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OPERATION AGENCY (OICA)

DIRECTORATE GENERAL OF SEA COMMUNICATION
MINISTRY OF COMMUNICATIONS
THE REPUBLIC OF INDONESIA

THE STUDY ON INTEGRATED MODERNIZATION PLAN FOR SEA TRANSPORTATION IN EASTERN INDONESIA

FINAL REPORT

Vol.2 FEASIBILITY STUDY

MARCH 1994

THE OVERSEAS COASTAL AREA DEVELOPMENT INSTITUTE OF JAPAN (OCADI)
JAPAN PORT CONSULTANTS, LTD. (JPC)

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THE STUDY ON INTEGRATED MODERNIZATION PLAN
FOR SEA TRANSPORTATION IN EASTERN INDONESIA

FINAL REPORT VOL.2 FEASIBILITY STUDY

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THE REPUBLIC OF INDONESIA

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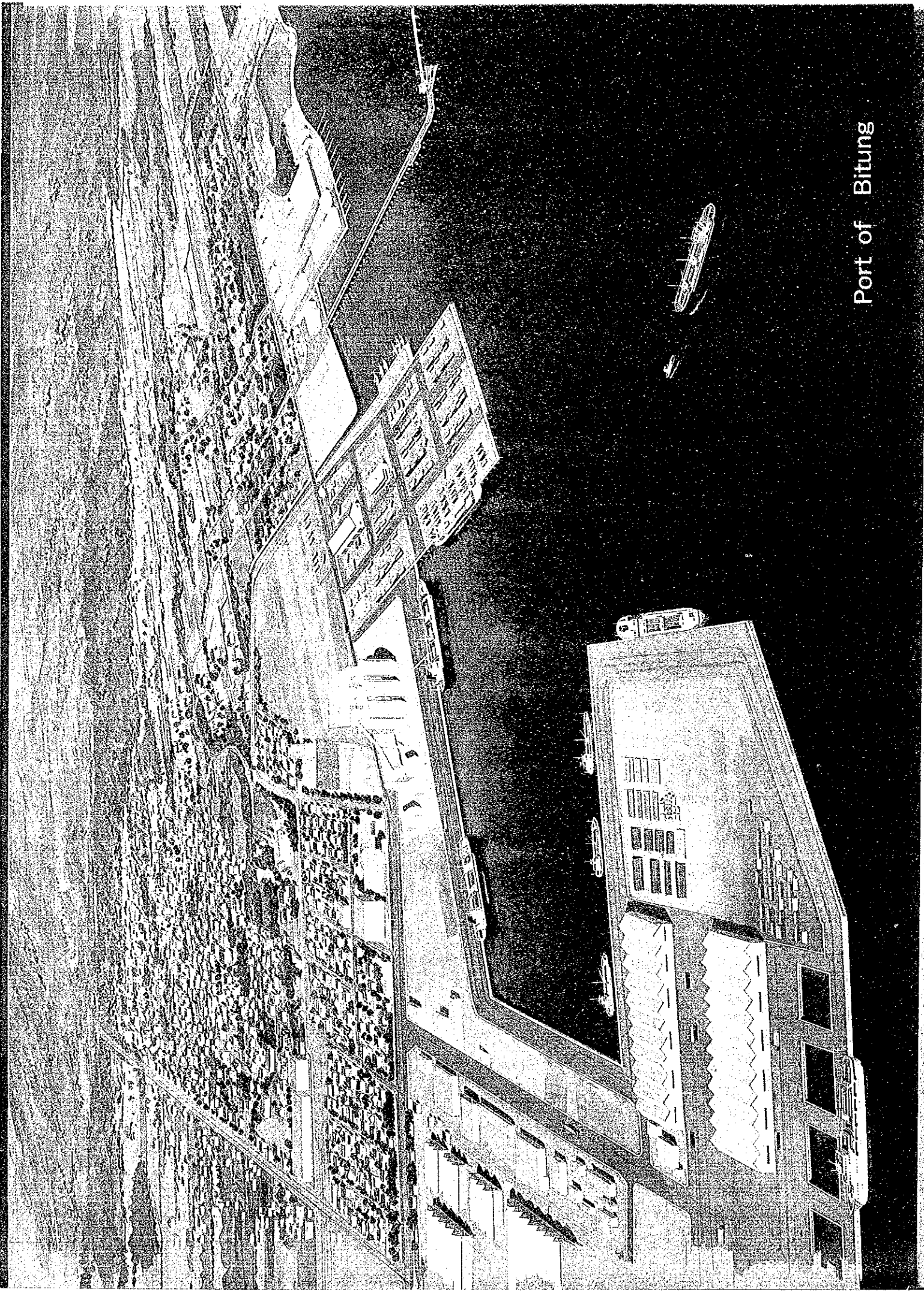
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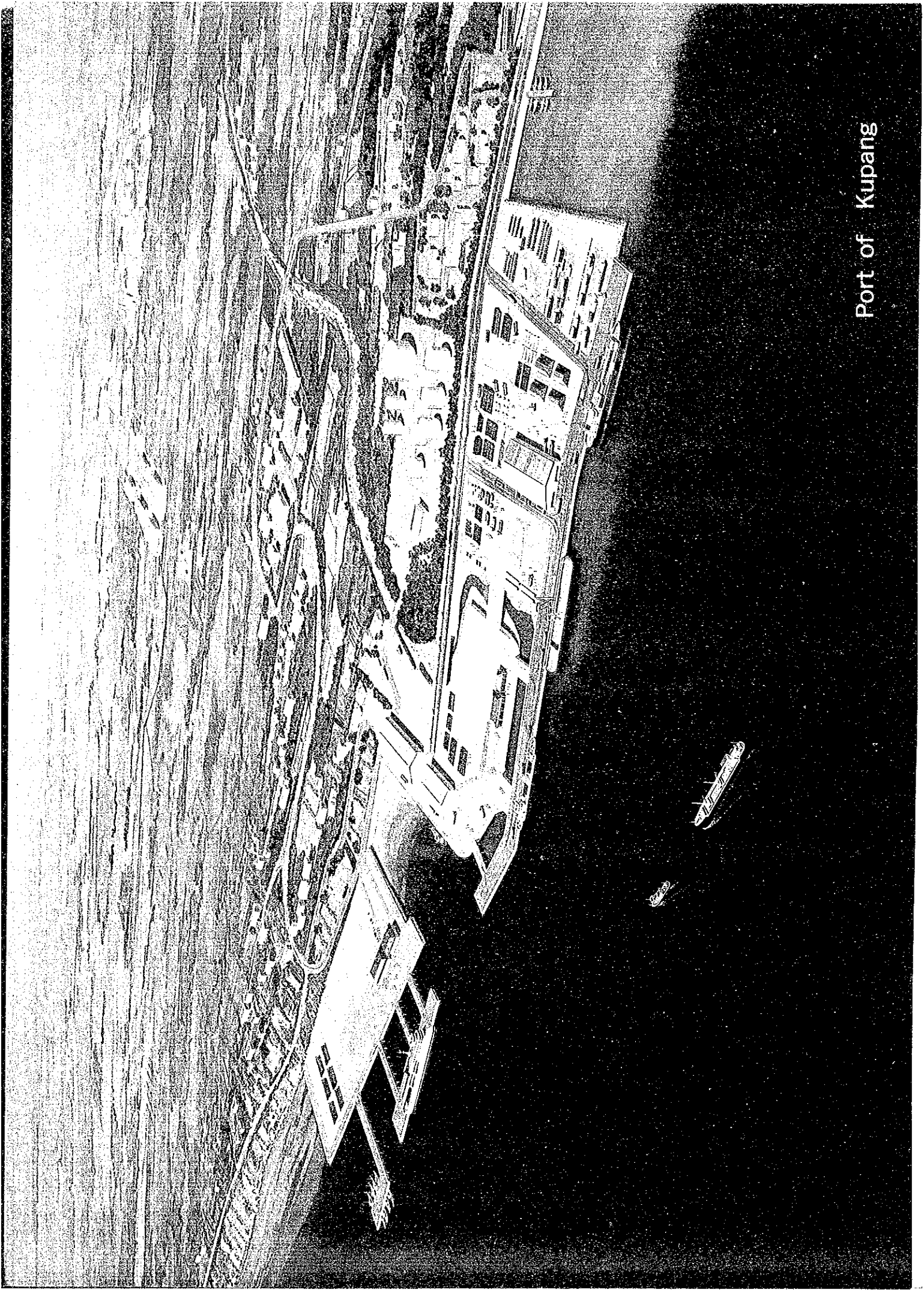
(June 1993)



