社会開発協力部報告書

NO. 3

THE REPUBLIC OF INDONESIA

FINAL REPORT
FOR
THE STUDY ON MARITIME SAFETY PLAN
CONCERNING
SEARCH AND RESCUE

LONG-TERM DEVELOPMENT PLAN

FEBRUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

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18825

PREFACE

In response to a request from the Government of the Republic of Indonesia, the Japanese Government decided to conduct a study on the Maritime Safety Plan concerning Search and Rescue in the Republic of Indonesia and entrusted the survey to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a survey team headed by Mr. Reijiro Shiobara from October to December, 1987 and Mr. Inehiko Yoshino of the Japan Association for Preventing Marine Accidents from July to September, 1988.

The team held discussions with concerned officials of the Government of Indonesia, and conducted field surveys.

After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the development of the Project and to the promotion of friendly relations between our two countries.

I wish to express my sincerest appreciation to the concerned officials of the Government of the Republic of Indonesia for their close cooperation extended to the team.

February, 1989

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

February 21, 1989

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency

Dear Mr. Yanagiya:

We have the honor to submit to you our final report for the Study on Maritime Safety Plan Concerning Search and Rescue in the Republic of Indonesia. It is a great pleasure for us that this Study has been completed under the close cooperation of two governments of Japan and Indonesia.

The final report was prepared during the past 18 months by the Study Team organized by members of Japan Association for Preventing Marine Accidents in association with Japan Life Boat Institution and Yachiyo Engineering Co., Ltd., and headed by Mr. Inehiko Yoshino. It comprises Summary, Long- and Short-term Development Plan, and Supporting Reports.

In preparing this Report, our Team benefited a great deal of the cooperation from officials and experts of Japan International Cooperation Agency and other authorities concerned of the Government of Japan.

On behalf of the study team, I would like to express my deepest appreciation to the officials concerned and other related agencies of the Republic of Indonesia for their enormous cooperation, assistance and warm hospitality extended to the study team members.

We sincerely hope that this Report will contribute to the further development of the Republic of Indonesia.

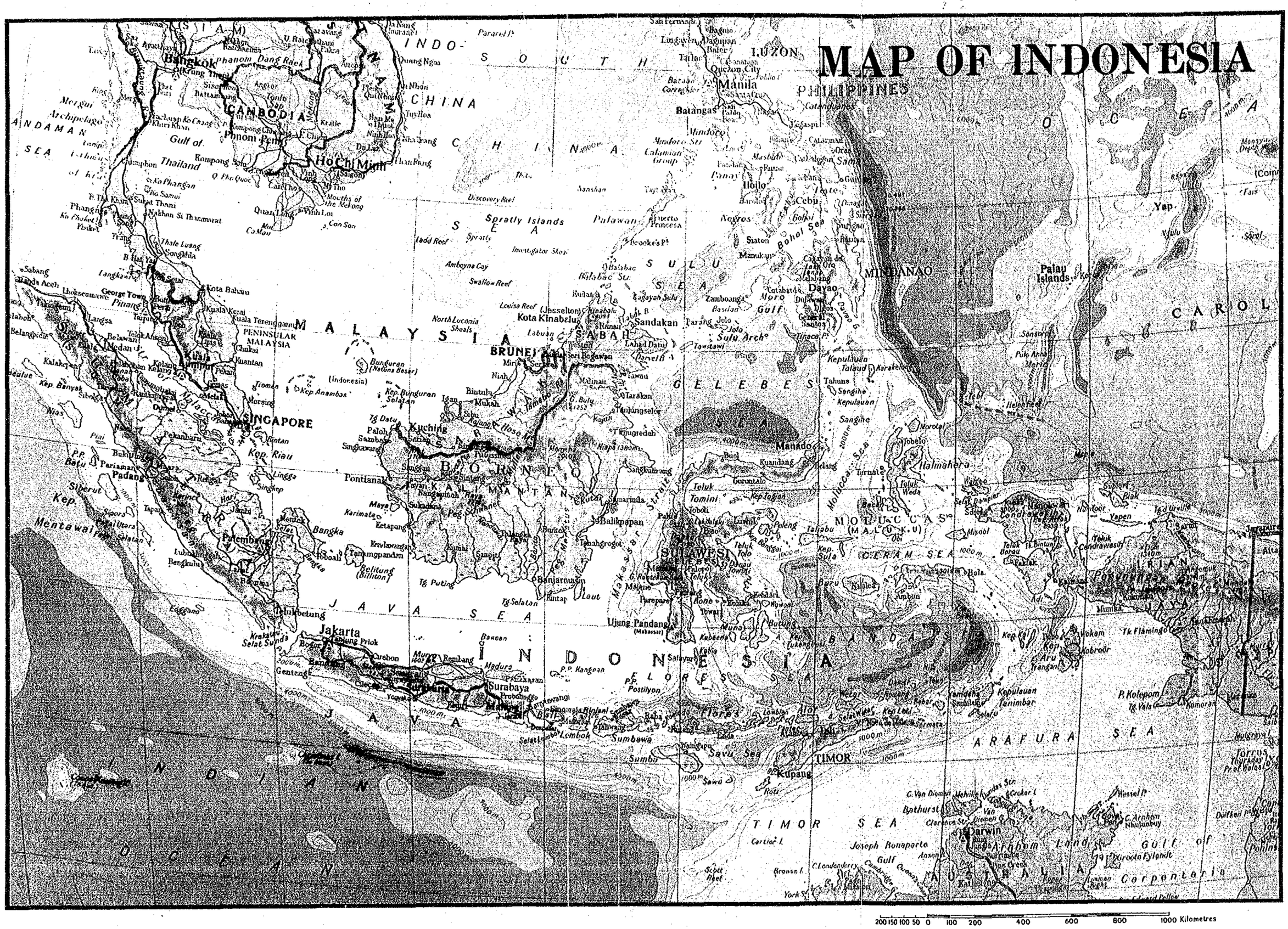
Sincerely yours,

Tadayasu Kodama

Tadayasu Kodama
President
Japan Association
for Preventing Marine Accidents

TK/ma

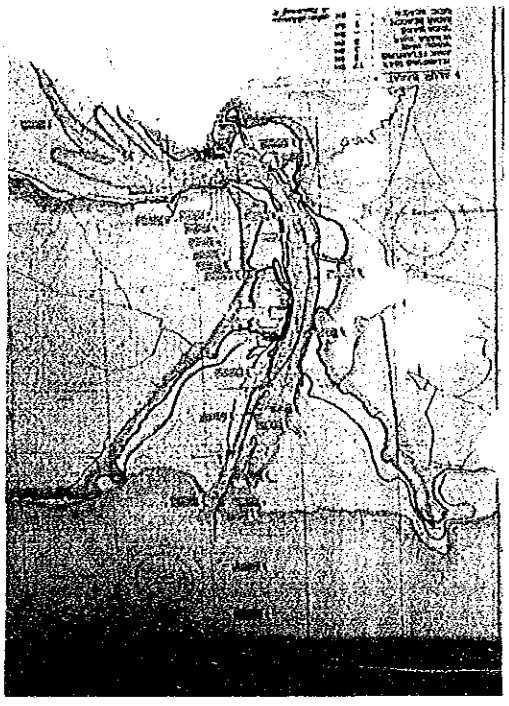
MAP OF INDONESIA



Discussion with the Indonesian counterpart personnel on the Draft Final Report

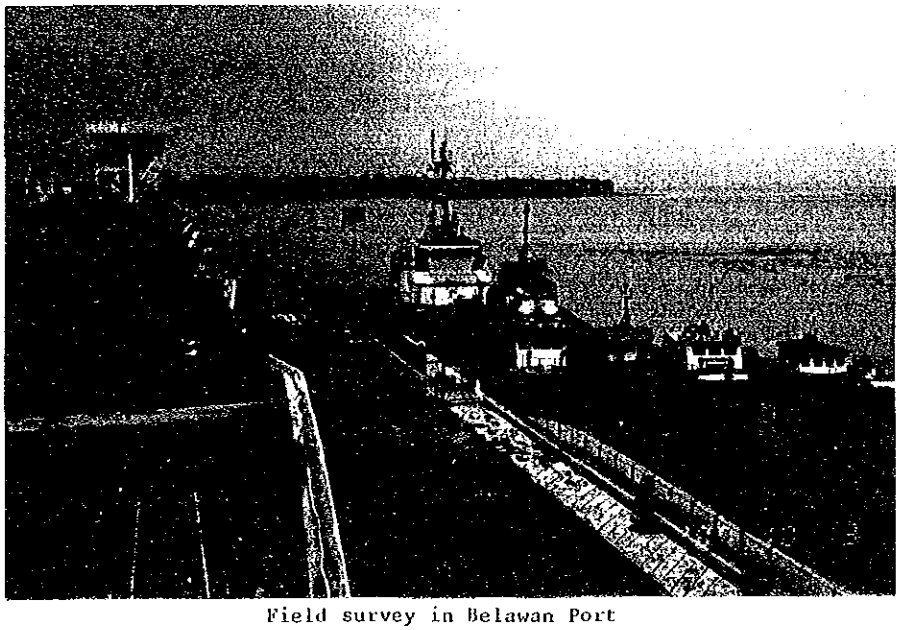
Field survey at a marine educational institute

Rescue equipment

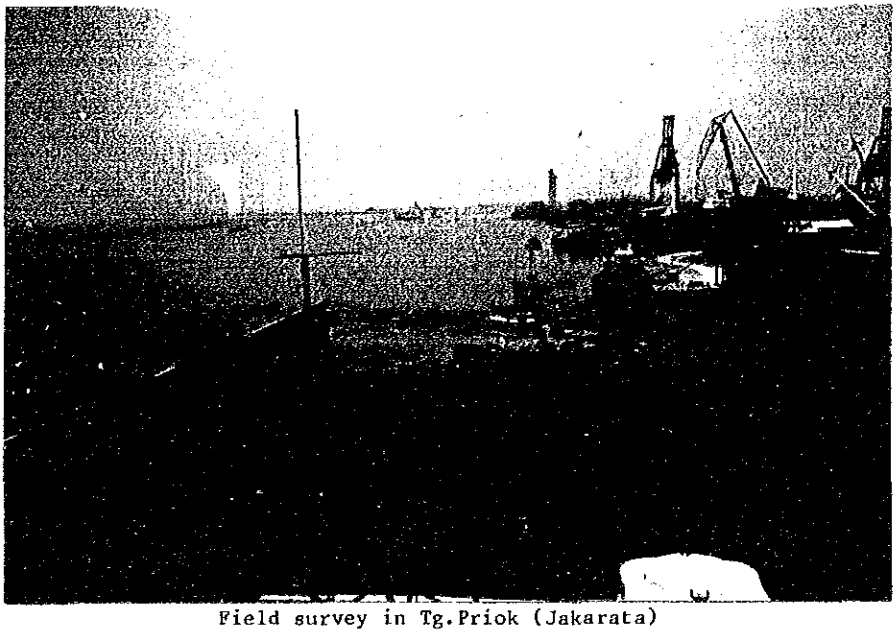


Northern approach to Surabaya

Field survey in Tg.Perak (Surabaya)



Field survey in Belawan Port



Field survey in Tg.Priok (Jakarata)

LONG-TERM DEVELOPMENT PLAN

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ABBREVIATIONS

A		
	ADPEL	Port Administrator Office (Administrasi Pelabuhan)
	AMVER	Automated Mutual Assistance Vessel Rescue System
	ARMADA KPLP	KPLP Fleet
	ARQ	Automatic Request
	ASEAN	Association of Southeast Asian Nations
	AUSREP	Australian Ship Reporting System
B		
	BAG. UMUM	General Affair Division
	BASARI	Indonesian SAR Board
	BASARNAS	National SAR Agency
	BR	Banjarmasin Rescue
C		
	CH	Channel
	COSPAS	Kosmicheskaya Sistyema Poiska Avariynych Sudov (Space system for search of distress vessels)
	CPU	Central Processing Unit
D		
	DISNAV	District of Navigation
	Dit.	Directorate
	DGSC	Directorate General of Sea Communication
	DRCS	Digital Radio Concentrator System
	DSC	Digital Selective Calling
	DWT	Dead Weight Tonnage
E		
	EGS	Engine Generator System
	EPD	Equipment Protection Device
	EPIRB	Emergency Position Indicating Radio Beacon
	ETA	Estimated Time of Arrival

