BASIC DESIGN STUDY REPORT

ON

THE PROJECT FOR ESTABLISHMENT

OF

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BASIC DESIGN STUDY PEPORT
ON
THE PROJECT FOR ESTABLISHMENT
OF
ENVIRONMENTAL MANAGEMENT CENTER
IN
THE REPUBLIC OF INDONESIA

DECEMBER 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to a request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct a basic design study on the Project for Establishment of Environmental Management Center and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a study team headed by Mr. Kazuhisa Matsuoka, Director, First Basic Design Study Division, Grant Aid Study and Design Department, JICA, from June 23 to July 20, 1991.

The team held discussion with the officials concerned of the Government of Indonesia, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Indonesia in order to discuss a draft report and the present report was prepared.

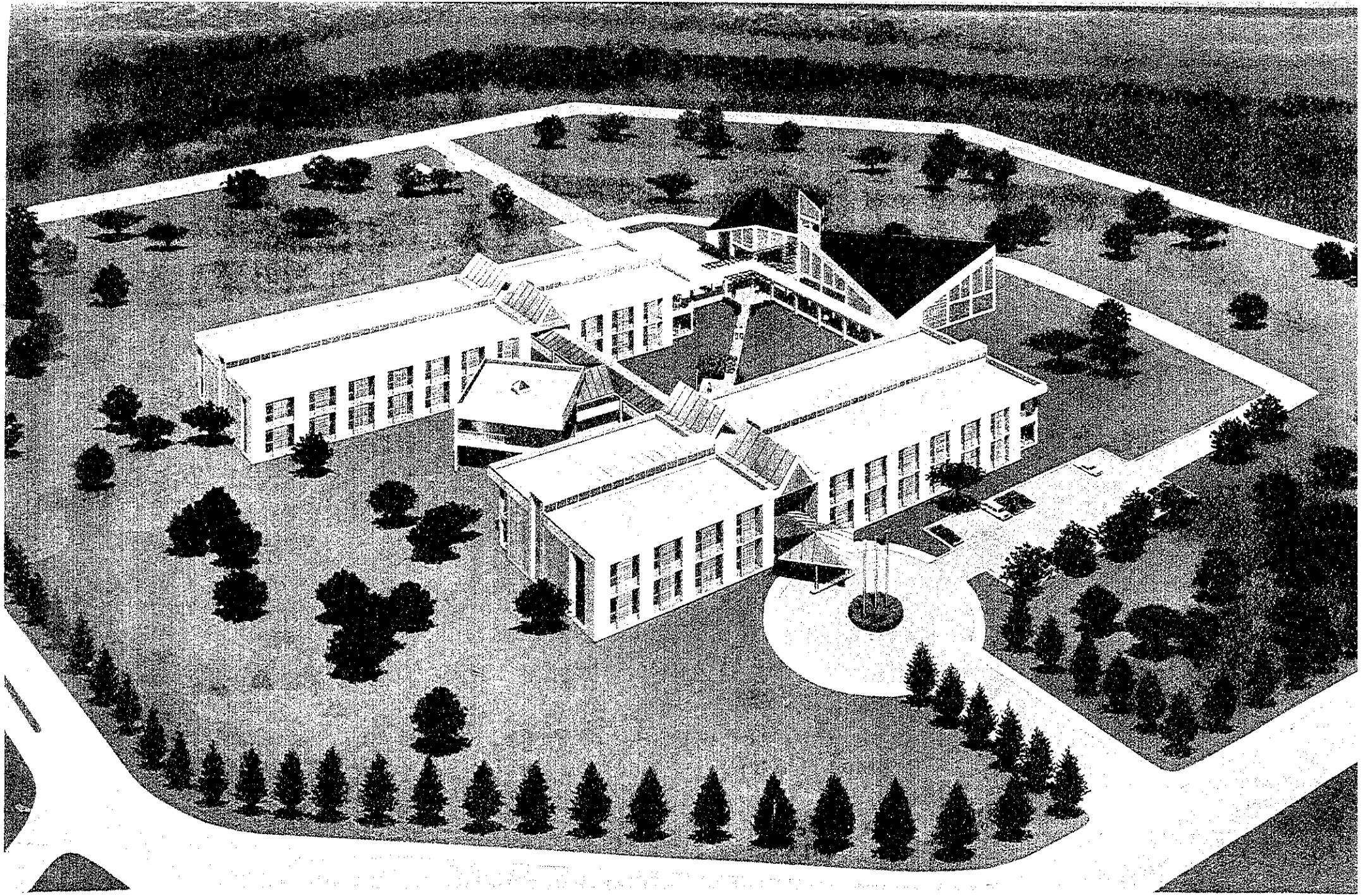
I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