Feasibility Study Ports



Port of Bitung



Port of Kupang

ABBREVIATIONS LIST

A	ADB	Asian Development Bank
	ADPEL	Port Administrator
	AFTA	Asian Free Trade Agreement
	ASEAN	Association of South-East Asian Nations
	Av.	Average
B	BAPPEDA	Provincial Development and Planning Board
	BAPPENAS	National Development Planning Agency
	BIRO	Bureau
	BOD	Biochemical Oxygen Demand
	BOR	Berth Occupancy Rate
	BPI	Berth Performance Index
	BPS	Central Bureau of Statistics
	BTP	Berth Throughput
C	CFC	Conversion Factor for Consumption
	CFS	Container Freight Station
	CIF	Cost, Insurance and Freight
	CO	Carbon Monoxide
	COD	Chemical Oxygen Demand
	C.Y.	Container Yard
D	dB	Decibel
	DIP	Decided Project Table of the Government Budget
	D.G.L.T	Directorate General of Land Transportation
	D.G.S.C.	Directorate General of Sea Communication
	DO	Dissolved Oxygen
	D.W.T.	Dead Weight Tonnage
E	EIA	Environmental Impact Assessment
	EIRR	Economic Internal Rate of Returns
	E.N.T.	East Nusa Tenggara

F	FC	Foreign Currency
	FCL	Full Container Load Cargo
	FIRR	Financial Internal Rate of Returns
	FOB	Free on Board
G	G.C.	General Cargo
	GDP	Gross Domestic Product
	GOI	Government of Indonesia
	GPI	Gang Productivity Index
	GRDP	Gross Regional Domestic Product
	GRT	Gross Registered Tonnage
	GT	Gross Tonnage
H	HA	Hectare(s)
	HP	Horse Power
	HR	Hour(s)
	HWL	High Water Level
I	IBRD	International Bank for Reconstruction and Development
	ILS	Inter-Island Liner System
	ISTS	Integrated Sea Transport Study
J	JICA	Japan International Cooperation Agency
K	KANPEL	Governmental Office at Non-commercial Port
	KANWIL	Provincial Office
	KG	Kilogram
	KLH	Ministry of State for Population and Environment
	KM	Decree of the Minister
	Km	Kilometer(s)
	KHUSUS	Special Sipping
	KOPERASI TKBM	Port Labour Corporation
L	LC	Local Currency
	LCL	Less than Container Load Cargo
	LWL	Low Water Level
	LPG	Liquefied Petroleum Gas

M	M	Meter(s)
	MARPOL	Final Act of the International on Marine Pollution
	MIN	Minute(s)
	MOC	Ministry of Communications
	MOF	Ministry of Finance
N	NO ₂	Nitrogen Dioxide
	NO _x	Nitrogen Oxides
	NTT	Nusa Tenggara Timor
O	OCC	Opportunity Cost of Capital
	OD	Origin and Destination
	OSOR	Open Storage Occupancy Ratio
	OSTP	Open Storage Throughput
P	PAKNOV 21/88	Regulation Reform Package in 1988
	PAO	Port Administrator's Office
	PC	Prestressed Concrete
	PELNI	State-owned Shipping Company
	PERSERO	State-owned Company
	PERTAMINA	State-owned Oil Company
	PERUM ASDP	State-owned Ferry Terminal Company
	PERUMPEL	Port State Enterprise
	PERINITS	Pioneer Ship System to Serve Remote Areas
	pH	Potential of Hydrogen
	PPI	Port Performance Index
	P.T.	Limited Company
	P2T	Center of Port Service
	P4T	Integrated Control and Service Planning Center
R	REPELITA	Five Year National Development Plan
	RLS	Regular Liner Service
	RP.	Rupiah
S	SCF	Standard Conversion Factor
	SOR	Shed Occupancy Ratio
	SO ₂	Sulphur Dioxide

	SOx	Sulphur Oxides
	SPM	Suspended Particulate Matter
	SS	Suspended Solid
	STP	Shed Throughput
T	TEU	Twenty Foot Equivalent Unit
U	UNCTAD	United Nations Conference on Trade and Development
V	VAT	Value Added Tax
\$		Dollar
¥		Japanese Yen

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CONCLUSION
AND
RECOMMENDATIONS

CONCLUSIONS AND RECOMMENDATIONS

Based on Integrated Master Plan for Sea Transportation (Vol.I), feasibility studies of ports of Bitung and Kupang have been implemented.

I-1 CONCLUSIONS

Socioeconomic Profile of North Sulawesi

1. North Sulawesi Province had a population of 2.5 million in 1990, and per capita GRDP excluding oil and gas sector was Rp.515,000, which was 65 per cent of the national average, and its annual growth rate from 1983 - 1990 was 3.6 per cent while the national average showed 5.7 per cent during the same period. Thus, North Sulawesi Province was one of the economically stagnated areas in the eighties in Indonesia.

2. Agriculture was the single most important sub-sector in North Sulawesi Province, and had a 37.0 per cent share of the provincial GRDP in 1990. Several sub-sectors in the tertiary sector also played important roles in the provincial economies such as Public administration & Defense 14.1 %. On the other hand, contribution of Manufacturing industry sub-sector to the provincial economy was minimal, having only a 4.8 % share.

Potential for Development

3. North Sulawesi Province is one of the natural resource rich provinces in Eastern Indonesia. The available natural resources include suitable soil for agriculture, food cropping and animal husbandry, fisheries and minerals. Development of Bitung fishery port will be realized during the coming REPELITA VI in the anticipation of promoting the fishery activities.

4. The government of North Sulawesi has established a 100 hectare industrial area adjacent to the municipality of Bitung. Kabima (Kauditan, Bitung, Kema) Industrial Estate is expected to play the most central role in the industrial activities in the northern part of Eastern Indonesia, and its expansion by 300 hectares has been proposed. In addition, the potential of North Sulawesi for electric power is huge, estimated at 3,000 megawatts. Hydraulic energy can be found on 30 rivers while only 125 megawatts were exploited in 1991. Geothermal energy resources are also found and partially tapped.

5. The provincial government as well as national government is eager to see the northern coastal area of the province near Likupang become the largest resort area in the northern part of Eastern Indonesia. Construction works are under way to widen and to pave the existing narrow strip leading to Likupang. A runway of Manado airport will be extended to 3,000 m from the existing 2,500 m in order to improve its function as an international airport.

6. A new economic zone concept has been proposed. "Triangle Zone of Economic Growth in East ASEAN" involves three islands of four nations, which are Mindanao Island in the Philippines, Sulawesi Island in Indonesia, Borneo Island which is shared by Indonesia, Malaysia and Brunei. Forty million people live in this zone, and this

economic zone concept aims at achieving economic growth in the whole triangle zone by mutually combining natural, agricultural, fishery, and human resources as well as social infrastructures in the zone. North Sulawesi is expected to play vital roles in this concept.