F		
	FAX	Facsimile
	FKSD	Regional SAR Coordination Forum
G		
	GDP	Gross Domestic Product
	GHz	Giga Hertz
	GMDSS	Global Maritime Distress and Safety System
	G & R Dept.	Guard and Rescue Dept.
	G/T	Gross Tonnage
H		
	HB/ADPEL	Harbour Master Office
	HF	High Frequency
	HUKUM	Legal Division
I		
	IMO	International Maritime Organization
	Indonesia	The Republic of Indonesia
	INMARSAT	International Maritime Satellite Organization
	INSPIRES	Indian Ship Position and Information Reporting System
J		
	JASMAR	Directorate of Marine Service
	JASREP	Japanese Ship Reporting System
	JICA	Japan International Cooperation Agency
K		
	KANWIL	Maritime District Office
	KAPPEL	Shipping and Marine Safety
	KEPEGAWAIAN	Personnel Division
	KKR	Rescue Coordination Center
	KPLP	Directorate of Sea and Coast Guard
	KPLP/ADPEL	Sea and Coaster Guard Unit
L		
	LALA/ADPEL	Sea Transportation Unit
	LUT	Local User Terminal

M		
	MCC	Mission Control Center
	MES	Message Exchange System
	METEO	Meteorology
	MF	Medium Frequency
	MIS	Management Information System
	MRDTS	Maritime Radio Direct Telephone System
	MSTEC	Maritime Safety Technology Center
N		
	NAVIGASI	Directorate of Navigation
	NAV/ADPEL	Navigation Unit
	NAVTEX	Navigation Telex
	NBDP	Narrow Band Direct Printing
	NM	Nautical Mile
O		
	OPEC	Organization of Petroleum Exporting Countries
P		
	Pelita/Repelita	Five-year Development Plan
	PELPENG	Port Dredging Division
	PERENCANAAN	Planning Division
	Pertamina	State Owned Oil Company
	Perumpel	Public Port Corporation
	Perumpen	Public Dredging Corporation
	PUSDIKLAT	Education & Training Agency
R		
	RCC	Rescue Coordination Center
	RDP	Radar Data Processor
	RLS	Regular Liner Service
	Rp	Rupiah
	RS	Relay Station
	RX	Receiving Station

S		
	SAR	Search and Rescue
	SAR Convention	International Convention on Maritime Search and Rescue, 1979
	SARSAT	Search and Rescue Satellite-Aided Tracking
	SES	INMARSAT Ship Earth Stations
	SKR	Rescue Coordination Sub-Center
	SOLAS 1974	International Convention for the Safety of Life at Sea, 1974
	SS	Subscriber Station
	S-S	Ship-to-Ship
	SSB	Single Side Band
	STCW 1978	International Convention on Standards of Training, Certification and Watchkeeping for Seafares of 1978
	STRATA	Education System meaning "Grade" in Dutch
	S/W	Scope of Work
T		
	TDMA	Time Division Multiple Access
	TDP	Traffic Data Processor
	TP	Telephone Device
	TRX	Transmitting and Receiver
	TTY	Teletypewriter
	TX	Transmitter
U		
	UPS	Uninterruptive Power Supply System
	U.S.	United State of America
V		
	VHF	Very High Frequency
	VLR	Very Long Range
	VTS	Vessel Traffic Services

1 Introduction

1.1 Background of the Study
1.2 Objective of the Study
1.3 General Work Flow
1.4 Organization of the Study

Section 1 Introduction

1.1 Background of the Study

Based on Nusantara Outlook (outlook of the Indonesian archipelago), the Republic of Indonesia (hereinafter called "Indonesia") has been devoting itself to the development of its socio-economy and various resources, in order to improve the living standard of its people as well as to increase national prosperity.

Sea, land and air transportation of cargoes and passengers is considered as one of important factors for developing this nation consisting of a great number of islands. Considering the geographic condition of Indonesia, sea transport among these transportation plays an important role for national prosperity. Therefore, it is the very important duty of the nation to secure the safety of such activities at sea as transport, fishing and so forth.

The maritime sector development plans have recently brought about the intensifying tendency of heavy traffic and an increase in marine casualties. However, the present setup for maritime safety and search and rescue (SAR) in Indonesia needs further development in order to secure the safety of human life and property at sea including port areas.

On the other hand, the International Convention on Maritime Search and Rescue, 1979 (SAR Convention), has been in effect since 1985 and the international SAR regime is currently in progress.

The provisional maritime SAR plans according to the SAR Convention have already been established in the ocean areas surrounding Indonesian waters. However, progressive SAR programs are needed in Indonesian waters.

In view of the above situation, it is necessary to establish a Maritime Safety System in Indonesian waters, that is, a system which assures safe and efficient routes for marine transport and safe marine activities based on a philosophy for maritime safety in harmony with socio-economic and resource development.

Subsequently, the philosophy for maritime safety in Indonesia as described in the Supporting Report is proposed by the DGSC. The main purpose of this philosophy is to take countermeasures for preventing marine accidents by ships and fishing boats, to take prompt and proper action in the event of marine accidents, to promote maritime safety administration (e.g., improved sea routes), and to assure effective and safe routes of marine transport and safe marine activities.

In light of the above, Indonesia plans to urgently establish a long-term development plan for maritime safety concerning SAR.

1.2 Objective of the Study

The objective of the Study is to establish a Master Plan for Maritime Safety concerning SAR including the review of the organizational set-up, and the education and training institute and investment plan (hereinafter called the "Master Plan") to run through the year 2005.

The Master Plan includes a Short-Term Development Plan (hereinafter called the short-term plan) for the projects studied in the Long-Term Development Plan (hereinafter called the long-term plan). The short-term plan, including the project evaluation for relevant projects, shall be fitted into the framework of the Fifth Five-year Development Plan (Repelita V).

1.3 General Work Flow

The Study is made on the three main items of maritime safety, development plan and project evaluation, as described below.

(1) Maritime Safety Subjects

On the basis of the analysis, a forecast is made for the following items towards the year 2005:

- Maritime activities, and
- Marine accidents

The above forecast constitutes the basis for the study formulating the Master Plan which covers:

- Maritime safety and search and rescue system
- Marine disaster prevention system
- Maritime safety, and SAR communications and information system
- Harbour traffic control system
- Education and training system, and
- Maritime safety and SAR organizational system

(2) Development Plan

The development plan study is made, primarily from the budgetary aspect, on the master plan established in the maritime safety subjects stated in (1) above in order to examine the suitability of the plan with reference to the development framework up to the target year.

(3) Evaluation

The evaluation study is made on the development plan established in the maritime safety subjects through the suitability study stated in (2) above in order to examine the priority of projects.

The general work flow is shown in Fig. 1.3.1.

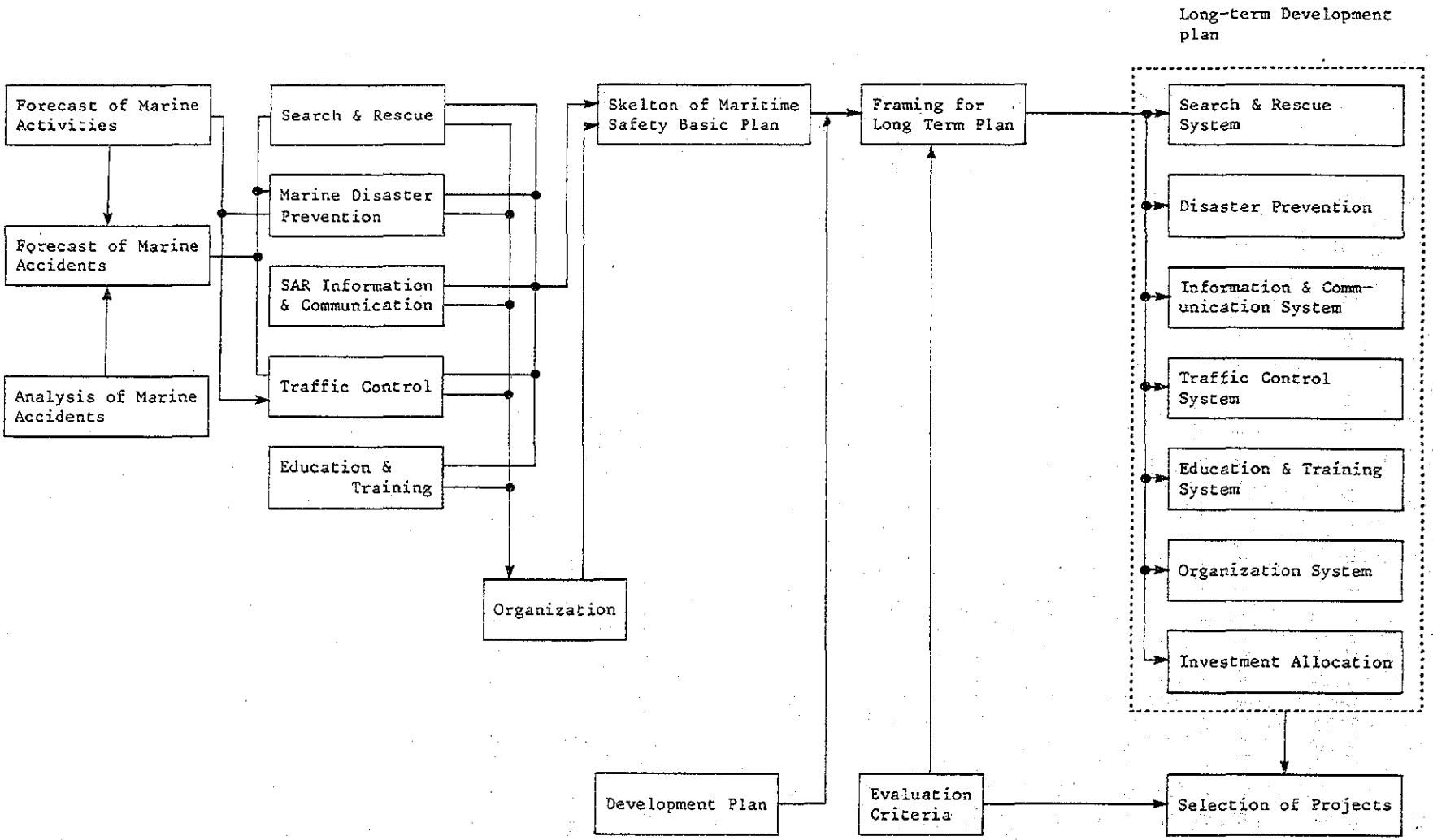


Fig. 1.3.1 General Work Flow

1.4 Organization of the Study

Study team members dispatched and the Indonesian counterpart personnel are listed in Tables 1.4.1 through 1.4.7.

Table 1.4.1 Study Team Members Dispatched
(Phase I; Oct-Dec., 1987)

Name	Assignment	Position
Mr. R. Shiobara	Team leader Forecast of marine accidents	Japan Association for Preventing Marine Accidents
Mr. H. Manabe	Development plan	Yachiyo Engineering Co., Ltd.
Mr. O. Hosokawa	Analysis of marine accidents	Japan Association for Preventing Marine Accidents
Mr. Takahashi	Maritime activities	Yachiyo Engineering Co., Ltd.
Mr. T. Onda	Organizational system	Japan Life Boat Institution
Mr. M. Kida	Rescue system	"
Mr. M. Sakamoto	Prevention of marine disasters	"
Mr. T. Chiba	Education and training	Japan Association for Preventing Marine Accidents
Mr. M. Katayama	Communications and information	"
Mr. S. Tokieda	Harbour traffic control (plan)	"
Mr. M. Danno	Economic evaluation	Yachiyo Engineering Co., Ltd.

Table 1.4.2 Study Team Members Dispatched
(Phase II; Jul.-Sept., 1988)

Name	Assignment	Position
Mr. I. Yoshino	Team leader	Japan Association for Preventing Marine Accidents
Mr. H. Manabe	Development plan	Yachiyo Engineering Co., Ltd.
Mr. T. Onda	Organizational system	Japan Life Boat Institution
Mr. T. Noma	Rescue system	"
Mr. M. Sakamoto	Prevention of marine disasters	"
Mr. M. Saito	Education and training (plan)	Japan Association for Preventing Marine Accidents
Mr. T. Chiba	Education and training (facility)	"
Mr. K. Watano	Communications and information	"
Mr. S. Tokieda	Harbour traffic control (plan)	"
Mr. K. Naohara	Harbour traffic control (facility)	"
Mr. M. Danno	Economic evaluation	Yachiyo Engineering Co., Ltd.