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

December, 1991

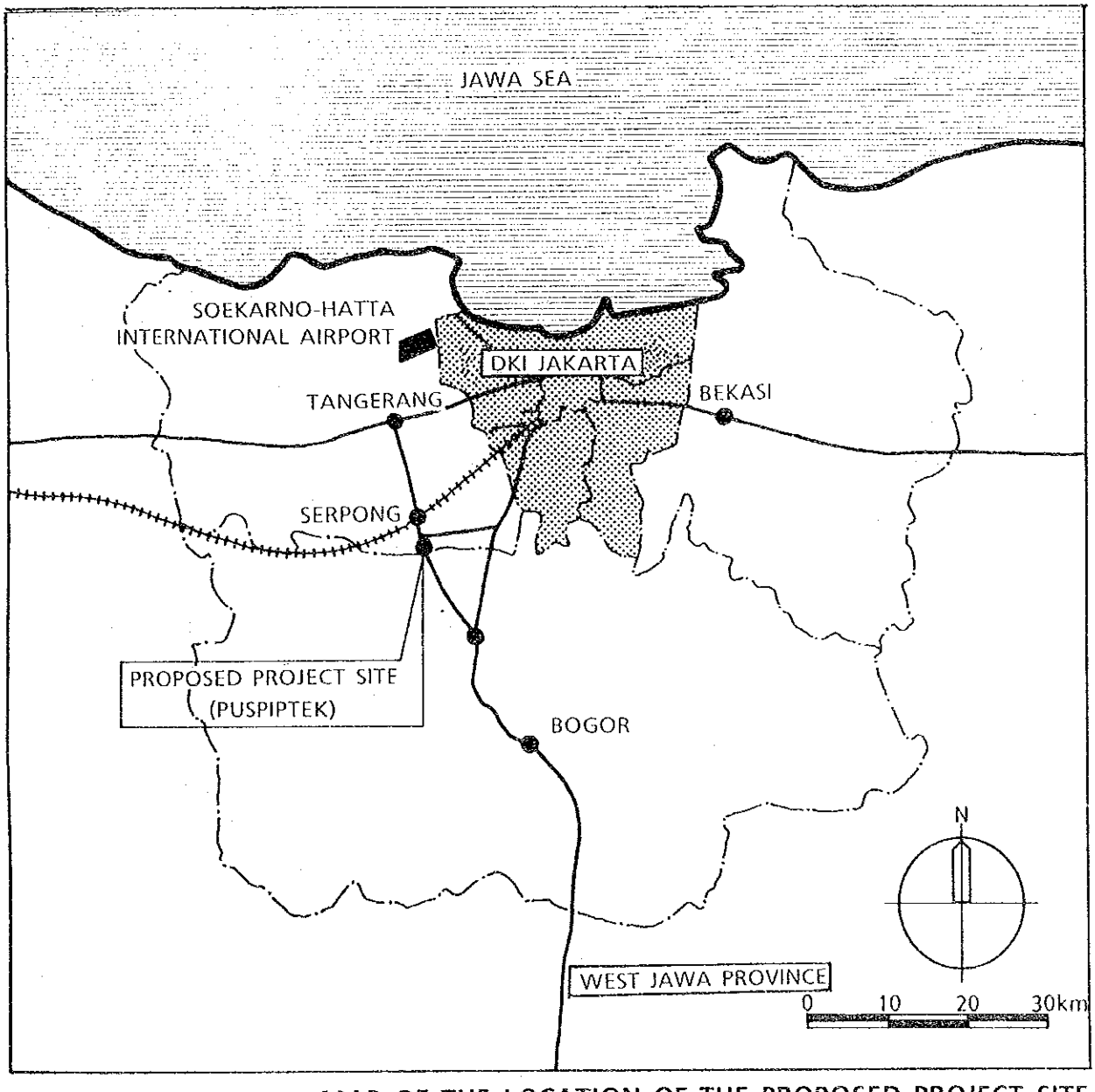
Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency



THE ENVIRONMENTAL MANAGEMENT CENTER IN THE REPUBLIC OF INDONESIA

MAP OF INDONESIA



MAP OF THE LOCATION OF THE PROPOSED PROJECT SITE

SUMMARY

From the beginning of the 1980s and on to the middle of the decade, Indonesia's oil industry continued to be sluggish, affected by the worldwide economic slump. As a result, the country's economy, which greatly depends on oil exports, remained depressed. In the Fourth Five-Year Development Plan (1984 - 1989) started in April 1984, the average annual growth rate was targeted at 5%, which was lower than the 6.0% average annual growth rate targeted in the Third Five-Year Development Plan (1979 - 1984), because of uncertain improvement in international oil demand. The Fourth Five-Year Development Plan especially aimed at promoting the export of non-oil and non-gas products, and thereby heightening the country's economic growth. Intensive industrial development, intended to maintain balance in the country's economic structure, resulted in 9.5% growth in this sector. The Fifth Five-Year Development Plan (1989 - 1994) started in April 1989 is aimed at advancing the country's development policies based on the promotion of favorable non- oil and non-gas products export industries. The Fifth Five-Year Development Plan is thus intended to invigorate the country's economic activities, raise the Indonesian people's living standard, and promote the country's emergence as a newly industrialized country.