7. As mentioned above, North Sulawesi Province is expected to play leading roles as a development center in the northern part of Eastern Indonesia through utilizing its rich natural resources and locational advantages. Industrialization should be promoted to pursue this goal, and Kabima industrial zone will gradually but steadily be activated centering around agro-industry or light industry. More port traffic, especially container traffic, will be generated with the increase of economic activities in the hinterland where an annual economic growth rate of at least 7% is expected. Thus, improvement of infrastructures and strengthening of the gateway function of Bitung port is a must to achieve the regional economic development.

Port of Bitung

8. Port of Bitung is situated on sheltered waters of Lembeh Strait at the northern end of Sulawesi Island. The port is not only the principal port of North Sulawesi Province, but also an important base of sea transport linking Sulawesi, Maluku and West Irian Jaya. Public port facilities at Bitung port are managed by the branch office of PERSERO IV as a class two commercial port. ADPEL office, under KANWIL control, supervises the overall port operation as governmental coordinator.

9. At the public port of Bitung, there is Oceangoing Wharf (-9 m) of 605 m in length, Interisland Wharf (-6 m) of 502 m in length, Chemical Based Industry Wharf (-6 m) of 146 m in length, and Local & Sailing Wharf (-5 m) of 60 m in length. PERTAMINA Jetty can be found 400 m to the west from Oceangoing Wharf. To the east of the main quay a new ferry jetty was constructed by DGLT, and its operation commenced on 6 May 1993 between Bitung and Ternate.

10. The public wharves handled 1,176,794 tons of cargo, and 198,209 passengers embarked or disembarked at the port in 1992. Of the total cargo, about 20 percent was exported. Among the unloading cargoes, daily necessities, cement and rice are the major commodities and account for 65 %. Total volume of public cargo increased at an annual growth rate of 7.85 % from 1984 to 1992. Average Berth Occupancy Ratio of the entire port was 64 %, and Berth Throughput was 1,270 ton/m at Oceangoing Wharf and 310 ton/m at Interisland Wharf in 1992.

11. Container handling at the port of Bitung started before 1984. Since then container traffic has shown a steady increase, and reached 70,226 tons in 1992. The annual growth rate of the container traffic at the port during past years has been about 30 % and is expected to keep its high growth rate even in future. The port of Bitung, however, is presently lacking adequate container handling capability, and it has been asserted that this insufficiency of the container handling capability at the port of Bitung is one of the serious hindrances to the economic development of North Sulawesi.

12. Because the port of Bitung is located near downtown Bitung, traffic generated from port activities sometimes caused traffic congestion near the port gates. In order to achieve harmonized development between the city and port, traffic to/from the port should be treated appropriately.

Short Term Development Plan

13. Short term development plan for the port of Bitung for the year of 2000 has been made. The following development policies are set;

- (a) Bitung port should not be a hindrance to regional economic development.
- (b) Container handling capability of the Bitung port should be significantly improved.
- (c) Bitung port should be improved as the gateway port in the northern part of Eastern Indonesia.

14. Based on the above development policies, the following planning framework is agreed among DGSC, PERSERO IV, and JICA study team;

- (a) Port of Manado will be closed and converted to a marina. Existing function of Manado port will be moved to Likupang port.
- (b) Fishery boats at Bitung port will be moved to a new fishery port.
- (c) Cement packing plant will be constructed at Interisland Wharf.

15. The cargo throughput at the year of 2000 is estimated at 2,119,000 tons including 332,000 tons of containerized cargo. Two hundred and sixty thousand tons of cement, which is the major solid bulk cargo at the port, will be transported by cement bulk carriers.

16. Based on the evaluation of cargo handling capacity of the existing berths, construction of a specialized container berth with yard and a bulk cement berth is proposed to accommodate the anticipated seaborne traffic. Alongside water depth of the above berths is 7.5 m. The site which is located between the existing Interisland Wharf and the Ferry Jetty is proposed for the location of the new berthing facilities. A passway along Interisland Wharf should also be developed to smoothen traffic in the port area. Equipment for handling containers and heavy cargoes is proposed for procurement as well as vessels for port operation. Development of an access road is also proposed to avoid traffic congestion around the port area.

17. Preliminary design for new infrastructures was carried out based on the actual soil data obtained through the natural condition survey. Calmness at the basin was also taken into consideration when type of structures was selected. Locally produced materials and precast members manufactured on land were encouraged to be used in the construction works. Pier type with pile foundations was selected as the most suitable structural type for both the berths.

18. Cost estimation was carried out based on the preliminary design of the major facilities and the implementation program. It will take two years each for the construction works of both Bulk Cement Berth and Specialized Container Berth. Total construction cost of Bulk Cement Berth amounts to Rp. 20,521 million and foreign portion is Rp. 4,993 million accounting for 24.3 %. On the other hand, total construction cost including infrastructure, superstructure, and equipment of Specialized Container Berth with yard amounts to Rp. 52,197 million and foreign portion is Rp. 19,436 million accounting for 37.2 %.

19. Environmental Impact Assessment concerning the port development of Bitung was carried out for the three stages: port construction stage, port existence stage, and port utilization stage. Computer simulation technique is applied to investigate possible magnitude of environmental impact regarding water quality. It is estimated that the impact to the environment around Bitung port by this project will be permissibly small.

