use Changes

There are three (3) major causes of change in land use, as follows:

- (a) To alter crops based on price for certain commodities such as shrimps, palm oil, cacao and coffee in the world market.
- (b) Traditional shifting cultivation method of agriculture in the upper reaches of the area.
- (c) Expansion of urban and industrial areas or government development projects such as highways, low cost housing development, dam and reservoir, flood protection, etc.