Table 1.4.3 Study Team Members Dispatched
(Phase II; Dec., 1988)

Name	Assignment	Position
Mr. I. Yoshino	Team leader	Japan Association for Preventing Marine Accidents
Mr. T. Noma	Rescue system	Japan Life Boat Institution
Mr. M. Saito	Education and training (plan)	Japan Association for Preventing Marine Accidents
Mr. T. Chiba	Education and training (facility)	"

(cont'd)

Name	Assignment	Position
Mr. K. Watano	Communications and information	Japan Association for Preventing Marine Accidents
Mr. S. Tokieda	Harbour traffic control (plan)	"
Mr. M. Danno	Economic evaluation	Yachiyo Engineering Co., Ltd.

Table 1.4.4 Advisory Committee Members Dispatched
(Phase I; Oct.-Nov., 1987)

Name	Position
Mr. T. Ozawa	Committee Chairman Director of Rescue Division, Guard & Rescue (G & R) Dept. Maritime Safety Agency (MSA)
Mr. Y. Hayafune	Special Assistant to the Director Rescue Division, G & R Dept., MSA
Mr. M. Yokoyama	Special Assistant to the Director Communications Management Div, Equipment & Technology (E & T) Dept., MSA
Mr. A. Kobayashi	Special Assistant to the Director Navigation Safety Division, G & R Dept., MSA
Mr. T. Toyokura	Administration Division, G & R Dept., MSA
Mr. S. Teramoto	Assistant Professor Maritime Safety Academy
Project Coordinator:	
Mr. S. Matsu-ura	Deputy Head, Social Development Cooperation Dept., Japan International Cooperation Agency

Table 1.4.5 Advisory Committee Members Dispatched
(Phase II; Jul.-Dec., 1988)

Name	Position
Mr. H. Kawabata	Chairman Director of Rescue Div., G&R Dept., MSA
Mr. T. Suzuki	Deputy Director, Rescue Div. G&R Dept., MSA
Mr. S. Teramoto	Professor of Maritime Safety Academy
Mr. M. Yokoyama	Deputy Director, Comm. Div. E&T Dept., MSA
Mr. Y. Hayafune	Hydrographic Dept., MSA
Mr. A. Kobayashi	Special Assistant to the Director Navigation Safety Division, G&R Dept., MSA
Project Coordinator:	
Mr. S. Matsu-ura	Japan International Cooperation Agency

Table 1.4.6 Indonesian Counterpart Personnel
(Phase I; Oct.-Nov., 1987)

Name	Position
Captain H.M.J. Lumentah	Directorate of KPLP
Mr. Ch. Paath	Directorate of Navigation
Capt. Albert Lapian	Directorate of KPLP
Capt. Conrad Siahaan	Directorate of KPLP
Mrs. Juliana, S.H.	Directorate of KPLP
Mr. W.H. Simorangkir	Directorate of KPLP
Mr. Hartono	Directorate of KPLP
Capt. Ronny Beaupain	Directorate of Shipping and Marine Safety
Mr. Judistar	Personnel Division
Drs. J. Soepardi	Personnel Division
Mr. Triyuswoyo	Education & Training Center

Table 1.4.7 Indonesian Counterpart Personnel

(Phase II; Jul.-Dec., 1988)

	Name	Assignment
	Soenardyo (DIR. KPLP)	Chief of Counterpart Group
1.	* H. Nelwan (DIT. KPLP)	Introduction, Socio-economic study, Maritime Activities and Marine Accidents
2.	Drs. Hamid Hasan (DIT. KPLP)	
3.	Soenoro (DIT. KPLP)	
4.	Drs. Wahyudi (BAG. UMUM)	
5.	Morton Panggabean (DIT. LALA)	
6.	Drs. H. Pangaribuan (DIT. KPLP)	
1.	* Capt. H. M. J. Lumentah (KPLP)	Maritime Safety and Search and Rescue
2.	Saman Abdullah (JASMAR)	
3.	A. Said (KPLP)	
4.	Kol. Manurung (BASARNAS)	
5.	Soemadi (BASARNAS)	
1.	* Muhdin Sslim S. H. (HUKUM)	Prevention of Marine Disasters
2.	Drs. C. Soetikno (KPLP)	
3.	Madiono (KPLP)	
4.	W. H. Simorangkir (KPLP)	
1.	* CH. Paath (NAVIGASI)	Maritime Safety and SAR Communications and Information System
2.	Hartono (KPLP)	
3.	Syamsu Wijaya (NAVIGASI)	
4.	Ir. Wahyudi (KPLP)	
1.	* R. Beaupain (DITKAPPEL)	Harbour Traffic Control System
2.	S. Djunaid (PELPENG)	
3.	Soeharyanto (DITKAPPEL)	
1.	* Capt. I. Sinambela (PUSDIKLAT)	Education and Training System for Maritime Safety and SAR Personnel
2.	Yudistar (KEPEGAWAIAN)	
3.	Edison Simanjuntak (KPLP)	
1.	* Dewata (NAVIGASI)	Organizational System
2.	Hotman Pangaribuan (PERENCANAAN)	
3.	Drs. J. Soepardi (KEPEGAWAIAN)	
4.	Drs. Eko Hadi Rumekso (KEPEGAWAIAN)	
1.	* H. Supit (KPLP)	Cost Estimate, Development Plan and Selection of Priority Projects
2.	Adolf Richard T. (PERENCANAAN)	
3.	J. Palambang (PUSDIKLAT)	
4.	Drs. Syamsuddin Riyadi (ARMADA KPLP)	
5.	Israhadi B. P. (KPLP)	
6.	Drs. Haryanto (KPLP)	
7.	Nugroho (KPLP)	

* Group leader

2 Socio-economic Study

2.1 Socio-economic Conditions
2.2 Pelitas and Economic Development
2.3 Socio-economic Framework towards the Year 2005

Section 2 Socio-economic Study

2.1 Socio-economic Conditions

The following are a summary of the present socio-economic structure of Indonesia.

(1) Indonesia consists of about 13,700 islands within a north-south range of 1,800 km and an east-west range of 5,500 km. About 150 million people live in the area.

(2) The regional distribution of the people is very uneven. Jawa island, which occupies only 6.9% of the total land area, has 62% of the total population in Indonesia.

(3) The growth rate of the real Gross Domestic Product (GDP) between 1973 and 1981 was 7.5% per year. The nominal GDP per capita reached US$560 in 1981. Indonesia in 1981 was classified as a medium income nation according to the World Bank. The GDP growth rate, however, went down to 2.2% per year in 1982 due to the decrease of oil revenue caused by the world-wide recession, and in 1983 went up to 4.2% per year with the devaluation of Rupiah currency. In 1984, the nominal GDP per capita, however, still ranked under US$500, though the GDP growth rate was 6.1%.

The GDP growth rates from 1985 through 1987 were 2.3%, 3.2% and 3.8% respectively. It now seems that it would be difficult to realize the GDP growth rate of 5% per year, the target figure of Pelita IV.

(4) Indonesia has been trying to change its industrial structure from an agriculture-led structure to a manufacturing-led structure through large government-initiated projects financed primarily by oil revenue.

(5) The balance of payments has recently been negative due to excess imports. To improve this situation, Indonesia has to export more manufactured goods or to depend on foreign aid if the oil revenue keeps going down. Foreign Exchange Reserves at the Central Bank recently turned upward from US$5.3 billion at the end of 1986 to US$6.5 billion at the end of 1987, with the export increment of non-oil and gas products, and the reserves are estimated to total US$10.5 billion if Foreign Currency Holdings of foreign exchange banks are added to those of the Central Bank. However, the debt service ratio has also been at unhealthy figures. It was over 20% in 1985 and is now estimated to be 35% for fiscal year 1987/88 (April 1987 - March 1988.)

2.2 Pelitas and Economic Development

(1) Past Development Plans (Pelita I - III)

Development plans in Indonesia started with the First Five-year Development Plan (Pelita I) in 1969, and have continued every five years. They are now being implemented in the Fourth Five-year Development Plan (Pelita IV).

The outline of each Pelita is described in Table 2.2.1.

Table 2.2.1 The Outline of Pelita I, II and III

Years	1969/70 - 1973/74 Pelita I	1974/75 - 1978/79 Pelita II	1979/80 - 1973/84 Pelita III
	(Urgent stabilization of the National Economy)	(Making a foundation for "Take-off" and Balanced Development)	(Further Development and Fair Distribution)
Main Objective	1) Expansion of the agricultural sector, especially in foods production 2) Expansion of the textile and apparel industry, construction of infrastructures, development of agriculture supporting industries 3) Control of inflation GDP growth rate Target 5% Realized 7.7%	1) Production expansion of goods, construction of infrastructures 2) Fair provision of social welfare, equalization of income distribution 3) Creation of job opportunities 4) Making a foundation to build the heavy industry GDP growth rate Target 7.5% Realized 6.9%	1) Faster economic growth 2) Stabilization of the healthy and dynamic society 3) Promotion of export of non-oil related goods 4) Development of labor-intensive industries, development of leading firms 5) Growth of the private sector 6) Self-supply of foods GDP growth rate Target 6.5% Realized 6.1%

(2) Fourth Five-year Development Plan (Pelita IV)

Pelita IV's aims are to improve the living standard, the educational level and the welfare level in order to build a strong foundation for future advancement. Mostly emphasized are economic developments, especially creating self-supply capability of foods in the agricultural sector, and producing capital goods in the manufacturing sector.

The financial policy stresses the continuation of balanced budgets, together with the increase of government revenue from non-oil sources and the increase of government surpluses by more efficient spending. The trade policy emphasizes the increase of the export of non-oil related products, particularly the export of manufacturing products, and expresses caution about foreign debt.

The GDP growth rate per year during Pelita IV is targeted to be 5%, which is set far below the target levels of Pelita II and III. The industrial growth rates are targeted as follows: 3% in the agricultural sector, 2.4% in the mining sector, 9.5% in the manufacturing sector, 5% in the transportation/communication service sector and 5% in the other sectors. The manufacturing sector is expected to be the leader.

Pelita IV plans to build the framework for "Take-off." Repelita V plans to strengthen the foundation. Repelita VI plans to achieve "Take-off." "Take-off" means to put the economy on a steadily growing path through reduced dependence on oil and more powerful private sector activities. The central force to lead the economy is expected to be shifted from the government to the private sector. Hence, the agricultural products-led export structure must be changed in such a way that high value-added manufacturing goods become the main exported goods.

(3) Policies for Growth and Adjustment

Table 2.2.2 shows the historical trend of national budgets from 1981 to date.

It is evident from the sectoral breakdown of development expenditures that industry and transmigration experienced the largest cuts, and agriculture, mining, communications and regional development continue to secure the largest shares of development expenditures.

The growth of GDP in nominal terms and the share of various categories concerning sea transport in current prices is shown in Table 2.2.3. Within a span of six years, development expenditure as a proportion of GDP remained constant at around 11.5%. Development expenditure for the communication sector as a proportion of total development expenditure ranged from 12% to 17%. The sea transport sector as a proportion of the communication sector ranged from 13% to 20%. It is noted that the communication sector had a stable percentages, while the sea transport sector has shown a slowly declining share in recent years.