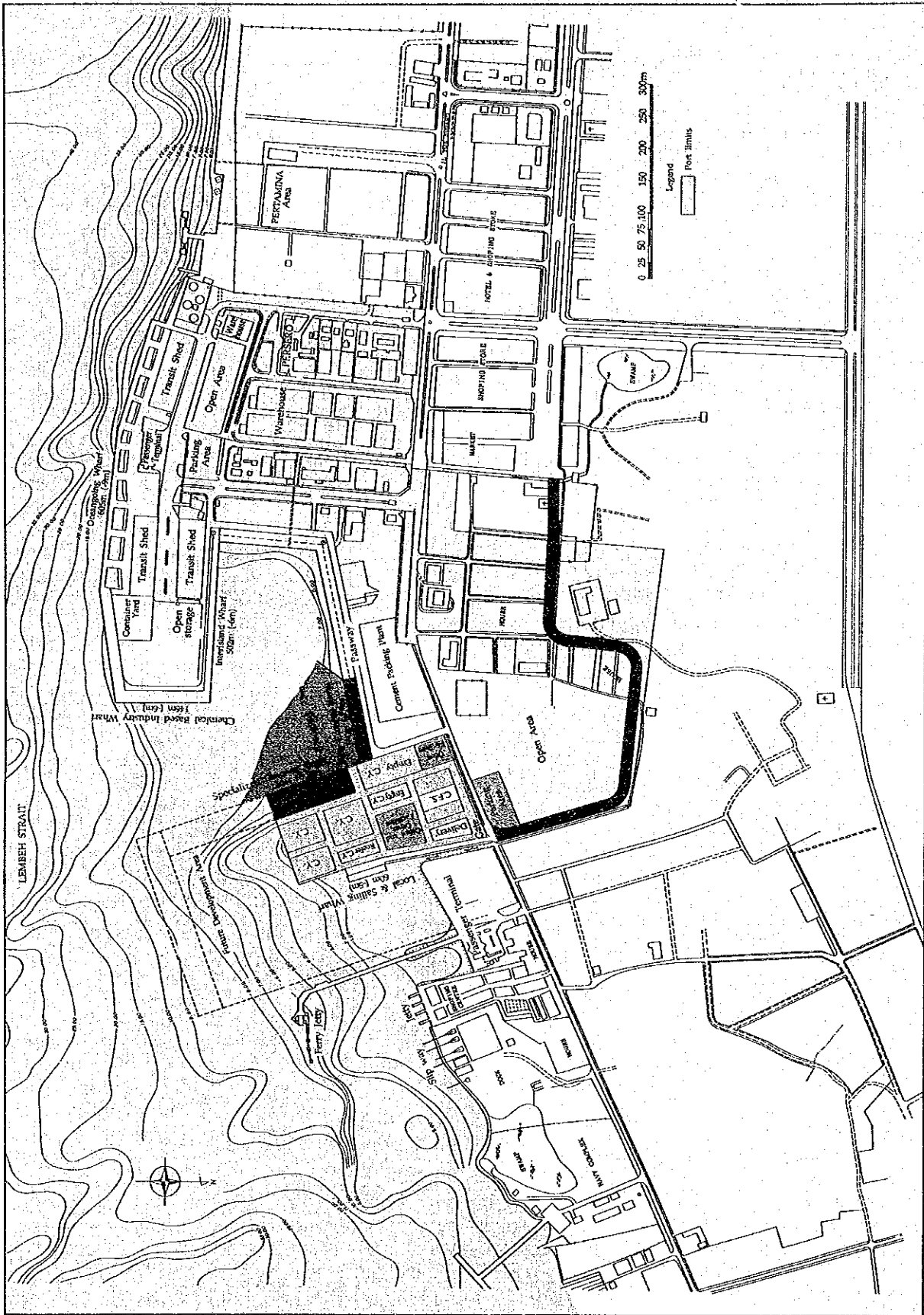


Figure 1 Bitung Port Development Plan (2000)

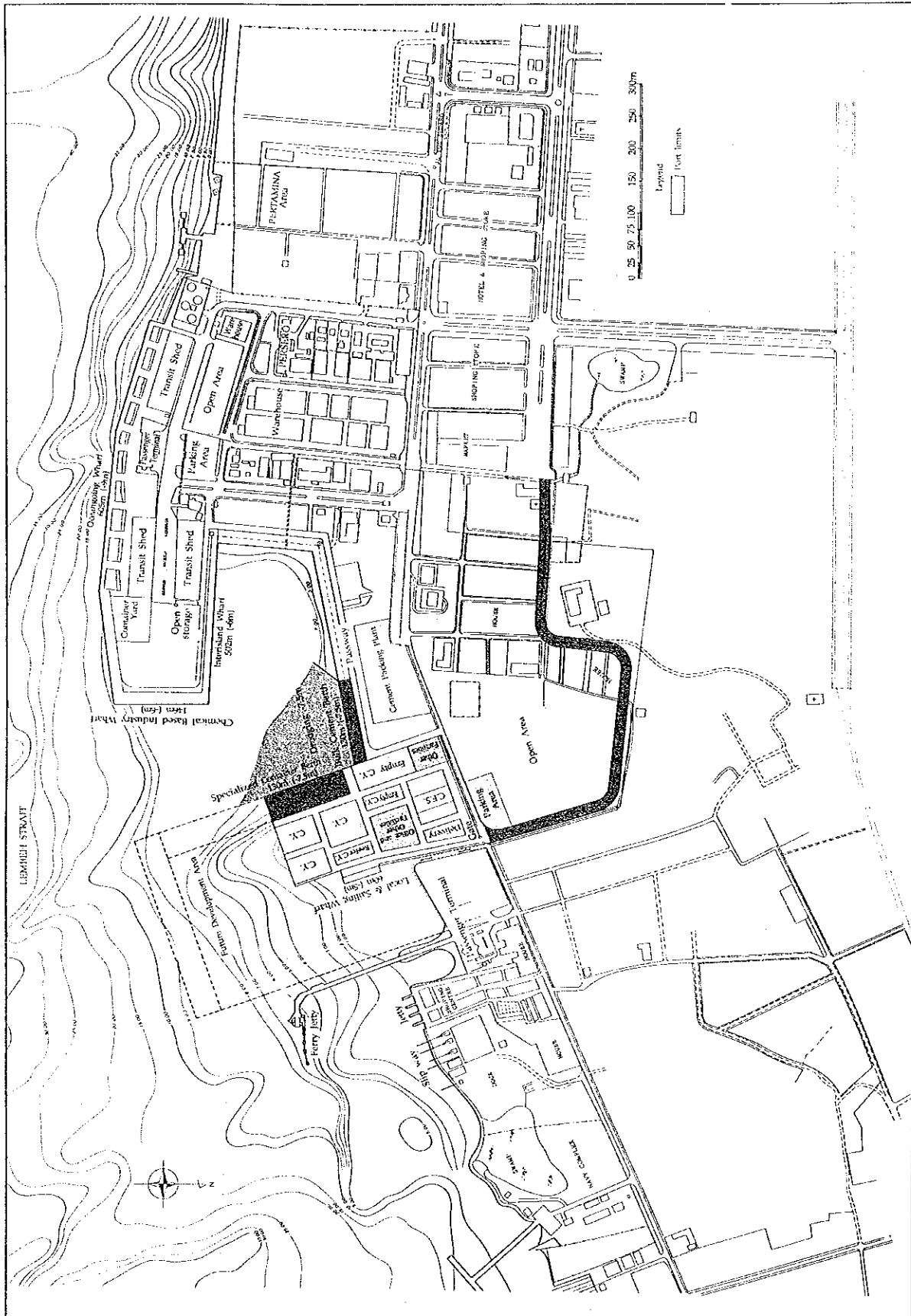


Figure 1 Bitung Port Development Plan (2000)

20. Evaluation from national economy point of view of the development project of the Bulk Cement Berth and the Specialized Container Berth was carried out by the internal rate of return (IRR) calculated through cost benefit analysis. Economic benefit is mainly accrued from the saving in ship's waiting time for berthing. Calculated IRR for the new berths is 16.4% under a 30-year project life. This figure clearly exceeds the international benchmark. Accordingly, this project can be considered economically feasible.

21. The viability of the project is analyzed using the Financial Internal Rate of Return (FIRR) by means of the discount cash flow method. The influence on the financial soundness of the port management body during the project life is also analyzed based on its projected financial statements. The FIRR is calculated as 7.5 %, which exceeds 2.21% of the weighted average interest rate of the funds in this study, and PERSERO IV will need only nine years after starting operation to clear cumulative deficit in case that total construction costs are borne by the government. The project can be regarded as financially feasible if the government funds are raised in this manner.

I-2 RECOMMENDATIONS

In accordance with the results of the study and the results of the discussions with the counterpart institutions and the team, it is recommended that the Government of Indonesia implement the Development Project of the port of Bitung with the target year of 2000 to cope with the forecast demand of port traffic and promote economic development of the hinterland region.

Projects Included in the Feasibility Analysis

1) Specialized Container Berth

- Project site : Present Port of Bitung
- Dimensions : Terminal area 4.3 ha
- Berth : Length 130 m, Water depth 7.5 m
- Revetment : Length 400 m
- Reclamation : 62,000 m³
- Main facilities:
 - Apron : 5,200 m²
 - Container yard : 15,000 m² (Excluding road)
 - CFS : 1,800 m²
 - Parking area : 3,500 m²
 - Other facilities : 2,500 m²
- Access road : Length 810 m, Width 17 m
- Onshore Mechanical Equipment
 - Container handling mobile crane (35t) 1 unit
 - (50t) 1
 - Tractor units (tug master) 3
 - 12m trailers 3
 - Reach stacker crane (top lifter) (35t) 1
 - Forklift trucks (2t) 2
 - Forklift trucks (10t) 1

2) Bulk Cement Berth

- Project site : Present Port of Bitung
- Berth : Length 130 m, Water depth 7.5 m
- Revetment : 150 m
- Other facility : Apron 2,600m²

3) Floating Craft for Port Operation

Tug	(2 x 750 HP)	1
Mooring boat	(2 x 80 HP)	1
Pilot boat	(2 x 200 HP)	1

Port Operation

- (a) Introduction of flexibility in gang formation for cargo handling
- (b) Maintaining the cargo handling equipment in good condition
- (c) Training and improvement of working conditions for port labor
- (d) Effective utilization of open yard
- (e) Specialization of the wharf step by step
- (f) Establishment of a new sub division to operate the Specialized Container Berth and yard

Environmental Preservation

- (a) When dredging is carried out, silt protector should be set up around the dredging area.
- (b) Reclamation works should be started after revetments are completed.
- (c) The sewage generated by port activities must be treated adequately.
- (d) Bilge generated by vessels must be treated adequately.
- (e) Drainage generated by civic life should not flow into the closed port sea area.