However, this rapid invigoration of economic activity has caused the country's sphere of socioeconomic activities to expand, and this exerts pressure on natural resources and causes increases in environmental loads. Urban areas such as Jakarta and Surabaya and rural regions are faced with different environmental problems. Urban regions where environmental pollution is evident are suffering from pollution caused by toxic chemical substances and heavy metals in industrial waste resulting from industrial development, organic pollution of surface water due to untreated household waste water, contaminated ground water, exhaust gas from industrial zones, air pollution due to exhaust from automobiles, noise, and solid waste management. Pollution by hazardous substances originating in pesticides is considerable in rural regions.

Environmental problems in the Republic of Indonesia are characterized, as in other developing countries, by a mixture of environmental pollution as mentioned above and natural resources on the verge of destruction, as well as general environmental sanitation, a problem that has already been solved in most of

developed countries. This fact makes Indonesia's environmental problems complicated.

Such being the case, it is important that appropriate measures be sought to solve Indonesia's environmental problems which differ considerably from those in developed countries. Regarding environmental administration, Act No. 4/1982 on the Basic Provisions of Environmental Management was enacted in 1982, and the Ministry of State for Population and Environment (KLH) was established in 1983. But currently the Ministry is only engaged in improving laws and regulations relevant to environmental administration and coordinating affairs under the control of the ministries and agencies concerned with development and environmental problems. The Government of Indonesia aims to develop human resources equipped with advanced technologies, in order to heighten its ability to solve environmental problems. As a measure for attaining these goals, the government established the Environmental Impact Management Agency (BAPEDAL) in June 1990 in accordance with a Presidential Decree.

However, environmental administration and environmental pollution control have just been started in BAPEDAL, which plays a leading role in these areas. Impediments to implementing adequate measures include financial and technical restrictions such as insufficient technology for measuring and analyzing pollution sources--technology indispensable for environmental pollution control--and insufficient numbers of environmental administration officials, engineers and researchers, as well as inadequate research facilities and equipment.

Under these circumstances, the Government of Indonesia decided in its Fifth Five-Year Development Plan to "promote sustainable development and control environmental pollution." On this basic policy, the government designed the "Project for Establishment of Environmental Management Center (EMC)", which was to be the "central institution for establishing future environmental administration by further promoting researches in environmental policies, development of environmental management technologies, information data analysis, and training for administrative officials and engineers in private institutions and corporations." The government also intended to specify this center as an affiliate of BAPEDAL, and requested grant aid and project- type technical cooperation of the Government of Japan for the project's implementation. In response to this request, the Government of Japan dispatched a preliminary study team in February 1991 to confirm the contents of the request

and make a study of the basic plan for the EMC and the necessity and appropriateness of cooperation. The study has made it clear that the Republic of Indonesia is now faced with environmental problems as severe as those facing other Asian countries, that it is necessary for the Government of Japan to actively cooperate with Indonesia in environmental conservation and environmental pollution control, by utilizing Japan's long and vast experience and technologies in this area, and that it is desirable that technical cooperation be provided, effectively connected with grant aid, in the case that the project will be implemented.

Against this background, the Government of Japan decided to make a basic design study, and JICA dispatched a basic design study team over 28 days from June 23 through July 20, 1991. Based on the study results, JICA conducted a basic design of facilities, selected equipment and materials, formulated operation, maintenance and management plans and a proposed construction schedule, and dispatched a basic design draft final report study team to Indonesia over eleven days from 5 through 15 November 1991.

This study has led to the conclusion that it is necessary for the Government of Indonesia to establish an environmental monitoring system and strengthen the science and technology base in the country, by developing human resources in this area, in order to promote Indonesia's environmental administration. The study has also led to the conclusion that it is reasonable for the EMC to be given two kinds of functions--environmental monitoring and training activities pertaining to environmental conservation. And the optimum plan was formulated for the project's implementation.

Regarding environmental monitoring activities, practical research is planned for establishing a nationwide monitoring network, with the view of directly contributing to environmental administration. These activities include ascertaining present conditions in four environmental conservation fields (water pollution, air pollution, noise and vibration, and toxic substances), identification of pollution sources, revision and establishment of environmental standards, and environmental pollution control. These activities also include the establishment of a reference laboratory, conducting environmental monitoring activities, and development of the environmental information system.

Training pertaining to environmental conservation consists of training in environmental technology and training in environmental administration. Such training is intended for those researchers, engineers, and administrative officials who are engaged in environmental pollution control, as well as for personnel in private sectors. Comprehensive training will be given pertaining to all aspects of environmental pollution control.

In training pertaining to environmental technology, 13 courses will be provided in four categories, namely, environmental monitoring techniques, environmental planning, environmental data processing, and environmental pollution control technology. These courses are planned to receive 340 technical trainees a year.