Table 2.2.2 Development Expenditure Budget
(Planned)

(Rp. billion, current prices)

Sector	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	Changes from 1986 (%)
1. Agriculture & Irrigation	941.9	1,252.5	1,323.8	1,401.7	1,430.3	1,105.5	1,180.7	6.8
2. Industry	330.3	366.1	448.1	650.0	655.1	489.3	229.7	-53.1
3. Mining & Energy	683.5	938.2	1,116.0	1,300.9	1,301.7	1,036.6	1,129.1	8.9
4. Communication & Tourism	810.2	1,098.4	1,307.3	1,392.1	1,425.4	1,063.3	1,288.1	21.1
a. Road	395.9	508.1	500.7	592.6	621.7	581.1	744.5	28.1
b. Land Transportation	88.0	145.0	230.7	236.6	238.1	146.1	108.3	-25.9
c. Sea Transportation	158.7	212.7	231.8	274.4	274.7	146.3	161.0	10
d. Air Transportation	122.1	162.9	163.2	189.2	190.4	103.0	172.4	67.4
e. Post & Telecommunications	24.3	42.9	63.9	70.7	71.6	68.7	84.8	23.4
f. Tourism	21.2	26.9	27.0	28.6	28.9	18.1	17.1	-5.5
5. Trade & Cooperation	64.2	106.4	106.7	127.1	128.8	111.6	132.5	18.7
6. Manpower & Transmigration	435.9	605.8	621.9	675.1	676.8	394.5	156.6	-60.3
a. Manpower	42.0	79.2	82.7	98.3	98.5	69.1	45.2	-34.3
b. TransMigration	394.0	526.7	539.2	576.8	578.3	325.4	111.2	-65.8
7. Regional, Rural & Urban Development	612.5	740.6	783.0	809.9	868.2	938.9	873.8	-6.9
8. Religion	46.5	60.3	60.7	62.9	63.6	41.9	15.6	-62.8
9. Education Youth, Culture	786.7	1,301.7	1,329.3	1,501.9	1,510.8	1,145.9	1,021.5	-10.9
10. Health, Welfare, Family Planning	258.4	322.1	344.0	408.0	413.4	311.6	207.7	-33.3
11. Housing	156.0	281.3	297.1	432.7	437.7	332.7	412.0	23.8
12. Law	66.6	79.3	79.5	80.4	80.7	40.6	14.0	-65.5
13. National Defense & Security	481.2	568.7	524.2	697.7	714.1	554.0	510.0	-7.9
14. Information, Press	45.7	54.5	57.0	67.6	67.7	41.5	24.0	-42.2
15. Science, Research & Technology	100.2	121.9	158.3	205.9	207.9	169.6	158.6	-6.5
16. State Apparatus	190.2	223.0	187.4	162.0	176.4	127.0	45.4	-64.3
17. Business Enterprise Development	100.5	264.8	264.9	226.9	229.2	202.0	191.1	-5.4
18. Natural resources & Environment	188.2	220.2	231.3	257.0	259.2	189.5	166.3	-12.2
Total	6,399.2	8,605.8	9,290.3	10,459.3	10,647.0	8,296.0	7,756.6	-6.5

Souce: "Indonesia Hand Book (1985)" Published by Jakarta Japan Club

Source: "Indonesia Hand Book (1985)" Published by Jakarta Japan Club
Bullefin of Indonesian Economic Studies (April, 1987)
Survey of Recent Developments

Table 2.2.3 Analysis of Development Budget

	GDP	Realized Development Budget	As % of GDP	Communication Sector Budget as % of planned Development Budget	Sea Transportation Budget as % of Communication Sector Budget
	(Rp. billion, current prices)				
1981	54,027.0	6,940.1	12.8	12.7	19.6
1982	59,632.6	7,359.6	12.3	12.8	19.4
1983	73,697.6	9,899.2	13.4	14.1	17.7
1984	87,054.8	9,951.9	11.4	13.3	19.7
1985	94,491.5	10,873.1	11.3	13.4	19.3
1986	96,489.3	8,332.0	8.6	12.8	13.8
1987				16.6	12.5

Source: Statistical Yearbook of Indonesia 1984, 1985, 1986

2.3 Socio-economic Framework towards the Year 2005

The population growth rate is predicted to be 2.06% per annum from 1980 to 2000. The population will increase from 148 million in 1980 to 223 million in 2000.

The annual GDP growth rate for the period from 1990 to 2005 is predicted to be 4%, taking the following factors into consideration.

(1) OPEC countries fixed the price of crude oil at US$18 per barrel and it is presumed that such a level will be maintained for the future, though some fluctuations may occur occasionally.

(2) Indonesia is endowed with much economic development potential: an extensive land area, a large labour force and abundant natural resources.

(3) The realized annual growth rate in the past three Pelitas was 7.7% for Pelita I, 6.9% for Pelita II and 6.1% for Pelita III. On March 6, 1987 it was reported that the GDP growth rate for 1988/89 (April to March) would exceed the 3.8% of 1987/88. However, to be on the safe side, 4% should be regarded as an achievable annual GDP growth rate in light of average GDP growth rates for the recent few years.

3 Maritime Activities

3. 1 Actual Status

3. 2 Forecast

Section 3 Maritime Activities

3.1 Actual Status

The maritime activities in Indonesia are broadly classified into 1) international shipping engaged in international trade, 2) domestic shipping engaged in transportation between the islands, 3) fishing activities and 4) oil drilling.

3.1.1 International Shipping

Shown in Table 3.1.1 is the actual status by service of the international shipping fleet in 1980-1984.

Table 3.1.1 International Shipping Fleet by Service

Shipping Service	Year					Growth Rate (%)	Annual Growth Rate (%)
	1980	1981	1982	1983	1984		
General Service							
Number	58	61	62	51	58		
DWT	667,270	796,619	827,227	732,052	832,530	24.8	5.7
Average DWT	11,504	13,059	13,342	14,354	14,354		
Special Service							
Number	89	96	96	88	88		
DWT	582,663	636,285	774,603	688,617	688,617	18.2	4.3
Average DWT	6,547	6,628	8,069	7,825	7,825		
Total							
Number	147	157	158	139	146		
DWT	1,249,933	1,432,904	1,601,830	1,420,669	1,521,147	21.7	5.0

Source: Statistical Yearbook of Indonesia 1986

3.1.2 Domestic Shipping

Domestic shipping in Indonesia is classified into the following five forms of service according to role, operation form, etc.

Regular Liner Service (RLS)
Local Service
Traditional Service
Pioneer Service
Special Service

The domestic fleet of Indonesia during the period from 1980 through 1984 is shown in Table 3.1.2 and the RLS services network is shown in Fig. 3.1.1.

Table 3.1.2 Domestic Shipping Fleet by Service

Shipping Service	Year					Growth Rate	Annual Growth Rate
	1980	1981	1982	1983	1984	(%)	(%)
RLS							
Number	342	361	397	387	398	16.3	
DWT	392,912	425,556	503,371	486,824	500,661	27.4	6.2
Average DWT	1,149	1,179	1,268	1,258	1,258	(9.5)	
Local							
Number	896	1,087	1,162	1,168	1,220	36.2	
BRT	138,286	161,302	177,177	178,092	186,021	34.5	7.7
Average BRT	154	147	152	152	152	(7.7)	
Traditional							
Number	2,563	3,346	3,486	3,657	3,807	48.5	
m^3	190,476	280,529	282,746	306,270	318,832	67.4	13.7
Average m^3	74	84	81	84	84	(13.5)	
Pioneer							
Number	33	35	36	31	26		
DWT	22,072	23,179	20,805	15,684	12,210		
Average DWT	669	662	578	506	472		
Special							
Number	2,039	2,302	2,597	2,633	2,669	30.9	
DWT	4,865,533	5,338,573	6,022,708	6,106,196	6,189,684	27.2	6.2
Average DWT	2,386	2,319	2,319	2,319	2,319	(6.2)	

Source: Statistical Yearbook of Indonesia 1986

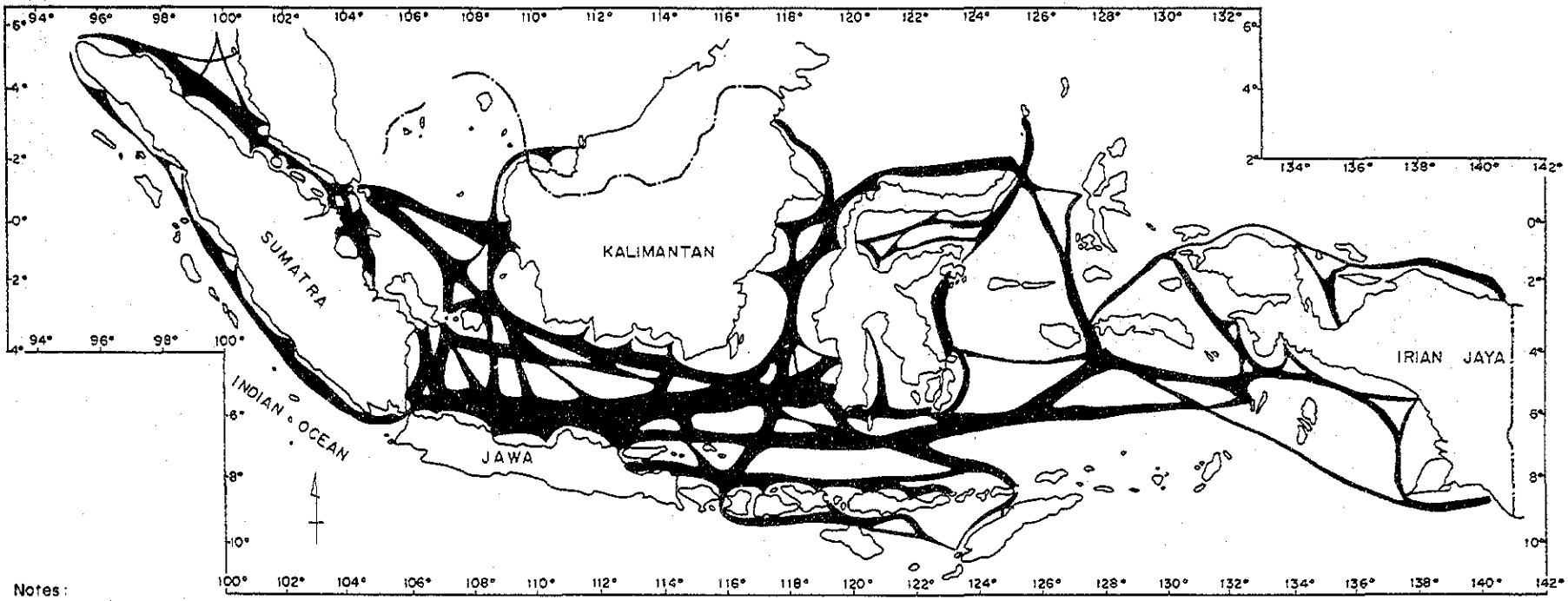
3.1.3 Marine Fishing Activities

Marine fishery production by major island in 1984 is shown in Table 3.1.3.

Table 3.1.3 Marine Fishery Production by Major Island (1984)

Major Island	Quantity		Value	
	Tons	%	Rp.	%
Sumatera	516,591	30.2	218,894	29.6
Jawa	435,963	25.4	194,862	26.3
Bali, Nusatengara, Timor Timur	133,058	7.8	42,251	5.7
Kalimantan	165,870	9.7	85,404	11.6
Sulawesi	334,044	19.5	132,564	17.9
Maluku, Irian Jaya	127,278	7.4	65,918	8.9
Total Production	1,712,804	100	739,893	100

Source: Statistical Yearbook of Indonesia 1986



Notes :

The different size in width gives general representation of the number of voyages of RLS routes

Source

DGSC Susunan Trayek DAN PENEMPATAN KAPAL-KAPAL, PELAYARAN NUSANTARA (R.L.S.), Tahun 1984—1989