II. Feasibility Study of Port of Kupang

II-1 CONCLUSIONS

Socioeconomic Profile of East Nusa Tenggara

22. East Nusa Tenggara Province had a population of 3.3 million in 1990, showing a population growth rate of 1.79% from 1980, which was one of the lowest growth rates in Eastern Indonesia. Per capita GRDP excluding oil and gas sector was Rp.314,000 in 1989, which was only 39 per cent of the national average. Furthermore, its annual growth rate was 3.4 per cent, which was far below the national average of 5.7 per cent during the same period. Thus, East Nusa Tenggara was one of the least developed provinces in Indonesia.

23. In East Nusa Tenggara Province, approximately 85% of the population earned their living in the agriculture sector. The agricultural sector played a dominant role in the formation of the GRDP of this province with its contribution of 50.1% in 1990. The second largest sub-sector in the provincial GRDP was Public administration & Defense with the contribution of 15.7%. On the other hand, the industrial sector had grown very slowly as seen in its contribution of only 2% to GRDP.

Potential for Development

24. Kupang together with Darwin is expected to play roles as a logistic and supply base for materials, air transportation, and other logistic supports for offshore drilling in Area A of Timor Gap Project. A total of 45 wells will be drilled, with more than 20 exploration wells drilled in the first three years, amounting to a total exploration budget in excess of US\$362 million. It is said that over the next few years, 20 international companies will explore the Timor Gap and the surrounding Timor Sea.

25. A public cement factory, PT. Semen Kupang, has an installed production capacity of 120,000 ton/year, and the factory is located on the hill about one km away from the port of Kupang. The cement factory has been proposing that its production capacity be increased up to 620,000 ton/year in order to meet the increasing demand of cement in the region.

26. There is another cement production project at Kupang. Memorandum of understanding has been exchanged between Czech (formerly Czechoslovakia) government and East Nusa Tenggara provincial government to establish a new cement factory with production capacity of 1,500,000 ton/year. The proposed site for the new cement factory is about 4 km south of the port of Kupang.

27. Southern area of Kupang port will be developed as an industrial zone, which will include 400 ha of land for the Timor Gap project-related industries. Road in the south of the port of Kupang is currently only 6 m wide, and will be improved to 18 m wide. Construction of a new road in the proposed industrial zone has been started.

28. Existing fishery jetty, which is adjacently located to the south of the port of Kupang, has been proposed to move further to the south. An area of 200 hectares

of land near Bolok ferry terminal has been prepared for the relocation of the fishery jetty, village and school, and other fishery related facilities.

29. East Nusa Tenggara Province, unlike North Sulawesi Province, is a natural resource poor province, and the primary sector in the province has limited potential for development because of unfavorable soil and weather conditions. The provincial government places the highest priority for policy making on changing its economic structure. Timor Gap Project and Cement Industry Project represent opportunities to attain the above goal. These projects will induce regional industrial development, and fairly contribute to achieve the other policy objectives as well: poverty reduction and output increase. To materialize the projects, construction of port facilities is a must because these projects will generate a considerable volume of new port traffic and require spacious open yards. It should be also noted that insufficient infrastructure in the province has been one of the main causes for poor performance of private investment, and that the government must take initiatives for development in this type of province.

Port of Kupang

30. Port of Kupang is situated near the west end of the Timor Island, and is the main deep water port for East Nusa Tenggara Province. The port is generally well protected by Semau Island from the waves coming from the west. Public port facilities at Kupang port are managed by the branch office of PERSERO III as a class three commercial port.

31. The public facilities are composed of Interisland Wharf of 223 m in length for interisland cargo vessels and Local Wharf of 100 m in length for sailing ships and passenger vessels. Both have around 8 m water depth alongside. The private port facilities along Semau Strait consist of a fishery jetty and a PERTAMINA tankfarm. The former is connected to the shore by a causeway at a distance of about 250 m south of the Interisland Wharf. The latter has an unloading facility further south of the fishery jetty.

32. A total of 309,582 tons of cargo was loaded or unloaded at the public wharves in 1992. The port is characterized as a general cargo port for the province as well as an industrial port of the cement factory. Total cargo traffic has been increasing at an annual growth rate of 12% from 1984 to 1992.

33. Average Berth Occupancy Ratio of the port has been fluctuating over past years such as 89% in 1990 and 57% in 1992. Average Berth Throughput of the port has a clear peak in 1990 with 1,027 ton/m, and its value in 1992 was 781 ton/m.

34. Container handling at the port of Kupang started in 1990, and is still at the initial stage of development although container traffic is growing steadily. Container vessels with ship gears regularly call the port from Darwin to load containers which are stuffed with sandalwood for foreign markets. Domestic semi-container ships are also plied between Kupang and Surabaya.

Short Term Development Plan

35. Short term development plan for the port of Kupang for the year of 2000 has been made. The following development policies are set;

- (a) Government should initiate actions through improving port facilities at Kupang port to promote regional development in East Nusa Tenggara
- (b) Kupang port should be developed to support locally-based industry
- (c) Kupang port should be developed as a leading container port in the region
- (d) Kupang port should be developed to support oil exploration projects in Timor Gap and Timor Sea

36. Besides the above development policies, the following planning framework is proposed;

- (a) Berthing space for people's and local shipping should be expanded in the light of their significant roles
- (b) Local Wharf should be expanded to accommodate a new passenger ship, which has about 140 m in length.

37. A total of 741,000 tons of cargo is forecast at the port in 2000. Cement-related cargoes, which are the major commodity group of the port, will reach a total of 401,000 tons a year. Containerization ratio is forecast at 10 %, and 22,000 tons of container cargo will be handled at the port in 2000.

38. Construction of Cement Berth and Heavy Cargo Berth is proposed to accommodate the anticipated seaborne traffic. Alongside water depth of the above berths is 7.5 m. The site which is located between the existing Interisland Wharf and the Fishery Jetty is proposed for the location of the new berthing facilities. A 30 m-wide waterway which passes through the Cement Berth is also proposed to avoid flushing at the rainy season. Development of Rakyat Wharf and extension of Local Wharf are needed to accommodate the anticipated traffic at the port in 2000 although they are treated as on-going projects in this study. Equipment for handling containers and heavy cargoes is proposed for procurement as well as a vessel for port operation. Development of access road is also proposed to smoothen container traffic between the public port and the proposed industrial area.

39. Preliminary design for new infrastructures was carried out based on the actual soil data obtained through the natural condition survey. Locally produced materials and precast members manufactured on land were encouraged to be used in the construction works. Pier type with pile foundations was selected as the most suitable structural type for both the Cement Berth and the Heavy Cargo Berth.

40. Cost estimation is carried out based on the preliminary design of the major facilities and the implementation program. It will take two years each for the construction works of both the Cement Berth and Heavy Cargo Berth. Total construction cost of the former amounts to Rp. 21,451 million and foreign portion is Rp. 1,544 million accounting for 7.2 %. On the other hand, that of the latter with a yard and equipment amounts to Rp. 18,346 million and foreign portion is Rp. 3,317 million accounting for 18.1 %.