In training pertaining to environmental administration, nine courses will be provided in four categories, namely, environmental impact assessment, environmental administration (1) and (2), environmental communication and public participation. These courses are planned to receive 440 administrative trainees a year. In addition, special training will be provided in the form of seminars. Seventeen seminars are planned annually, each of which will receive 50 to 800 participants.

The proposed construction site of the EMC is located in the complex of the National Center for Research, Science and Technology (PUSPIPTEK) in Serpong, a city in West Java province. It is about 45 kilometers away from the capital, Jakarta, or about an hour's ride. Since the proposed site is distant from Jakarta, it is necessary to ensure lodgings for trainees and houses for staffs.

PUSPIPTEK is a research, science and technology complex established by the Government of Indonesia in October 1974 as an institution controlled by the minister in charge of research and technology. The government established it with the view of creating a national center for science and technology, by gathering together the national science and technology research institutions scattered throughout the country.

PUSPIPTEK is located in a site having an area of 350 hectares and extending from east to west. The site is divided into two zones--housing zone and research zone--by a road running
through the middle from south to north. The eastern zone with an area of 120 hectares is the housing zone, which has houses for researchers, a mosque, a

primary school, a secondary school, a clinic, a guest house, a park, and athletic facilities. In the western zone--the research zone with an area of 230 hectares--researchers are at work in laboratories used for research on the strength of materials, energy, calibration and metrology, applied physics, applied chemistry, etc. Both zones of the Center are equipped with roads with water supply pipes and drainage ditches along them, an electric power supply main line, and a telephone trunk line.

Regarding the proposed site for the EMC, a lot having an area of about 5 hectares in the research zone is planned for the facilities for monitoring research, training, and management, while a lot having an area of about 1 hectare in the housing zone is planned as the lodging facilities. The distance along the road between these two lots is about 1 kilometer.

Since the ground of the proposed sites has already been leveled, the Government of Indonesia is not required to bear a great deal of expenses for infrastructure improvements such as the raising of the ground level.

Structure and size of the planned facilities are mentioned below.

1) Facilities for monitoring research, training, and management: research and training building
   Structure: reinforced concrete structure, two-storied, partially one-storied
   Total floor area: about 7,300 m^2
   The building has main rooms as described below.
   Monitoring facilities :
      Rooms relevant to research and analysis (water pollution, air pollution, toxic substances), rooms of common analytical equipment, rooms relevant to data processing, office for the researchers, meeting room, workshop, library etc.
   Training facilities :
      Practice rooms, computer practice rooms, lecture room, audiovisual room, auditorium, canteen, etc.
   Management facilities :
      Rooms relevant to management, office for the instructors, meeting room, etc.

2) Lodging facilities : Dormitory building
Structure: reinforced concrete structure, two-storied
Total floor area: about 1,400 m^2
The dormitory building has the main rooms mentioned below.
Dormitory office, bedroom for trainee
(16 rooms accommodating three persons each; 48 trainee in total), bedroom for instructors (4 rooms accommodating two persons each; 8 instructors in total), dining room, meeting room, laundry, etc.

Major pieces of equipment for the EMC include common analytical equipment, general laboratory equipment, and equipment for the four environmental pollution fields (water pollution, air pollution, noise and vibration, and toxic substances).

The period required for constructing the EMC is estimated as about 10 months from the starting of the first phase construction (facilities for monitoring research and management) and about 10 months from the starting of the second phase construction (facilities for training block and lodging, equipment).

The Indonesian implementing agency is BAPEDAL, whose Director has general control over the Project.

In the EMC, being one of BAPEDAL's institutions, researches on environmental policies, technological development, and environmental information processing and analysis are conducted and technical and administrative training is provided for researchers and engineers of administrative organizations, administrative officials and engineers of private sectors.

The EMC is organized into nine sections in four divisions : the EMC is headed by the Head. The Head controls the Deputy Director I who controls the Reference Laboratory Division (Water Quality and Soil Section, Air and Noise Section, and Toxic Substances Section) and the Environmental Information Division (Data Analysis and Evaluation Section, Information and Documentation Section, and Data Processing Section). These division constitute the EMC's environmental quality monitoring planning system. The Director also controls the Deputy Director II who controls the Training Division (Planning Section, Course Section, and Control Section). This division provides the EMC's human resources

development system. A fourth division under the control of the Director is the Management Division.
It is planned that the EMC will be started with 63 staffs, including those transferred from BAPEDAL and other ministries and new graduates.

Activities in the EMC are expected to produce the following effects.

1) The expanded programs projects and unified monitoring network will make it possible for the researchers to collect highly reliable data, which will make provide adequate information on the state of the environment in Indonesia as a base of environmental policy development, law enforcement and program implementation. Environmental conservation administration will become more efficient when these data are processed, analyzed and provided to the environmental, relating agencies.