Fig. 3.1.1 Regular Liner Service (RLS) Routes

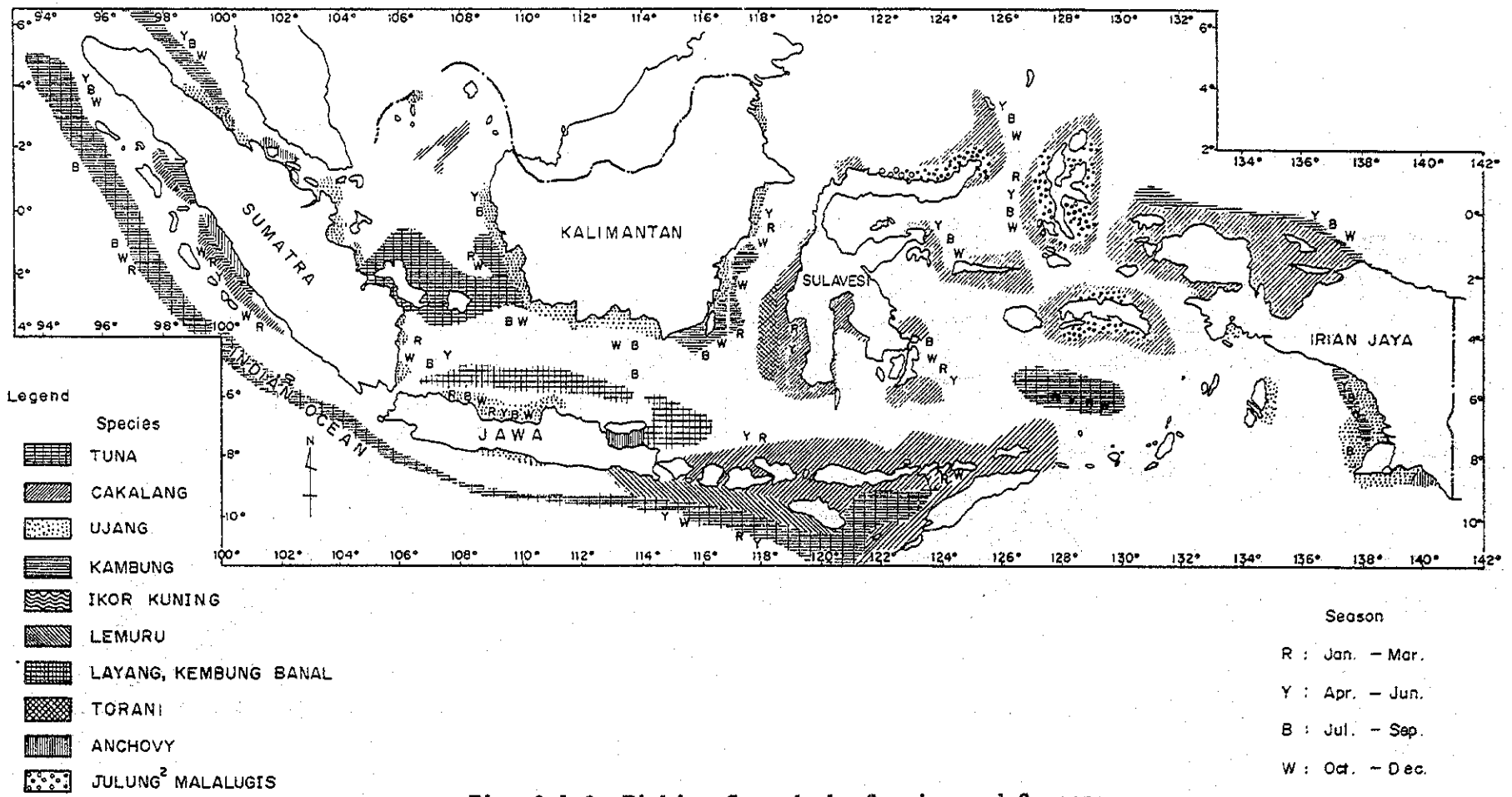


Fig. 3.1.2 Fishing Grounds by Species and Season

The local distribution of fishing boats is shown in Table 3.1.4.

Table 3.1.4 Marine Fishing Boats by Major Island (1984)

Major Island	Total Number	(%)	No. of Motorized	(%)	No. of Non-powered	(%)
Sumatera	68,034	(100)	27,156	(39.9)	40,878	(60.1)
Jawa	63,088	(100)	31,513	(49.9)	31,575	(50.1)
Bali, Nusatengara, Timor Timur	36,674	(100)	7,388	(20.1)	29,286	(79.9)
Kalimantan	22,004	(100)	12,278	(55.8)	9,726	(44.2)
Sulawesi	81,185	(100)	13,287	(16.4)	67,898	(83.6)
Maluku, Irian Jaya	42,655	(100)	2,089	(4.9)	40,566	(95.1)
Total	313,640		93,711		219,929	

Source: Statistical Yearbook of Indonesia 1986

The distribution of marine fishery grounds is shown in Fig. 3.1.2. In particular, important areas are:

(1) The water area extending over 1,250 km along the north coast of Jawa Island,

(2) The water area extending over 600 km on the side of the Strait of Malacca along the northeast coast of Sumatera Island, and

(3) The water area extending over 500 km on the Makassar Strait side at the southwestern part of Sulawesi Island.

3.1.4 Other Maritime Activities

Off shore oil drilling activities are considered as other maritime activities. The annual oil productions form 1981 through 1985 are shown in Table 3.1.5. The Indonesia is the largest oil producing country in the Southeast Asia. The main off shore oil fields are as follows:

Table 3.1.5 Crude Oil and Natural Gas Production (1982-1985)

Commodity	Unit	1982	1983	1984	1985
Crude Oil	1,000 Brl	488,189	490,503	516,990	483,786
Natural Gas	1,000 Mcf	1,111,928	1,186,362	1,506,714	1,578,012

Remarks: $1m^2$ = 6.2898 Barrel = 35.3 Mcf
Source: Statistical Yearbook of Indonesia 1986

a) Jawa Sea Area

Arjuna Oil Field	-	about 125 km east of Jakarta
Krisna "	-	about 120 km NNW of Jakarta
Cinta "	-	about 100 km NW of Jakarta
Selatan "	-	about 10 km SW of Cinta O.F.
Rama "	-	about 98 km NW of Jakarta

b) East Kalimantan Area

Attaka Oil Field	-	about 150 km NE of Balikpapan
Uandil "	-	about 65 km NE of Balikpapan
Bekapai "	-	about 80 km ENE of Balikpapan

In the above areas, the oil exploration and drilling activities are carried out continuously, and such activities are expected to continue in the future.

The facilities constructed for oil exploring and drilling have considerable effect onto the sea traffic. However, they are utilized as navigation aids by vessels navigating in the surrounding areas.

3.2 Forecast

3.2.1 Existing Development Plans

(1) Shipping Activities

The domestic and international shipping fleet need to be strengthened in order to meet increasing cargo demands and enhance productivity, and such improvement is planned according to Table 3.2.1.

Table 3.2.1 Ships and Cargo Volume at the End of Pelita IV

Type of Service	Ship (DWT)	Cargo (tons)
(Domestic Shipping)		
Regular Liner Service	736,000	14,750,000
Local Service	217,000	4,200,000
Traditional Service	245,000	3,400,000
Pioneer Service	18,000	770,000
(International Shipping)		
General Service	1,149,000	23,700,000

Source: Repelita IV

(2) Maritime Fishing Activities

Regarding improvement of maritime fishing activities, according to the Long-term Plan of fishery production and fishery fleet in Indonesia (1985-2000) disclosed by the Ministry of Fishery in 1983, the schedules are indicated in Table 3.2.2 and 3.2.3.

Table 3.2.2 Forecast of Marine Fishery Production

(Unit: 1,000 ton)

Fishery Sector	1985	1986	1987	1988	Average Growth Rate	2000	Growth Rate after 1989
Fishing	1,742.3	1,832.6	1,925.1	2,018.3	5.1	2,814.0	39.4
Plantation	6.8	12.7	22.7	40.3	93.1	129.1	320.3
Total	1,749.1	1,845.3	1,947.8	2,058.6	5.6	2,943.1	43.0

Source: Ministry of Fishery 1983

Table 3.2.3 Forecast of Marine Fishing Boats

	1985	1986	1987	1988	2000
Number of Boats	342,655	360,383	378,666	396,948	553,346

Source: Ministry of Fishery 1983

3.2.2 Forecast towards the Year 2005

(1) Shipping Activities

A look at the real growth rate of cargo volume during five years from 1980 to 1984 shows that the total cargo volume of international shipping is 30%, or 6.8% on an annual average, and when it is limited to general cargo, the growth is 12.3%, or 2.9% on an annual average.

Forecast of the cargo volume or, more particularly, quantitative forecast of the cargo carried by international shipping in 2005 is very difficult because it is governed by complicated international socio-economic factors. However, if it is assumed that there will not be much change in socio-economic factors, the growth of the international shipping cargo should appropriately be about 4.0% which will be commensurate with the forecasted growth rate of GDP in a long-range view. With this rate applied for calculation, the international seaborne cargo in 2005 is forecast to reach about 2.3 times as the total in 1984, that is, from 19.4 mil. to 44.2 mil. tons in general cargo or from 132.2 mil. to 301.5 mil. tons in total volume. Of such volume, the cargo carried by the Indonesian flag ships will be 42.2 mil. tons if such ships continue to maintain their share of 14% in 1984.

According to Pelita IV, the ship tonnage is forecast to be 1.15 mil. DWT in 1988, as stated previously. In light of the real growth in 1980-1984, the rate is 21.7% or 5% annually, and when the special service is excluded the growth in these five years is 24.8% or 5.7% as an annual average.

Assuming that the productivity per DWT of the Indonesian flag ships remains unchanged (11.9 tons in 1984), in order to transport the increasing cargo at an annual rate of 4.0%, the ship tonnage will have to be increased at an annual rate which approximately equals that of the growth of cargo volume, that is, about 4.0%. Thus, the international shipping fleet in 2005 will be 3.47 mil. DWT.

As for the results in 1980-1984, domestic shipping, as a whole, had attained 5.3% growth per year in cargo volume. In the case of domestic shipping, it is particularly necessary to consider the increase rate of the population (about 2% per annum according to recent years and the forecast), the growth rate of GDP and the progress of regional development. In consideration of these factors, a growth rate of about 4.5% is considered to be adequate for forecasting over the long period up to 2005. When calculated at such a growth rate, the domestic cargo will reach 198.1 mil. tons in 2005.

The actual growth of the domestic fleet in 1980-1984 is, except for the traditional service, 6.2% in an annual rate for RLS, 7.7% for the local service and 6.2% for the special service.

Therefore, considering the improvement of operational efficiency through the improvement of ship performance by, for example, scrapping and replacing deteriorated ships with new ones, the number of fleet in 2005 will increase from 8,120 ships in 1984 to 2.06 times that number or 16,727 fleet, with a growth rate of about 4.5%, also considering the forecast increase in cargo volume.

Based on the foregoing forecasts, the shipping activities in 2005 are summarized below.

Table 3.2.4 Shipping Activities in 2005

	Unit	Forecast Amount	Annual Growth Rate (%)
International Shipping	Cargo volume (mil. tons)	301.5	4.0
	Fleet (mil. DWT)	3.47	4.0
Domestic Shipping	Cargo volume (mil. tons)	198.1	4.5
	Fleet (number of ships)	16,727	3.5

(2) Marine Fishing Activities

Indonesia endeavors to modernize the fishing boats and develop the fishing techniques used in marine fishing to secure proteins for its people as well as to generate resources for export. As shown in Table 3.2.2, according to its long-term plan up to the year 2000, the annual average growth rate of marine fishery until 1988 is 5.6%, its average growth rate from 1989 to 2000 is 3%, and fishery production in 2000 is 2.94 mil tons. A look at the actual catch of marine fishery in 1980-1984 showed that the growth rate during these five years was 22.8% or the annual average growth rate was 5.3%. If the future growth of GDP, the population increase rate and the improvement of the future productivity are considered for long-term prediction up to 2005, the above annual average growth rate is considered to be reasonable. Assuming this growth rate, the forecast catch of marine fishery in 2005 will reach 1.86 times as the catch in 1984 or increase from 1.71 mil. to 3.19 mil. tons.

A look at the number of fishing boats engaged in marine fishery according to the results of 1980-1984 showed that such number increased from 272,000 to 313,000 boats; the growth rate was 15.4% and the annual average growth rate was 3.6%. According to the Government's forecast of fishery production up to 2000, the annual growth rate was 5.1% until the end of Pelita IV (1988) and 2.8% from 1989 to 2000, and these are commensurate with the said forecast of the catch of marine fishery and may be said to be adequate forecast values, if the progress of fishing boats towards modernization including motorization and the resulting improvement of productivity are considered.

If the annual average growth rate is assumed to be 2.8%, the number of fishing boats in 2005 will reach 1.78 times as that in 1984 or 557,000.