41. Environmental Impact Assessment concerning the port development of Kupang was carried out in the same manner as the development study at the port of Bitung. It is estimated that the impact to the environment around Kupang port by this project will be permissibly small.

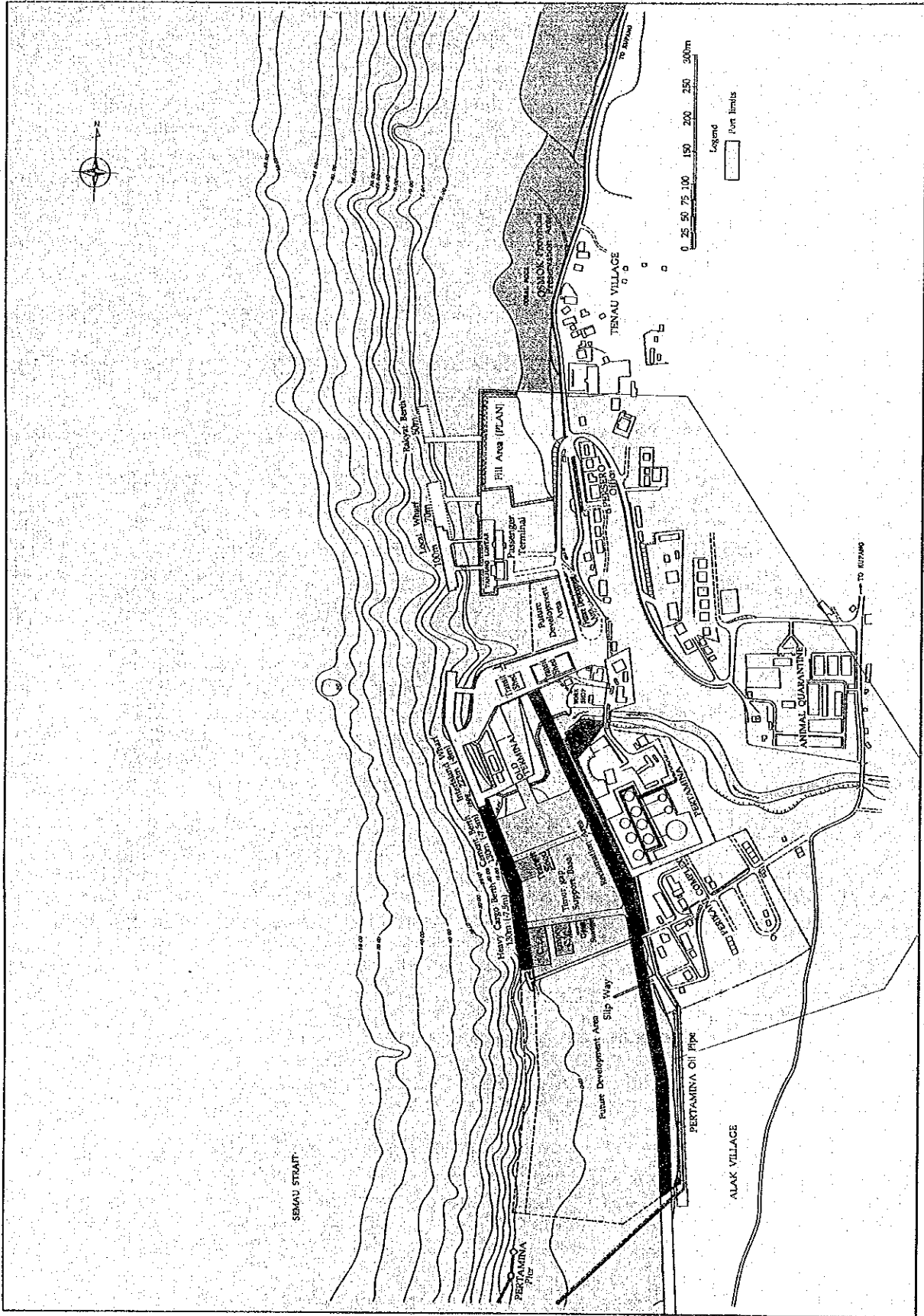


Figure 2 Kupang Port Development Plan (2000)

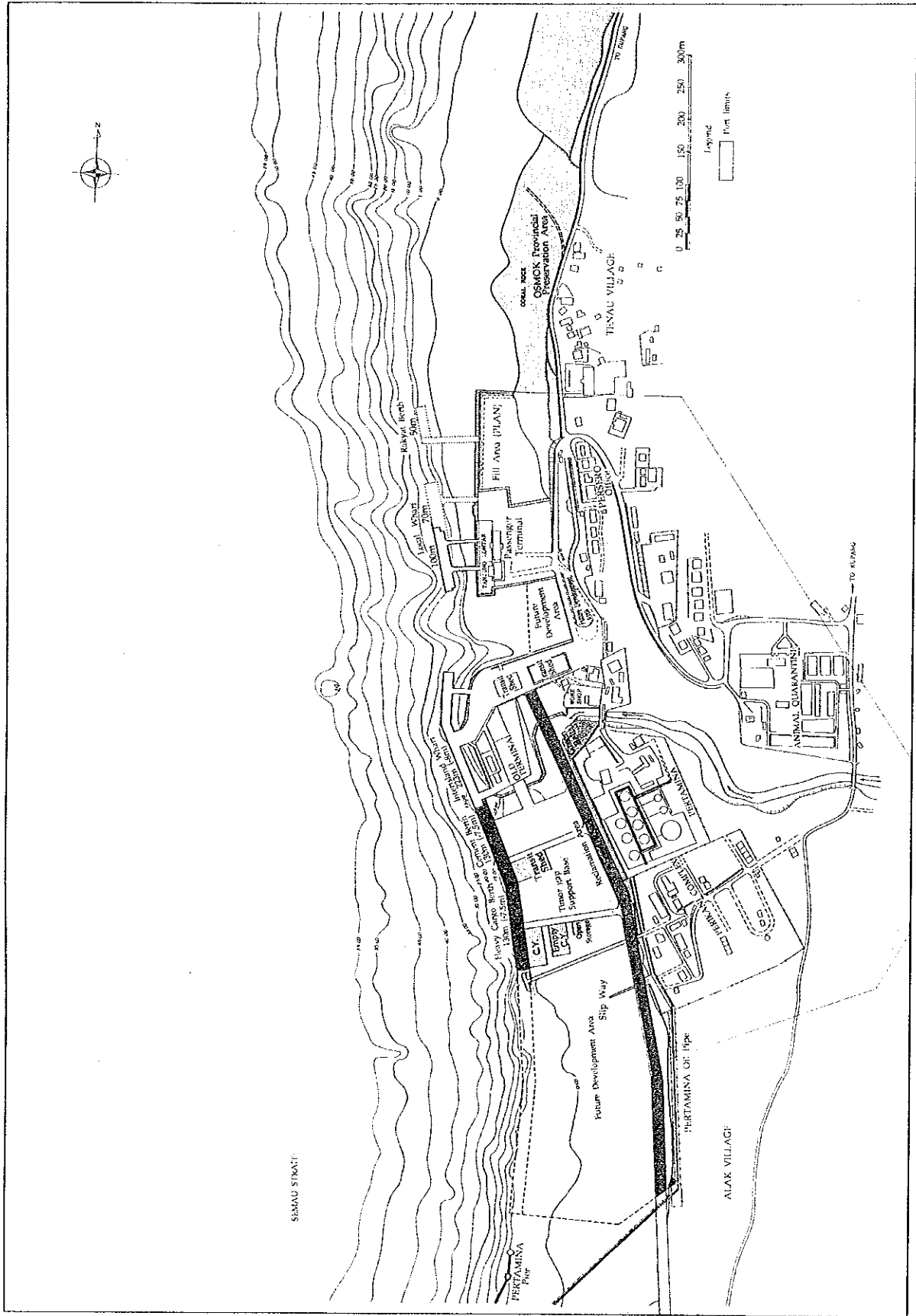


Figure 2 Kupang Port Development Plan (2000)

42. Economic analysis is carried out for the development project of the Cement Berth and the Heavy Cargo Berth. Economic benefit is generated from the saving in ship's waiting time for berthing. Calculated IRR for the new berths is 15.3% with a 30-year project life, and exceeds the international benchmark. Accordingly, this project can be considered economically feasible.