   The execution of practical environmental research and analysis based on data collected through monitoring networks will lead to the development, establishment and revision of environmental standards and regulations appropriate to the conditions in Indonesia. Also, it will promote better understanding of the causes of environmental pollution, development of environmental pollution control technologies, and taking measures for environmental pollution issues.

2) It is expected that monitoring and data processing techniques will be improved and knowledge, know-how and experience of environmental administration will be increased. This will ensure appropriate execution of environmental conservation measures including environmental regulations and environmental impact assessments, and promote the integration of environmental consideration into development and thus sustainable development of Indonesia.

The EMC is to become the first institution in the Republic of Indonesia for conducting environmental monitoring and research as well as human resources development activities in this area, particularly for environmental pollution control. It is desired that this project be implemented as early as possible, since the establishment of the EMC is indispensable for the country's environmental conservation and maintenance of the people's health.

Project-type technical cooperation with experts dispatched from Japan is also planned, in order for the EMC to work more effectively.

Activities in the EMC will heighten the qualifications of persons responsible for environmental conservation and thereby contribute to solving the serious environmental problems now Indonesia facing. It is of great significance that the Project is to be implemented under the grant aid of Japan and the project type of technical cooperation, which has abundant experience and technology in environmental conservation. A great deal of positive effects can be expected from the Project's implementation.

CONTENTS

LIST OF ABBREVIATIONS

AMDAL	Environmental Impact Assesment (Analisa Mengenai Dampak Lingkungan)
ANDAL	Environmental Impact Research (Analisa Dampak Lingkungan)
Asmen	Asistant Minister (Asisten Menteri)
BAPEDAL	Environmental Impact Management Agency (Bandan Pengendalian Dampak Lingkungan)
BAPEDALDA-1	Provincial BAPEDAL (Badan Pengendalian Dampak Lingkungan Tingkat Propinsi)
BAPEDALDA-2	Regional BAPEDAL (Badan Pengendalian Dampak Lingkungkn Tingkat Kabupaten)
BAPPEDA	Provincial Development Planning Board (Badan Peren Canaan Pembangunan Daerah)
BAPPENAS	National Development Planning Board (Badan Perecanaan Pembangunan Nasional)
BDP	BAPEDAL Development Project
BKLH	Provincial Government Office for Environmental and Population (Biro Kependudukan dan Lingkungan Hidup)
BMG	Meteorogical and Geophisics Agency (Badan Meteorologi dan Geofisika)
BPPI	Industrial Research and Development Institute Ministry of Industry (Badan Penelitian dan Pengembangan Industri) (Balai Penelitian dan Pengenbangan Industri)
BPPT	(Badan Pengkajan dan Penerapan Technologi)

BTKL	Environmental Technical Health Institute (Balai Teknik Kesehatan Linkungan)
B3	Hazardous and Toxic SubstanceManagement (Bahan Beragun Dan Berbahaya)
CIDA	Canadian International Development Agency
Depkeu	(Departmen Keuangan)
Dinas	Service of Local Government
DKI	Capital City Special Region (Daerah Khusus Ibukota)
EKUIN	(Menteri Koodinator Bidang Ekonomi Keuangan dan Induetri & Pengawasan)
EMC	Environmental Management Center
EMDI	Environmental Management Development Indonesia
EMTAG	Environmental Management Technical Assistance Grant
EMTAL	Environmental Management Technical Assistance Loan
GEMS	Global Environmental Monitoring System
GOI	Government of Indonesia
IBRD	World Bank
INPRES	President Decree (Instruksi Presiden)
IPB	Bogor Agricultural University (Institut Pertanian Bogor)
ITB	Bandung Institute of Technology (Institut Teknologi Bandung)
JABOTABEK	Jakarta, Bogor, Tangerang, Bekasi
KLH	Ministry of State for Population and Environment (Menteri Negara kependudukan dan Lingkungan Hidup)
LEMIGAS	National Institute of Oil and Gas (Lembaga Minyak dan Gasbumi)
PAM	(Perusahan Air Minum Jaya)
PERIND	(Departemen Perindustrian)
PERUMTEL	(Perusahan Telekomunikasi)

PLN	(Perusahan Listik Negara)
PLTU	Electrical Steam Power Plant
	(Penbangkit Listrik Tenaga Uap)
PROKASIH	Clean River Program
	(Program Kali Bersih)
PSL	Environmental Studies Center
	(Pusat Stndi Lingkungan)
PU	(Departemen Pekerjan Umum)
PUSPIPTEK	National Center for Research, Science and Technology
	(Pusat Penelitian Ilmu Pengetahuan dan Teknologi)
P4L	Center for Urban and Environmental Research and Development
	(Pusat Penelitian dan Pengembangan Perkotaan dan Lingkungan)
REPELITA V	The 5th Five Year Development Plan
	(Rencana Pembangunan 5 Tahunz)
RKL	Management Plan
	(Rencana Pengelolaan Lingkungan)
RPL	Monitoring Plan
	(Rencana Pemantauan Lingkungan)
SEKAB	Secretary Cabinet
	(Sekretariat Kabinet)
SEKNEG	State Secretariat
	(Sekretariat Negara)
SUCOFINDO	State Run Survey Company
	(Superintending Company of Indonesia)
TKP2	Pollution Monitoring and Control
	(Tim Koordinasi Penanggulangan Pencemaran)
UGM	Gadjah Mada University
	(Universitas Gajah Mada)
UI	University of Indonesia
	(Universitas Indonesia)
UNDP	United Nations Development Programme