4 Marine Accidents

4. 1 Actual Status
4. 2 Analysis of Marine Accidents
4. 3 Forecast of Marine Accidents

Section 4 Marine Accidents

4.1 Actual Status

Analysis is made for the data on marine accidents which occurred from 1982 to 1986 as recorded in the DGSC Log Book which has details by kind and by category of ship, location and date, damages and so on. The total number of marine accidents occurring during the five years (1982-1986) amounted to 1,781 as shown in Table 4.1.1.

Table 4.1.1 Number of Marine Accidents by Kind and by Category of Ship (1982-1986)

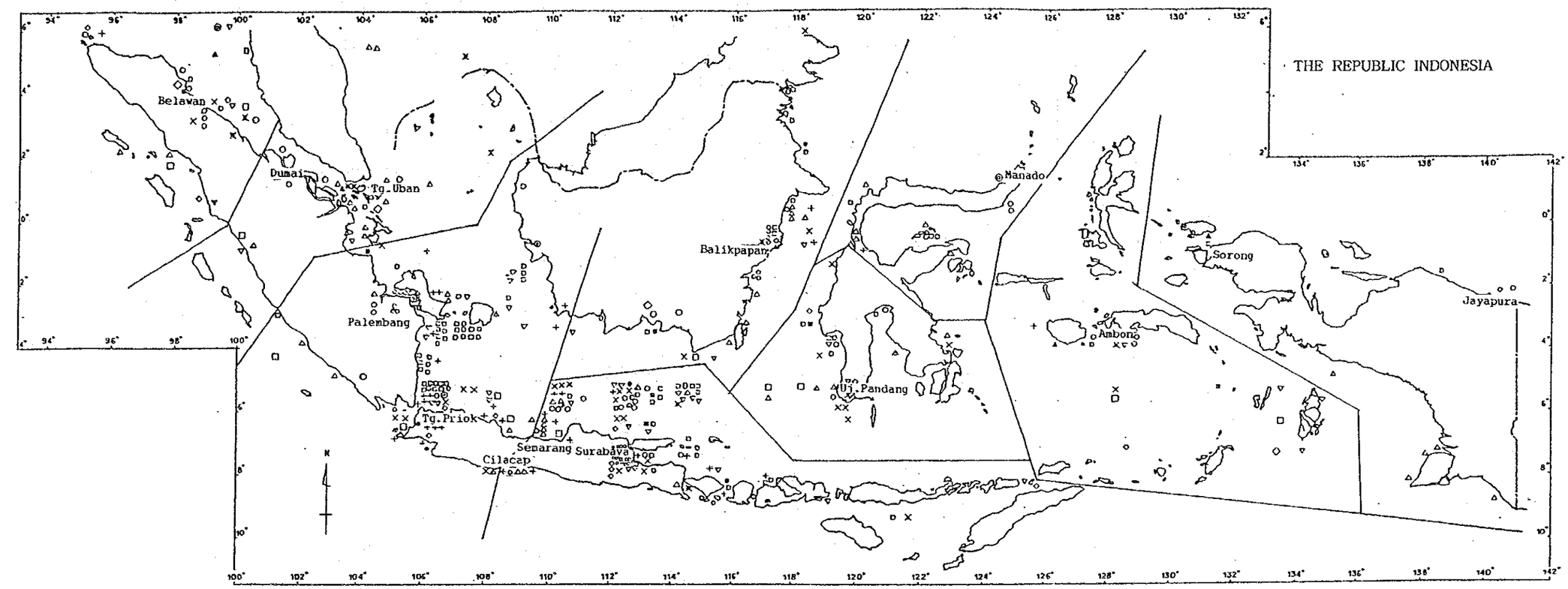
Kind \ Type	Cargo	Tanker	Passenger Ship	Tug Boat	Barge	Fishing Vessel	Pleasure Boat	Motor Ship	Motorized Sailing Ship	Sailing Ship	Unknown Others	Total
Collision	74	22	5	28	5	19	4	71	21		17	266
Stranding	49	15	3	10	6	15		60	51	1	16	226
Capsized	7			5	2	2	2	13	8	1	1	41
Fire	18	3		6		4	2	32	31		5	101
Flooding	19	3	3	4	3	6	1	27	59		4	129
Sunk	56	2	2	10	9	26	2	103	265	2	15	492
Engine Propeller Rudder Trouble	38	17	6	41	1	15	3	49	38		15	223
Drifting	15	1		3	4	2		8	12		2	47
Human Loss-Injury	40	3	4	9	3	50	1	42	33	2	14	201
Others Unknown	12	1		8	2	3		17	6	1	5	55
Total	328	67	23	124	35	142	15	422	524	7	94	1,781

Source: Data of DGSC

As seen above, "sunk" occupies the highest portion, followed by "collision" and then "stranding". The typical feature of marine accidents in Indonesia is that "sunk" by motorized sailing ships occupies the greatest part (14.9%). It should be noted that the marine accidents by fishing vessels number only 142 in the above data though those of non-powered vessels are not included. The number is obviously too low in light of the total number of several hundred thousands of fishing vessels existing in Indonesia. As regards the accidents by size of ship, small ships of less than 100 gross tons (G/T) stand highest (39.4%). The area-wide distribution of marine accidents which occurred in 1982 is plotted as shown in Fig. 4.1.1, and the high density areas are in the Jawa

Sea, around the Bangka Island, east of Sumatera and east to south of Kalimantan. The accidents of "flooding" and "sunk" frequently occurred in January and from June to August when the south-east monsoon prevails. On the other hand, other accidents occur at almost the same rate throughout the year.

As regards damages, loss of cargo by "sunk" occupies the highest portion. The number of dead and missing persons has been on an increasing trend.



Legend :

○ Collision	● Collision
△ Stranding	▲ Stranding
□ Sunk	■ Sunk
◇ Fire	◆ Fire
▽ Flooding	▼ Flooding
◎ Capsized	◉ Capsized
× Human Loss-Inury	
+ Other	

(Accidents involed human loss and missing)

Fig. 4.1.1 Area Distribution of Marine Accidents in 1982

4.2 Advice on Countermeasures for Preventing Marine Accidents

The geographical distribution of "collisions" and "strandings" is concentrated in the Jawa Sea and in and around the main ports and channels, where there is heavy traffic, and reefs, shallows and narrow meandering waters exist.

The safety measures to be taken under these conditions should be to develop and improve the aids to navigation, and in the congested narrow waters, it is necessary to take measures to develop a traffic control system and/or information system.

Furthermore, in terms of human elements, an education and guidance system should be thoroughly planned for maritime personnel. In cases of limited visibility or at night when the risk of collisions and strandings substantially increases, the International Regulations for Preventing Collisions at Sea should be strictly observed.

Apart from collisions and strandings, there are a number of "sunk" accidents of motorized sailing vessels of less than 30 G/T, and engine troubles tend to increase among powered wooden vessels as they become old due to loss of structural stability, and these troubles lead to "sunk" accidents through "drifting" and "flooding".

Considering the above, the following safety measures should be taken:

- Proper cargo loading and observance of loadlines to avoid "flooding" and "sunk"
- Confirmation of weather information before sailing out and postponement of the departure if adverse weather is expected
- Modernization and rehabilitation of engines especially for aged motorized sailing ships

As safety measures for accidents involving human life such as falling overboards, life jackets should be provided and communications equipment should be installed on board even 300 G/T or less small vessels.

It is of extreme importance that the present situation concerning accident occurrences be firmly understood for proper analysis and evaluation so that optimum countermeasures may be taken for prevention and rescue.

4.3 Forecast of Marine Accidents

4.3.1 Forecast of Marine Accidents

The forecast regarding marine accidents is made based on the forecast made separately for maritime traffic in 2005, through the establishment of a correlation between the number of marine accidents and maritime traffic.

As regards maritime traffic density, an estimation is made for the annual number of voyages for each category of ships with the inclusion of the ratio of number of accidents to the number of voyages (which was normalized).

The number of accidents, recorded in the data from the Maritime District Office (KANWIL) IV, is applied to the estimation of occurrences to calculate a correlation with the traffic density to provide data for successive ten years, and it occupies about 30% of accidents in the total number occurred in Indonesia.

Among the various kinds of marine accidents, the frequency of collisions is generally in square proportion to the traffic density and other accidents are in direct proportion to the traffic density, provided that the conditions relevant to accident occurrences remain unchanged. Therefore, two separate regression formulae are applied to the accidents to estimate a correlation.

The formulae given below are applied to forecast the number of marine accidents in 2005 on the basis of the accidents occurring in 1986.

(a) Marine accidents other than collision

$$\log_{10}Y = \log_{10}X^{0.315} + 0.6642 \quad \text{..... (1)}$$

(b) Collision accidents

$$\log_{10}Y = \log_{10}X^{2.10} - 10.0739 \quad \text{..... (2)}$$

where,

X: normalized number of voyages

Y: number of accidents

As shown in Table 4.3.1, a forecast for the number of accidents in 2005 amounts to 480; 1.6 times the number of 300 recorded in the 1986 data extracted from the DGSC Log Book.

4.3.2 Forecast of Marine Accidents in Major Ports

The analysis of accidents from the viewpoint of traffic control is focused on the six main ports of Belawan, Palembang, Tg.Priok, Surabaya, Banjarmasin and Ujung Pandang.

For forecasting purposes, the number of accidents is equal to the number of ships which is converted into a size of 1,000 G/T by the ratio of their length, since the occurrence probability of accidents is in the proportion of a power 1.3 of the length of ships.

It is assumed that the increase rate of accidents in all areas is applicable to the forecast in 2005 to be made on the basis of the average number which occurred from 1982 to 1986.

Table 4.3.2 shows the forecast in 2005 for ship calls, collisions and strandings in major ports, where Surabaya has the highest figures followed by Belawan and Ujung Pandang.

Table 4.3.1 Forecast of Marine Accidents by Kind and by Category in 2005

Category / Kind	Cargo	Tanker	Passenger Ship	Tug-boat	Barge	Fishing Vessel	Pleasure Boat	Motor Ship	Motorized Sailing Ship	Total	%
Collision	43	16	4	24		24	6	35	8	160	33
Stranding	7		2	2		4		12	12	39	8
Capsized	3			1		2		2	2	10	2
Fire	4			3				9	7	23	5
Flooding	3		2			5		7	17	34	7
Sunk	18		2	7	2	7	3	26	31	96	20
Engine Propeller Rudder Trouble	6	5	2	9	1	4		9	5	41	9
Drifting	4				3	2			1	10	2
Human Loss-Injury	6	2		1		26		16	2	53	11
Others Unknown	2			3		1		7	1	14	3
Total	96	23	12	50	6	75	9	123	86	480	100
%	20	5	3	10	1	15	2	26	18	100	

Table 4.3.2 Forecast of Marine Accidents and Ship Calls in 2005

– Major Ports –

Item / Port	Average in 1982 to 1986 (Actual)				Average in 1982 to 1986 *				Forecast in 2005 *			
	Ships Call (1984)	Number of Marine Accidents			Ship Call (1984)	Number of Marine Accidents			Ship Call	Number of Marine Accidents		
		Collision	Stranding	Total		Collision	Stranding	Total		Collision	Stranding	Total
Belawan	2,870	1.6	0.2	1.8	3,800	1.8	0.2	2.0	8,056	7.2	0.2	7.4
Palembang	6,556	1.6	0.4	2.0	5,987	0.8	0.7	1.5	12,670	2.4	0.8	3.2
Tg. Priok	5,408	0.2	0.2	0.4	5,511	0.4	0.2	0.6	11,683	1.6	0.2	1.8
Surabaya	9,141	2.6	0.6	3.2	7,321	3.2	0.7	3.9	15,414	11.4	0.8	12.2
Banjarmasin	4,282	0.6	0.6	1.2	2,920	0.4	0.4	0.8	6,122	1.6	0.5	2.1
Uj. Pandang	2,902	1.4	0.4	1.8	2,235	1.6	0.2	1.8	4,702	3.6	0.2	3.8

*: Values if converted into 1,000 G/T

5 Maritime Safety and Search and Rescue System

5. 1 Present Situation

5. 2 Analysis

5. 3 Long-term Development Plan

Section 5 Maritime Safety and Search and Rescue System

5.1 Present Situation

Maritime SAR activities in Indonesia are performed under the coordinating umbrella of the National SAR Agency (BASARNAS).