43. The Financial Internal Rate of Return (FIRR) is calculated for the development project at the port of Kupang. The influence on the financial soundness of the port management body during the project life is also analyzed based on its projected financial statements. The FIRR is calculated as 5.9 %, which exceeds 2.21% of the weighted average interest rate of the funds in this study, and PERSERO III will need ten years after starting operation to clear cumulative deficit in case that total construction costs are borne by the government. The project can be regarded as financially feasible if the government funds are raised in this manner.

II-2 RECOMMENDATIONS

In accordance with the results of the study and the results of the discussions with the counterpart institutions and the team, it is recommended that the Government of Indonesia implement the Development Project of the port of Kupang with the target year of 2000 to cope with the forecast demand of port traffic and promote economic development of the hinterland region.

Projects Included in the Feasibility Analysis

1) Cement Berth

- Project site : Present Port of Kupang
- Berth : Length 130 m, Water depth 7.5 m
- Other Facilities:
 - : Apron 2,600 m²
 - : Shed 1,700 m²
- Revetment : 240 m
- Reclamation : 64,000 m³
- Waterway : Length 100m, Width 30 m

2) Heavy Cargo Berth

- Project site : Present Port of Kupang
- Berth : Length 130 m, Water depth 7.5 m
- Revetment : Length 300 m (Including an existing 175 m causeway)
- Reclamation : 96,000 m³
- Main facilities:
 - Apron : 2,600 m²
 - Container yard: 3,200 m²
 - Open storage : 600 m²

- Other facility: Timor Gap Support Base: 14,000 m²
 - Onshore Mechanical Equipment
 - Heavy duty mobile crane (50t) 1 unit
 - Forklift trucks (24t) 1
 - Forklift trucks (2t) 1
 - Access road: Length 1,150 m, Width 17 m
- 3) Floating craft
- Tug : (2 x 400 HP) 1 unit

Port Operation

- (a) Introduction of flexibility in gang formation and allocation of port labor
- (b) Adequate coordination with land transport by truck
- (c) Maintaining cargo handling equipment in good condition
- (d) Training and improvement of working conditions for port labor
- (e) Specialization of cargo handling at the Cement Berth

Environmental Preservation

- (a) Reclamation works should be started after revetments are completed.
- (b) The sewage generated by port activities must be treated adequately.
- (c) Bilge generated by vessels must be treated adequately.
- (d) When bulk cargoes are handled, any cargo handling system in which diffusion of dust can be prevented should be adopted.

PART I

FEASIBILITY STUDY OF PORT OF BITUNG

Chapter 1 SOCIO-ECONOMIC PROFILE OF NORTH SULAWESI PROVINCE

A. Geographical Features

Land Area

1. The North Sulawesi province, where the port of Bitung is located, is one of the four provinces in Sulawesi Island, the others being, Central Sulawesi, South Sulawesi and South East Sulawesi province. This province is bounded on the north by the Sulawesi Sea, on the south by Banda Sea, on the east by Maluku Sea, and the west by the Central Sulawesi province.

2. The North Sulawesi province has a total land area of 2,748,763 ha(1.4 % of Indonesia's total land area) and is composed of three second level Municipalities viz., Manado, Gorontalo, Bitung and four second level Regencies viz., Bolaang Mongondow, Minahasa, Gorontalo, Sangihe Talaud. Manado Municipality is the provincial center.

Land Form

3. The area of the North Sulawesi lies in the north peninsula of Sulawesi Island, including the group of Sangihe Talaud.

4. At the portion of the Sulawesi Island along the strait, volcanic mountains of Mt.Duasudara with an altitude of 1,351 m and Mt.Batuangus with an altitude of 1,109 m are located inland at a distance of 7 to 8 km from the coastline. The land use in the North Sulawesi province is dominated by forest land use which covers 1,876,083 ha(68.3 % of the province's total land area). Secondary land use in this province is for plantations and pastures.

Climate

5. The North Sulawesi province belongs to the tropical zone. This area is affected by monsoon winds with two regular seasons, that is, dry season (from April to September) and rainy season (from October to March).

Coast

6. The coastal features of North Sulawesi are characterized in the north by high capes formed by spurs from the high mountains that rise a short distance within the more or less hilly coast. Sandy beaches often lie between these high capes with numerous reefs lying within the charted 200 m depth contour. Numerous small islands lie close to the coast. The south coast varies considerably geomorphologically with all the features and processes of a typical coastline, from coastal plains to steep shores, bays, a strait, a coral barrier reef with navigation channel, and deltaic marshy areas.

B. Administrative Subdivision

Local Government

7. In Indonesia, there are five types of local government units: the province (Propinsi), the municipality (Kotamadya), the regency (Kabupaten), the sub-regency (Kecamatan) and the village (Kelurahan).

1) Province (Propinsi)

8. The province is the first level region. There are 27 provinces (including DAERAH ISTIMEWA Ache, DAERAH KHUSUS IBUKOTA Jakarta and DAERAH ISTIMEWA Yogyakarta). The governor of the province is appointed by the president of Indonesia. His term of office is five years.

2) Municipality (Kotamadya)

9. The municipality is the second level region. There are about 60 municipalities in Indonesia. The Mayor of the municipality is appointed by the governor of the province. His term of office is five years.

3) Regency (Kabupaten)

10. The regency is the second level region. There are about 240 regencies in Indonesia. The Regent of the regency is appointed by the governor of the province. His term of office is five years.

4) Sub-district (Kecamatan)

11. The sub-district is under the second level region. There are about 3,600 sub-districts in Indonesia.

5) Village (Kelurahan)

12. The village is under the second level region. The village is one of the smallest units in local government in Indonesia.

Number of Local Governments in North Sulawesi

13. The number of municipalities, regencies, sub-districts and villages in the North Sulawesi province is shown in Table 1-1. According to this table, there are three municipalities, four regencies, 85 sub-districts and 1,374 villages in this province. The location of above municipalities and regencies is shown in Figure 1-1.

Table 1-1 Area and Number of Administrative Units
in North Sulawesi Province (1990)

Regency/Municipality	Area		Number	
	(ha)	(%)	Sub-district	Village
Gorontalo Regency	1,215,065	44.2	16	279
Bolaang Mongondow Regency	835,804	30.4	15	220
Minahasa Regency	418,920	15.2	27	497
Sangihe Talaud Regency	226,395	8.2	16	221
Gorontalo Municipality	6,479	0.2	3	45
Manado Municipality	15,700	0.6	5	68
Bitung Municipality	30,400	1.1	3	44
Total	248,574	9.1	24	334