UNPAD	Padjajaran University (Universitas Pajajaran)
USAID	United States Agency for International Development
WWF	World Wide Life Fund for Nature
CH_3SH	Methyl Mercaptane
CO	Carbon Monoxide
H_2S	Hydrogen Sulfide
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxide
O_X	Oxidants
SO_2	Sulfure Dioxide
SPM	Suspended Particulate Matter
TSP	Total Suspended Particulate Matter

CHAPTER 1 INTRODUCTION

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In the Republic of Indonesia, the rapid population growth urbanization and industrialization especially in urban areas have greatly affected its natural resources and environment. Consequent environmental pollution has become more and more severe both in urban areas such as Jakarta and Surabaya and in rural regions, posing environmental problems different from region to region.

Under these circumstances, the Government of Indonesia enacted the Basic Provisions of Environmental Management in 1982 after establishing the Ministry of State for Development Control and Environment (PPLH) in 1978 which later was changed to the Ministry of State for Population and Environment (KLH) in 1983. The Ministry, however, is currently only in charge of the development of laws and regulations relevant to environmental administration and coordination among the ministries concerned regarding the implementation and enforcement of them. Such being the case, only a small number of government and private engineers and researchers are engaged in surveillance of the environment through monitoring environmental pollution, analyzing environmental information, and taking appropriate measures for environmental conservation. In addition, financial and technical restrictions impede the solution of various environmental problems now the country facing.

The Government of Indonesia established the Environmental Impact Management Agency (BAPEDAL) in June 1990 baseded on the Presidential Decree, with the view of increasing its ability to cope with environmental, problems through human resources and technological development and implementation of environmental impact control. In connection with this, the government is making preparations for supporting projects formulated by BAPEDAL, by utilizing the EMTAL (Environmental Management Technical Assistance Loan) provided by the World Bank. In addition, the Government of Indonesia planned to establish the Environmental Management Center (EMC), an affiliate of BAPEDAL, in order to develop a environmental monitoring network and to promote the training of technicians and researchers engaged in environmental administration researches, environmental management technology development, and environmental data and information analysis.

For establishing the EMC, the Government of Indonesia requested project-type technical cooperation, in addition to grant aid, of the Government of Japan, which had produced good results in cooperation with Thailand and China in the area of environmental protection.

In response to this request, the Government of Japan decided to make preliminary studies, which were conducted by the Japan International Cooperation Agency (JICA).

Regarding this project, for whose implementation the Government of Indonesia requested grant aid of the Government of Japan, JICA confirmed the contents of the request and the implementing agency in Indonesia, and had discussions regarding the range of cooperation of the Japanese government. JICA dispatched the Grant Aid Preliminary Study Team (headed by Kinichi Komano, Deputy Director, Research and Programming Division, Economic Cooperation Bureau, the Ministry of Foreign Affairs) over ten days from February 10 to 19, 1991.

The Team reported that it was necessary to actively cooperate with the Government of Indonesia to cope with the environmental pollution now facing the country, by giving full play to Japan's experience and technologies in environmental protection and environmental pollution control. The Team also concluded that it would be effective to give relevant technical cooperation in addition to grant aid. In response to this report, JICA sent the Project-type Technical Cooperation Preliminary Study Team (headed by Hisakazu Kato, Director, Office of Overseas Environmental Cooperation, Global Environment Department, Environmental Agency) from May 28 to June 3, 1991. The Team confirmed the implementation system of Indonesia and the contents of the Project, and had discussions regarding the organization of the EMC, the requested plan, and policies for receiving technical cooperation.

The Government of Japan decided to make a basic design study, based on the results of the grant aid and technical cooperation preliminary studies, and JICA dispatched the Basic Design Study Team (headed by Kazuhisa Matsuoka, Director of First Basic Design Study Division, Grant Aid Study and Design Department, JICA over 28 days from June 23 through July 20, 1991.

A basic design study was made regarding the following matters.