The coordination functions of the national SAR system are conducted on a central level by BASARNAS, at the level of Directorate General, Head of Staff, and on a regional level by Rescue Coordination Center (KKR) and Rescue Coordination Sub-Center (SKR) which are subordinate bodies of BASARNAS.

The DGSC is responsible for the execution of maritime safety and SAR activities where SAR operations are under the coordination of BASARNAS, and more specifically the Directorate of Sea and Coast Guard (KPLP) carries out maritime safety and SAR tasks through its operation units. The Directorates of Navigation and Marine Safety provide support for the KPLP operations through their operation units of Districts of Navigation and Harbour Masters.

5.1.1 Responsible Operation Areas

(1) Operation Areas of Maritime District Offices (KANWIL)

The areas of operation for which each KANWIL is responsible for sea patrol and SAR are the water areas administratively designated to the respective KANWILs as shown in Fig. 5.3.1.

(2) KPLP Unit Operation Areas

The operational areas for which each KPLP unit is responsible are not clearly defined, except for the general coverage designation from the port areas to the outer buoy areas. This ambiguity creates an unclear designation of the operational responsibility. Under such a situation, the maritime safety and SAR operations may not be effectively executed in a controlled way.

5.1.2 Allocation of KPLP Unit Bases

There are 44 bases geographically allocated throughout the country with strategic emphasis on the areas alongside the coastal lines facing the Jawa Sea, Riau and north of Irian Jaya.

The number of bases for each KANWIL is shown in Table 5.3.1.

5.1.3 Allocation of Maritime Safety Rescue Ships and Aircraft

There are 123 ships in total, consisting of 9 Class II, 16 Class III, 33 Class IV and 65 Class V, currently allocated to the KPLP unit bases. Sea patrol and SAR by the DGSC are to be carried out by the KPLP Fleet. Nine Class II maritime safety rescue ships belong to the Fleet situated in Tg.Priok, and 7 to 8 of them are attached generally one each to the respective KANWILs for about three months at one KANWIL and then rotated from one to the other in the same rotation period to carry out maritime safety rescue and SAR missions in the respective areas. Class III to V maritime safety rescue ships belong to KPLP units.

The major characteristics of maritime safety rescue ships are summarized below:

Table 5.1.1 Characteristics of Maritime Safety Rescue Ships

Class	Main Propulsion (PS)	Length (m)	Operation Area
I *	6,000 or over	45 or over	Open sea
II	3,000 - 6,000	35 - 45	Open sea
III	800 - 1,200	20 - 35	Coastal waters
IV	400 - 800	10 - 20	Harbour and limited waters
V	Less than 400	5 - 10	Harbour and limited waters

Note: * Helicopter carrying type

The operational performances and capacity of those ships are very limited due to aging except those of Class II which are not obsolete, and some of the ships seem not to have sufficient capabilities for normal operation and to have been kept in a favorable condition through skillful maintenance. Under such conditions, execution of proper activities for maritime safety patrol and SAR can hardly be attained.

There are currently no DGSC-owned aircraft.

5.1.4 Marine Accidents Requiring Special Techniques and Expertise

Recently, some of the marine accidents which have occurred in the waters of Indonesia have been getting complex and cannot be successfully met only by conventional SAR techniques and knowledge. The demand for a maritime special rescue system with highly specialized rescue techniques and skills has been increasing in rescue operations for vessels with dangerous cargoes, capsized or sunken vessels, and so on.

5.1.5 Ship Reporting System

There is currently no ship reporting system in Indonesia.

5.1.6 Private SAR Organization

It is expected that such organizations in the private sector as fishing associations, diving clubs, etc., will participate in and support SAR operations. The only one organization presently set up for exclusive SAR is a volunteer and charity body established in 1981 in Banjarmasin called "Banjarmasin Rescue".

5.2 Analysis

5.2.1 Method

It has been proved that the occurrence of marine accidents conforms with the Poisson Distribution, and based on this, the method of the "Waiting Line Theory" is applied to the study of the optimum number of maritime safety rescue ships and aircraft to be allocated to the on-shore bases in order to establish a prompt response system for SAR.

This theory may not necessarily justify the absolute optimum requirements, but it was proved as a practical and reasonable method through the field

research done for the task forces belonging to the Maritime Safety Agency in Japan, showing that the result obtained was in general agreement with the actual allocation.

The basic formulae applied to the waiting line are given below:

$$P_1 = \lambda/\mu \cdot Pn \quad (n \geq S+1)$$

$$Pn = \frac{\lambda + S\mu}{S\mu} \cdot P_{n-1} - \frac{\lambda}{S\mu} \cdot P_{n-2}$$

where

n : The unit number in the waiting line during time 't' including the number of units under service, and the total number of maritime accidents with which an on-shore base is involved.

Pn: The probability that the number of accidents concerned falls in 'n'.

S : The number of maritime safety rescue ships or aircraft

μ : Average rescue efficiency of a maritime safety rescue ship

λ : Average ratio of making rescue requests

λ/μ: Rescue load ratio

Preconditional verification has been made on the parameters of distribution of both the occurrence probability of accidents and the rescue efficiency.

5.2.2 Calculation of Number of Maritime Safety Rescue Ships

Based on the analysis of the data on marine accidents, calculations were made on the number of maritime safety rescue ships with the assumption that provisionally one each of the Class II ships is allocated to each KANWIL and that they are to be mobilized from the bases nearest to the respective KANWILs. As for the ships of Class III and lower classes, the calculations are focussed on the main ports.

A review analysis was made on the above in order to calculate the most suitable allocation with the minimum number of ships.

5.2.3 Calculation of Optimum Allocation of Aircraft

Calculations were made on the optimum allocation of airplanes and helicopters applying the "Waiting Line Theory" in the same way that the optimum allocation of maritime safety rescue ships was calculated.

5.3 Long-term Plan

5.3.1 Operational Responsibility

In order to achieve effective maritime safety and SAR operations, the present administrative areas of each KANWIL should be clearly organized into sub-areas, each of which should be under the operational responsibility of the relevant KPLP units. In other words, each KPLP unit will have its own areas of operation clearly allocated to it.

As an example, the areas of operation for which the respective KPLP units would be responsible are shown in Fig. 5.3.1 and Table 5.3.1.

The areas of operational responsibility are defined based on the existing classification of base allocation in order that the relevant KPLP units may assume the local administrative and operational responsibilities for their own areas: where the area of responsibility is covered by a single KPLP unit, it assumes the sole responsibility, and where such an area is covered by two or more KPLP units, i.e., joint areas of responsibility, the operational arrangements shall be made among them through establishment of appropriate procedures.

The coordination and operational arrangements among the relevant KPLP units shall be carried out by the KANWILs concerned. The designation of areas of operational responsibility is primarily based on the ships' operation, while the aircraft carry out allround operations to cover the areas beyond the assigned coverages as described in 5.3.4.

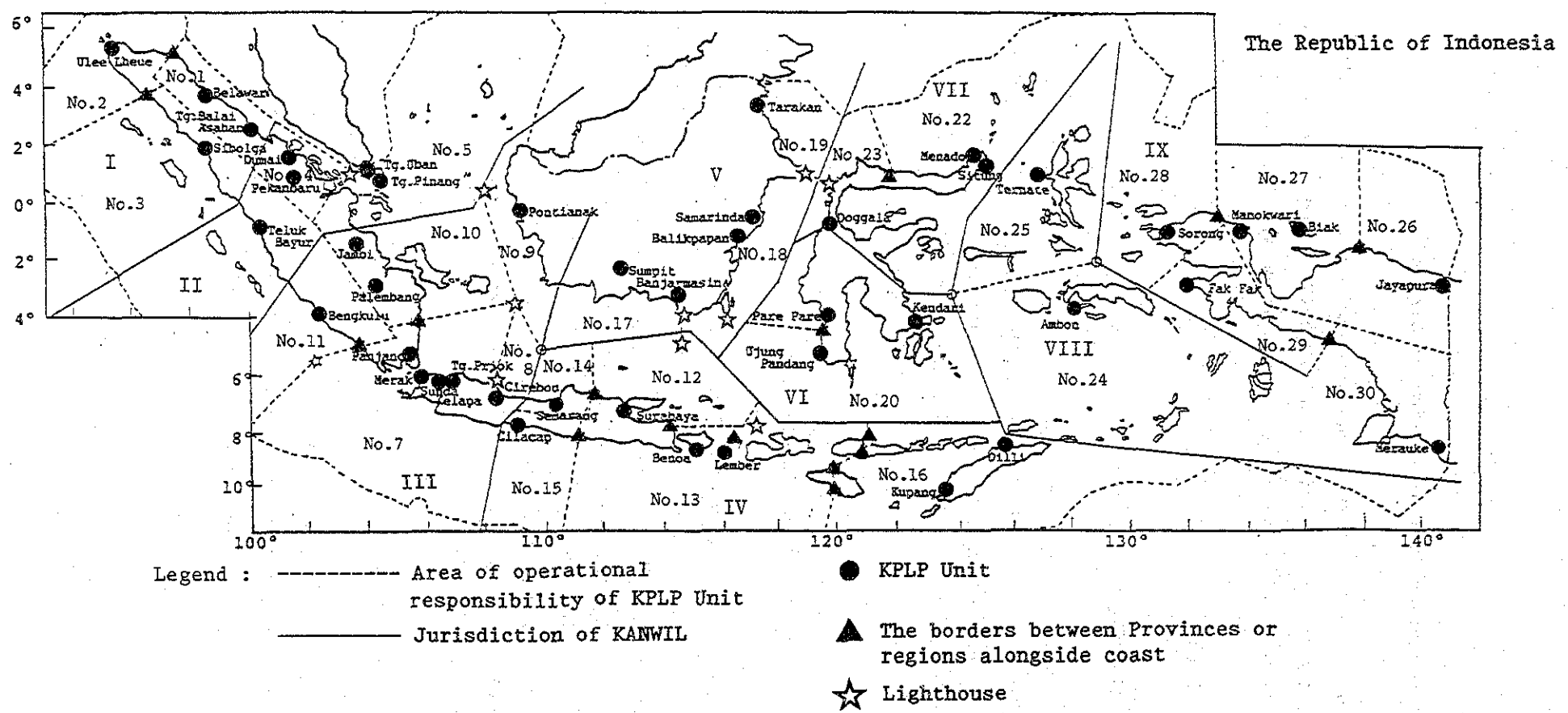


Fig. 5.3.1 Area of operational responsibility of KPLP Unit

Table 5.3.1 Areas of Operational Responsibility for KPLP Units

No.	KANWIL	KPLP Unit	No.	KANWIL	KPLP Unit
1*	I	Belawan/Tg.Balai Asahan	17*	V	Banjarmasin/Sampit
2		Ulee Lheue	18*		Samarinda/Balikpapan
3		Sibolga	19		Tarakan
4*	II	Dumai/Pekanbaru	20*	VI	Ujung Pandang/Kendari
5*		Tg.Uban/Tg.Pinang	21		Pare Pare
6		Teluk Bayur	22*	VII	Manado/Bitung
7*	III	Tg.Priok/Sunda Kelapa/	23		Donggala
		Merak/Panjang	24	VIII	Ambon
8		Cirebon	25		Ternate
9		Pontianak	26	IX	Jayapura
10*		Jambi/Palembang	27*		Biak/Manokwari
11		Benkulu	28		Sorong
12	IV	Surabaya	29		Fak Fak
13*		Benoa/Lember	30		Merauke
14		Semarang			
15		Cilacap			
16*		Kupang/Dilli			

Note: * shows joint areas of operational responsibility (Total 12)

5.3.2 Allocation of Maritime Safety Rescue Ships

(1) Number and Allocation of Maritime Safety Rescue Ships

As shown in Table 5.3.3, the optimum allocation of maritime safety rescue ships is made based on the analysis and also on the strategic and operational requirements.

The allocation of Class I maritime safety rescue ships is based on the following principles:

a. To cover the areas out of the reach of shore-based helicopters
b. To cover the ocean areas for international SAR
c. To supplement the gap areas operationally created by the coverage of Class II ships

The optimum allocation of Class II maritime safety rescue ships is made to provide effective operations based not only on the analysis as defined in 5.2.2, but also on the volume of multi-purpose services, being fully prepared to be always ready to move, types and numbers of ships allocated at present, number of personnel and relevant neighboring stations, and so on. The ships in Class III to V are allocated in consideration of the port scale, marine accidents and other factors.