Source: BAPPEDA Manado

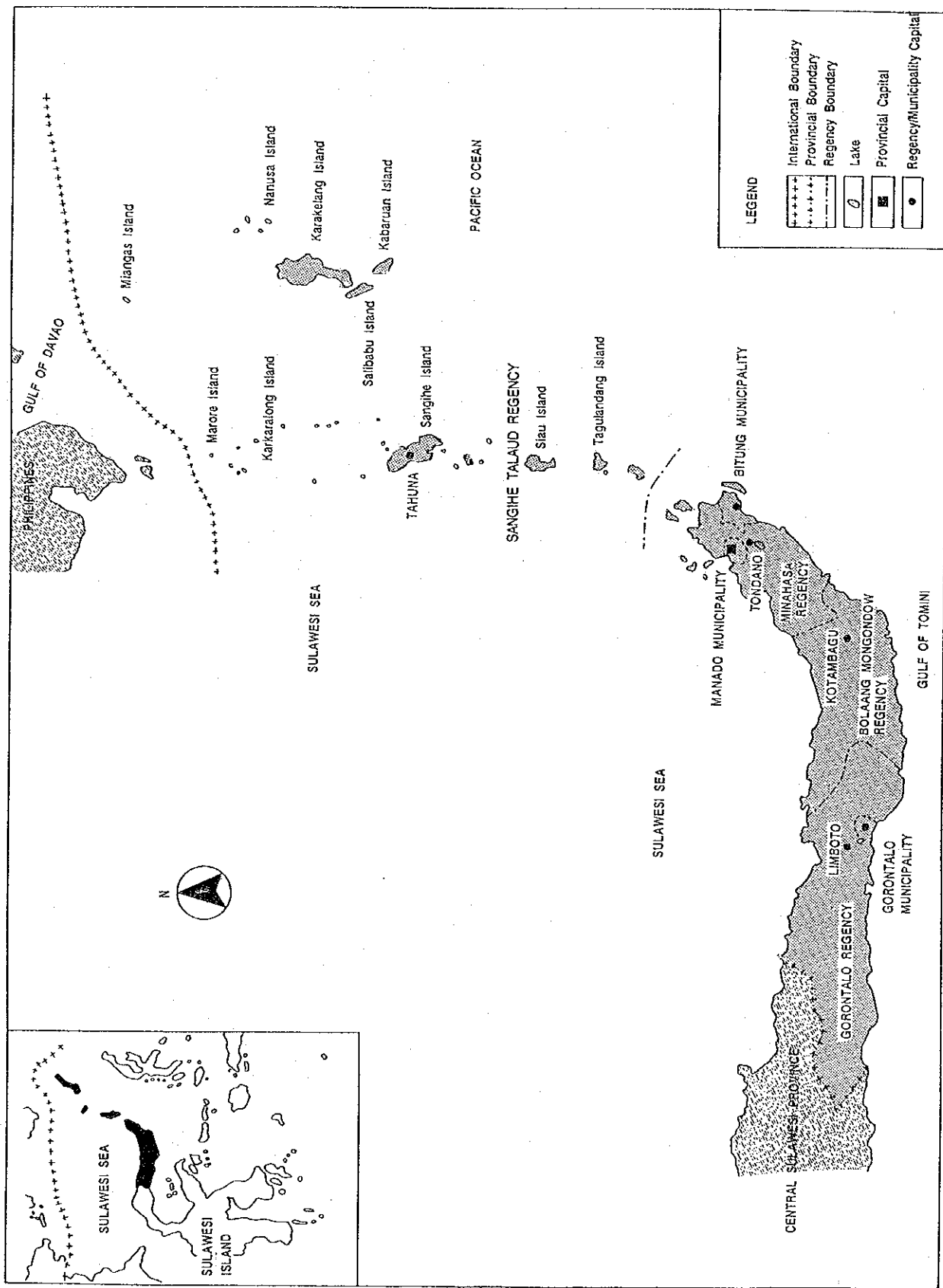


Figure 1-1 Administrative Division North Sulawesi Province

C. Demographic Features

14. As of the 1991 Result of Population Registration at End of Year, the province has a total population of 2,493,251 with an average ratio of 91 persons per square kilometer (Table 1-2). Out of the total population, 102,553 and 317,614 people reside in Bitung and Manado municipality respectively, and 714,813 reside in Minahasa regency.

Table 1-2 Movement of Population and Density

Region	Population			Area (km ²)	Density (Person/km ²)
	1985	1990	1991		
North Sulawesi Province	2,250,714	2,455,798	2,493,251	27,487.63	91
Gorontalo Regency	544,472	595,982	599,126	12,150.65	49
Bollang Mongodow Regency	331,035	357,555	379,277	8,358.04	45
Minahasa Regency	718,582	703,193	714,813	4,189.20	171
Sangihe Talaud Regency	243,025	259,386	260,091	2,263.95	115
Gorontalo Municipality	103,172	119,566	119,777	64.79	1,849
Manado Municipality	223,904	313,323	317,614	157.00	2,018
Bitung Municipality	86,524	106,793	102,553	304.00	337

Source: KANTOR STATISTIK PROPISI SULAWESI UTARA

15. According to this Table, the population of the North Sulawesi province has gradually increased from 1985 to 1991. However, the population of Bitung municipality decreased from 1990 to 1991.

D. Economic and Industrial Features

General

16. There are multifarious natural resources in the North Sulawesi province. Current utilization of these resources is described below:

a) Agriculture

As an agriculture region, North Sulawesi area relies on foodcrops, second crops, horticulture, fishery, animal husbandry, plantation and forestry

b) Maritime

This region has vast maritime area and vast potential, but only a small portion of this area is being utilized.

c) Mineral

Despite adequate volume of mineral resources, no effort has yet been made to intensively exploit them.

Gross Regional Domestic Product

17. Gross Regional domestic Product (GRDP) in the North Sulawesi province is shown in Table 1-3. According to this Table, there was a rapid increase during this period regarding the total GRDP. The agriculture sector of GRDP has the largest share in this province. Regarding the growth rate of GRDP by sector, the mining & quarrying sector and the banking & other financial intermediaries sector had higher growth rate than that of the other sectors.

Table 1-3 GRDP of North Sulawesi Province at Constant Prices by Origin (1983-1990)

Unit: Million Rp. (1983 prices)

Industrial Origin	Year								Growth R (%) ('83-'90)
	1983	1984	1985	1986	1987	1988	1989	1990	
Agriculture	240,930	224,218	234,223	249,439	267,844	292,095	307,570	354,018	5.65
Mining & Quarrying	2,766	2,906	3,183	3,546	4,204	6,385	7,166	8,492	17.38
Manufacturing industries	36,261	38,377	40,073	37,919	39,227	40,111	42,739	45,973	3.45
Elect., Gas & Water supply	5,423	5,633	6,122	6,839	7,220	7,978	8,662	9,418	8.20
Construction	40,547	44,652	49,331	44,495	44,576	45,828	47,080	48,516	2.60
Trade, Resturant & Hotel	90,157	92,193	94,374	97,304	102,244	110,256	116,945	126,928	5.01
Transport & Communication	76,682	81,220	83,422	87,115	93,308	102,477	108,343	116,053	6.10
Banking & Other financial intermediaries	11,660	12,646	10,666	11,199	13,309	18,388	26,840	33,413	16.23
Ownership of dwelling	20,033	20,454	20,883	21,244	22,148	23,088	24,067	25,093	3.27
Public adm. & Defence	105,043	113,232	115,496	121,447	125,645	127,149	130,964	134,751	3.62
Services	42,148	45,749	46,778	49,461	50,116	51,270	52,911	54,827	3.83
Total	671,650	681,280	704,551	730,008	769,841	825,025	873,287	957,482	5.20

Source: BIRO PUSAT STATISTIK JAKARTA-INDONESIA

Agriculture

18. Agriculture in the North Sulawesi province is mainly characterized by the coconut plantations which are equally spread throughout the province. The other industrial plants coming after coconut are clove, nutmeg, coffee, rice, corn and miscellaneous tubers. Other plants like soybean, vanilla and ginger have just been developed on a larger scale cultivation in keeping with the steadily increasing demand. Also considered to have potential for development, among others, are cashew nut, palm, garlic, onion, cinnamon, fruits, flowers, asparagus and others.