1) Confirmation of the contents of the Indonesian Government's request and background of the request
2) Study of effects of environmental pollution
3) Study of the project implementing agency and the related agencies
4) Confirmation of the subjects of activities in the EMC
5) Study of the organization of the EMC and the personnel plan
6) Study of the contents of the EMC maintenance and management plans
7) Field survey at the proposed construction site, investigation of the condition of relevant infrastructure
8) Study of facility functions and sizes, and construction-related technical matters
9) Reference investigation of related facilities and study of relevant equipment
10) Discussions with the ministries and agencies concerned with construction
11) Study of the project implementation schedule and budgetary measures taken by the Government of Indonesia
12) Collection of data and information necessary for calculating the cost for the Project's implementation

The Basic Design Study Team made necessary investigations regarding the above-mentioned basic design and had discussions with the Indonesian officials concerned. Both parties reached an agreement concerning the contents of the Project, the implementing agency, the construction site, the EMC facility plan, materials and equipment to be provided, and the demarkation of construction work to be executed by both government. The basic matters agreed upon were compiled as the Minutes of Discussions, which were exchanged between Mr. P. L. Courtrier, Deputy for Development, BAPEDAL, and Mr. Matsuoka, Team leader, in the presence of the Hon. Emil Salim, Head of BAPEDAL (as well as Minister of State for Population and Environment).

Based on the domestic analysis of their field study results, which were analyzed in Japan, this basic design report was prepared.

The Government of Japan dispatched the Draft Final Report Explanation Team of Basic Design (headed by Mr. Ryutaro Yatsu, Deputy Director, Planning Division, Global Environment Department, Environment Agency) over eleven days from 5 through 15 November 1991.

The Team and the Indonesian officials concerned confirmed the contents of the basic design and compiled the matters agreed upon as the Minutes of Discussions for their basic design draft final report. The Minutes of Discussions was exchanged on 13th November 1991 between Mr. P. L. Courtrier, Deputy for Development BAPEDAL and Mr. Yatsu, team leader.

The present report is a description of these studies and discussions.

The organization of the Teams, major persons interviewed, a copy of the Minutes of Discussions, etc., are included in the APPENDIX.

CHAPTER 2 BACKGROUND OF THE PROJECT

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2-1 Summary of Environmental Conditions

2-1-1 Background and Current Conditions of Environmental Problems

(1) Expanded Socioeconomic Activities in the Republic of Indonesia

The economy of the Republic of Indonesia, having emerged from the slump that lasted until the end of the 1970s, is now in a favorable condition due to expanded exports of products other than oil and gas, expanded direct investments from foreign countries, a large increase in domestic corporations' investment, expanded consumer spending, and higher oil prices.

Under the Fifth Five-Year Development Plan (REPELITA V) started in April 1989, development policies have been promoted aiming at further promotion of industries concerned with non-oil/non-gas product exports and improvement and expansion of the infrastructure. The Plan is aimed at considerably raising the people's standard living and level of education, and advancing the country's development as a newly industrialized economy.

However, rapidly expanding economic activities lead to the expansion of social activities, and, as a matter of course, result in population pressure in urban areas. Pressures on natural resources and environmental loads are increased as a result, and environmental problems are becoming more serious, though they differ between urban areas, such as Jakarta and Surabaya, and rural regions. In urban areas, industrial development has caused pollution by toxic chemicals and heavy metals in industrial waste water, organic pollution of ground surface water, ground water contamination, and land subsidence. Air pollution caused by automobile exhaust gas, noise, and waste management also pose serious problems. Expanding socioeconomic activities in Indonesia cause environmental loads to increase for the following reasons.

- Population increase and gravitation of population toward cities
- Expanded economic activities (industrialization, urbanization, motorization)
- Increased consumption of resources and energy

Table 2-1-1. Population and Growth Rates of 10 Main Cities of Indonesia (in 1971 and 1980)

	Population (×1,000)		Growth a rate
	1971	1980	
JAKARTA	4,579	6,504	3.98
SURABAYA	1,556	2,028	2.99
BANDUNG	1,200	1,463	2.22
SEMARANG	647	1,027	5.27
MEDAN	636	1,379	8.93
PALEMBANG	583	787	3.39
UJUNG PANDANG	435	709	5.58
BANJARMASIN	282	381	3.40
TANJUNG KARANG	199	284	4.03
MENADO	170	217	2.75
Total 10 Cities	10,287	14,779	4.11

Source : Central Bureau of Statistics

Table 2-1-2. Sectral Growth Rates and Structural Change in 4th and 5th REPELITA V

Sector	4th REPELITA V			5th REPELITA V		
	1983	1988	Average Annual Growth Rate	1989	1993	Average Annual Growth Rate
Agriculture	29.2	26.4	3.0	23.2	21.6	3.6
Mining and Quarrying	7.4	6.6	2.4	15.9	12.6	0.4
Manufacturing	15.8	19.4	9.5	14.4	16.9	8.5
Construction	6.3	6.3	5.0	5.6	5.8	6.0
Trade	-	-	-	15.9	16.7	6.0
Transportation and Communication	6.0	6.0	5.2	5.7	6.0	6.4
Others	35.3	35.3	5.0	19.3	20.4	6.1
Total	100.0	100.0	5.0	100.0	100.0	5.0