(2) Improvement of Maritime Safety Rescue Ships

The improvement of maritime safety rescue ships is planned below:

Table 5.3.2 Improvement Plan of Maritime Safety Rescue Ships

Class	Total No. Required (A)	Existing No. (B)	Balance (A)-(B)	Scrapping by 2005	Balance to be improved & replaced
I-A	6	0	6	0	6
I-B	5	0	5	0	5
II	21	9	12	0	12
III	33	16	17	5	22
IV	37	33	4	0	4
V	62	65	Δ3	3	-
Total	164	123	41	8	49

(3) Summary of Classified Maritime Safety Rescue Ship

Class I-A
Coverage : All waters
Cruising range : 5,000NM
L = 74 m
B = 10 m
D = 5 m
G/T = 1,000 tons

Main engine = 1,500 ps x 2
Speed : 15 KT
With Heli-port

Class I-B

Coverage : All waters
Cruising range : 3,000 NM
L = 59 m
B = 8 m
D = 4.5 m
G/T = 500 tons

Main engine = 1,300 ps x 2
Speed : 15 KT

Class II

Coverage : All waters
Cruising range : 520 NM
L = 35 m
B = 6.3 m
D = 3.4 m
G/T = 100 tons

Main engine = 2,400 ps x 2
Speed : 26 KT

Class III

Coverage : Coastal waters
Cruising range : 350 NM
L = 24 m
B = 6 m
D = 2.85 m
G/T = 93 tons

Main engine = 540 ps x 2
Speed : 16 KT

Class IV

Coverage : Coastal waters

Cruising range : 200 NM

L = 18 m

B = 4.3 m

D = 2.3 m

G/T = 37 tons

Main engine = 450 ps x 2

Speed : 21 KT

Table 5.3.3 Number and Allocation of Maritime Safety Rescue Ships

KANWIL		No.	KPLP Unit	Ship Class						ADPEL Class
				I-A	I-B	II	III	IV	V	
	(Jakarta)	1	KPLP Fleet			(9)				I
I	Medan	2	Belawan		1	2		2 (1)	3 (2)	I
		3	Sibolga				1 (1)		1 (1)	V
		4	Ulee Leue				1	(1)	1 (1)	
		5	Tg.Balai Asahan				1		1 (3)	V
II	Dumai	6	Dumai					1 (2)	1 (6)	III
		7	Tg.Uban		1	2	1	2 (1)	3 (7)	
		8	Tg.Pinang				1 (1)	1 (1)	1 (3)	IV
		9	Tilk Bayur			1	1	1 (1)	1 (3)	III
		10	Pekanbaru				1		1 (1)	IV
III	Jakarta	11	Tg.Priok	2		3	(1)	3 (2)	3 (2)	I
		12	Sunda Kelapa				1 (1)	1 (1)	1 (2)	IV
		13	Cirebon				1	(1)	1 (2)	III
		14	Jambi				1	1 (1)	1 (2)	IV
		15	Palembang			1		2 (2)	1 (1)	III
		16	Panjang				1	1 (1)	1 (1)	III
		17	Merak				1 (3)	1 (1)	1 (1)	
		18	Pontianak				1	1	1 (2)	III
		19	Benkulu				1		1	
IV	Surabaya	20	Surabaya/ Tg.Perak	2		3	(1)	2 (3)	3 (2)	I
		21	Semarang				1	1 (1)	1 (2)	III
		22	Cilacap			1		2 (1)	1 (1)	III
		23	Benoa			1	1 (1)		1	IV
		24	Lember/Ampenan				1	(1)	1 (1)	IV
		25	Kupang			1	1		1 (1)	
		26	Dilli				1		1	V
V	Banjarmasin	27	Banjarmasin				1	1 (2)	1	III
		28	Samarinda				1 (1)	1 (1)	1	III
		29	Balikpapan			1		2 (1)	3 (2)	III
		30	Sampit				1	(1)	1	IV
		31	Tarakan				1		1	IV
VI	Ujung Pandang	32	Ujung Pandang	2		1	(1)	3 (2)	3 (3)	I
		33	Pare Pare				1		1	V
		34	Kendari				1		1 (1)	IV
VII	Manado	35	Manado				1	1 (1)	1 (1)	V
		36	Bitung		1	1		2	3 (2)	III
		37	Donggala				1		1	
VIII	Ambon	38	Ambon		1	1	(2)	2	3 (3)	III
		39	Ternate				1		1 (2)	IV
IX	Jayapura	40	Jayapura		1	1	(1)	2 (1)	3 (1)	III
		41	Sorong				1 (1)	1	1	III
		42	Manokwari				1	(1)	1 (1)	V
		43	Biak				1		1 (1)	IV
		44	Merauke			1	1 (1)		1	IV
		45	Fak Fak				1	(1)	1 (1)	V
		Total		6	5	21(9)	33(16)	37(33)	62(65)	-

Note: Numbers in ( ) indicate the present numbers of maritime safety rescue ships.

5.3.3 Moorage-piers for Exclusive Use of Maritime Safety Rescue Ships

Maritime safety rescue ships presently use exclusive or public moorage-piers for mooring. However, the piers are located deep inside harbours where the waters are shallow and overcrowded with small vessels and lighters. They are, therefore, unsuitable for use by ships in Class I-A and I-B. Accordingly, it will be necessary to construct new moorage-piers at Tg.Priok, Surabaya and so on, where Class I-A and I-B maritime safety rescue ships are to be allocated.

Table 5.3.4 *Size and Location of New Moorage-piers*

Class	Length (m)	Width (m)	Thickness of Deck (m)	Newly Proposed Locations
I-A	95	6	0.25	Tg.Priok, Surabaya, Ujung Pandang
I-B	75	5	0.20	Tg.Uban, Belawan, Bitung Ambon, Jayapura

5.3.4 Allocation of Aircraft

(1) Necessity of Allocating Aircraft

In order to carry out SAR activities such as prompt dispatch, search and lifting up for marine accidents which increase and scatter in wide Indonesian waters, it is necessary to make use of highly mobile aircraft.

(2) Performance of Aircraft

The major performances of aircraft are summarized below:

(i) Airplane

Type : VLR (Very Long Range - radius of action of more than 1,000 NM, plus 2.5 hours search remaining)

Cruising speed : 250 KT

Cruising range : Over 2,700 NM

Operational radius : Approx. 1,000 NM

(ii) Helicopter

Type : HEL-M (Medium helicopter - maximum capacity for evacuating 15 persons/endurance up to 3-3.5 hours)

Cruising speed : 135 KT

Cruising range : 450 NM

Operational radius : 175 NM

(3) Number and Allocation of Aircraft

As shown in Table 5.3.5, the optimum allocation of aircraft is made based on the analysis together with a consideration of the geography.

Airplanes from two stations are to cover the most areas, while helicopters from six stations will provide the regional operation coverages as shown in Fig. 5.3.2. The operational coverage is to be further expanded by refueling. The aircraft will also participate in international SAR activities.

One pair of two airplanes and two helicopters is to be allocated at each station for operational readiness to fulfill 24-hour activities.

Table 5.3.5 Number and Allocation of Aircraft

Type	KAN-WIL	DGSC Air Station	Airport	No. of Aircraft
Airplane	III	Jakarta	Jakarta	2
	VI	Ujung Pandang	Ujung Pandang	2
	Sub Total			4
Helicopter	I	Medan	Medan	2
	II	Tg.Uban	Tg.Uban	2
	III	Jakarta	Jakarta	2
	IV	Surabaya	Surabaya	2
	VI	Ujung Pandang	Ujung Pandang	2
	VIII	Ambon	Ambon	2
	Sub Total			12
	Total			16

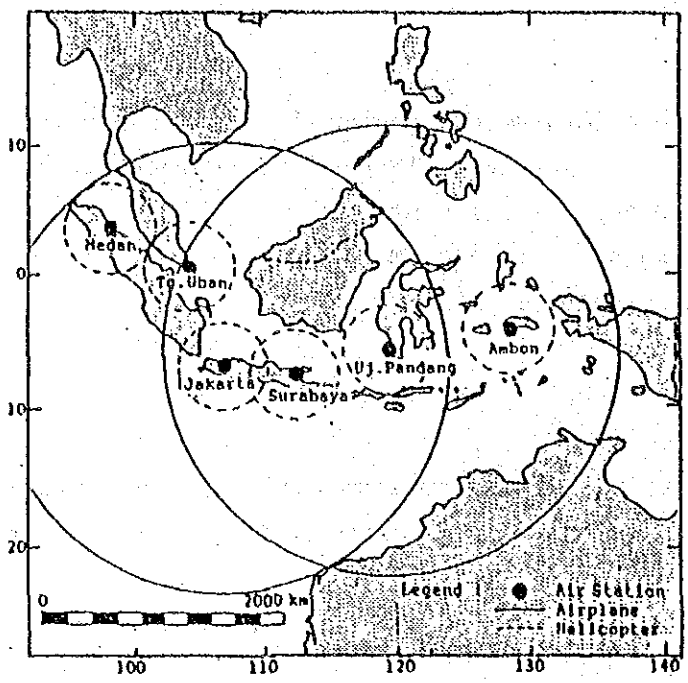


Fig. 5.3.2 Operational Coverages by Aircraft

5.3.5 Special Rescue Team

Special Rescue Teams will be formed to carry out special tasks as given below.

(1) to rescue vessels carrying dangerous cargoes such as high pressure gas, toxic substances;
(2) to rescue crews of capsized or sunken vessels by utilizing skilled scuba diving techniques
(3) to send specially trained rescue teams by helicopter to scenes that maritime safety rescue ships can not approach.

The Teams will be based at five Special Rescue Stations described in 10.3.2, (5). It is also desirable to have the divers on board the Class I-A and I-B maritime safety rescue ships, whenever necessary.

5.3.6 Ship Reporting System

In order that general passing ships as well as the coastal nation's SAR units take prompt and effective SAR action in wide sea areas, the Maritime SAR Convention proposed the establishment of a ship reporting system. Thus, various systems have already been put into operation, namely the Automated Mutual-assistance Vessel Rescue System (AMVER) in the U.S., Australian Ship Reporting System (AUSREP), Japanese Ship Reporting System (JASREP), and Indian Ship Position and Information Reporting System (INSPIRES).

The ship reporting system is a system for prompt and efficient search and rescue. Operation office periodically receives information on ships position, speed, course, etc., and stores them into data processing unit. In case rescue is required, the operations office outputs the necessary data from the processing unit and sends the data to rescue ships navigating near a ship in distress. This system would make great contribution to the prompt and proper SAR activities if data on sea condition, etc., in addition to the above data could be obtained.

In Indonesia, the ship reporting system may be implemented through the joint use of the SAR information networks, Message Exchange System (MES) and Management Information System (MIS) described in 7.2.1, (2) and (3) under the management of the Sea and Coast Guard (KPLP).

6 Marine Disaster Prevention

6. 1 Present Situation
6. 2 Analysis
6. 3 Long-term Development Plan

Section 6 Marine Disaster Prevention

6.1 Present Situation

6.1.1 Actual Status of Marine Disasters

(1) Indonesian Flag Tankers

According to data from Lloyd's, there were 193 Indonesian flag tankers of 100 G/T and upwards in 1986, and their gross tonnage was 3,127 tons on average.

The annual growth rates of national flag tankers have been about 7% in number and about 6% in gross tonnage on average for the past 8 years.

(2) Tanker Accidents

Huge tankers are cruising in Malacca and Singapore straits or otherwise the Lombok and Makassar straits in order to keep their under-keel clearance and to ensure safety of their navigation.

Tanker accidents including those of other national flag carriers in and around Indonesian waters during the five years from 1982 to 1986 annual averaged 13 annually. Of these, stranding occupied about 22% and collision 33%. As for accidents by distance, 80% occurred within 12 miles from the coasts.

In the analysis by areas, Cilacap, Surabaya and Palembang are specified as areas where a high number of accidents occurred.

(3) Marine Disasters Other than Tanker Accidents

In the past, large marine disasters happened along the coasts of Indonesia, and along the Malacca and Singapore straits. There has also been an accident involving a chemical tanker and a fire on an oil rig. Furthermore, natural disasters such as flooding and high tides on small islands have occurred.