Source : Central Bureau of Statistics

1) Population increase and gravitation of population toward cities

The rate of population increase in Indonesia was 2.32% annually between 1971 and 1980. The annual average rate of population increase up to 1990 is estimated at 1.74%, while that of world population is 1.63%. Indonesia now has a population of 180,000,000. Unevenness of the country's population distribution is considerable, and Java, where the capital Jakarta is located, has 62% of the country's population. Indonesia has five cities with a population of more than 1,000,000: Jakarta, Surabaya, Bandung, and Semarang, which are located in Java, and Medan in Sumatra. Some expect that the population of Jakarta will exceed 10,000,000 by the year 2000. Increase in urban population is attributable to not only natural increase but also inflows from other regions. This is caused by modernization and consequent labor-saving in rural regions, where employment opportunities decrease as a result. Excessive population flows into cities, swelling the urban population and worsening living environments in cities, and resulting in the creation of slum quarters. In rural regions in turn, lowered agricultural productivity and degradation of resources and the natural environment result.

2) Expanded economic activities (due to industrialization, urbanization, and motorization)

Agriculture is the major industry in Indonesia's economy. But its ratio to GNP has become smaller and smaller in Indonesia, in contrast to the growth of other industries. Especially such industries as mining, transportation, and communications have shown rapid growth in recent years.

REPELITA V includes two major goals as mentioned below.

1. Industrial development primarily aimed at export promotion, labor absorption, agricultural product processing, and the promotion of mechanical industries
2. Agricultural development primarily aimed at self-sustenance and diversification of crops

Table 2-1-3. The Estimated Energy Demand during REPELITA V

Unit : one thousand barrel

Energy Resources	1989/90		1990/91		1991/92		1992/93		1993/94	
	(%)	volume	(%)	volume	(%)	volume	(%)	volume	(%)	volume
Natural Gas	23.46	72,610.2	24.40	79,351.7	24.39	83,171.4	24.88	89,289.3	25.22	94,839.0
Coal	6.84	21,167.1	7.95	25,852.0	7.65	26,075.3	7.71	27,676.1	8.81	33,133.4
Water	7.50	23,206.4	7.18	23,340.1	6.99	23,853.2	6.83	24,495.8	6.66	25,041.2
Geothermal	0.64	1,967.7	0.61	1,957.7	1.03	3,514.3	1.41	5,058.8	1.35	5,058.8
Non-oil	38.44	118,951.4	40.13	130,511.5	40.06	136,614.2	40.83	146,520.0	42.03	158,072.4
Oil	61.56	190,504.0	59.87	194,726.7	59.94	204,424.0	59.17	212,377.2	57.97	218,039.9
Total	100.00	309,455.4	100.00	325,238.2	100.00	341,038.2	100.00	358,897.2	100.00	376,112.3

Source : Indonesia's Fifth Five-Year Development Plan

Table 2-1-4. Major environmental loads and environmental problems in Indonesia

- Increase in energy consumption
  - Emission of carbon dioxide, nitrogen dioxides, sulfur dioxides, and dust into the atmosphere -- air pollution
  - Waste oil from tankers and fishing boats -- water pollution
- Increase in agricultural, forestry and fishery production
  - Increased agricultural production (extension of farmland) -- diminished or destroyed forests
  - Increase in fishery production (development of fishing grounds) -- deterioration of fishing grounds due to destroyed ecosystems
- Increased use of chemical substances
  - Agricultural chemicals, chemical fertilizers -- water pollution, soil deterioration
  - Dispersed chemical substances -- water pollution, air pollution
- Increased domestic and industrial waste water -- water pollution
- Increased waste
  - Waste dumping -- water pollution
  - Industrial waste -- increased hazardous waste -- water pollution
- Increased traffic volume
  - Increased automobile traffic volume -- air pollution, noise, vibration

Industrialization and consequent improvement in infrastructure has been advancing in urban areas and their peripheries. And foreign investments which have rapidly increased since 1988 are giving impetus to the country's industrialization.

In addition to expanded economic activities and urbanization, motorization, too, is rapidly advancing. Especially in urban areas, increased traffic volume and resultant traffic jams and exhaust gas from industrial zones are major causes of atmospheric pollution.

3) Increased consumption of resources and energy

Energy consumption is expected to continue to grow to a considerable extent, on account of economic growth and population increase. In REPELITA V, energy consumption is estimated to grow at an annual rate of 5.2%. Regarding energy supply in fiscal 1988, oil accounted for 62.4%, natural gas 18.9%, coal 9.7%, hydraulic power 8.3%, and geothermal heat 0.7%. Domestic energy consumption is increasing in industries, transportation, and households. Increased consumption promotes resources development, but causes environmental disruption. The environment, including the ocean, coast, forests, water resources and fishing resources, is now being subjected to various pressures.

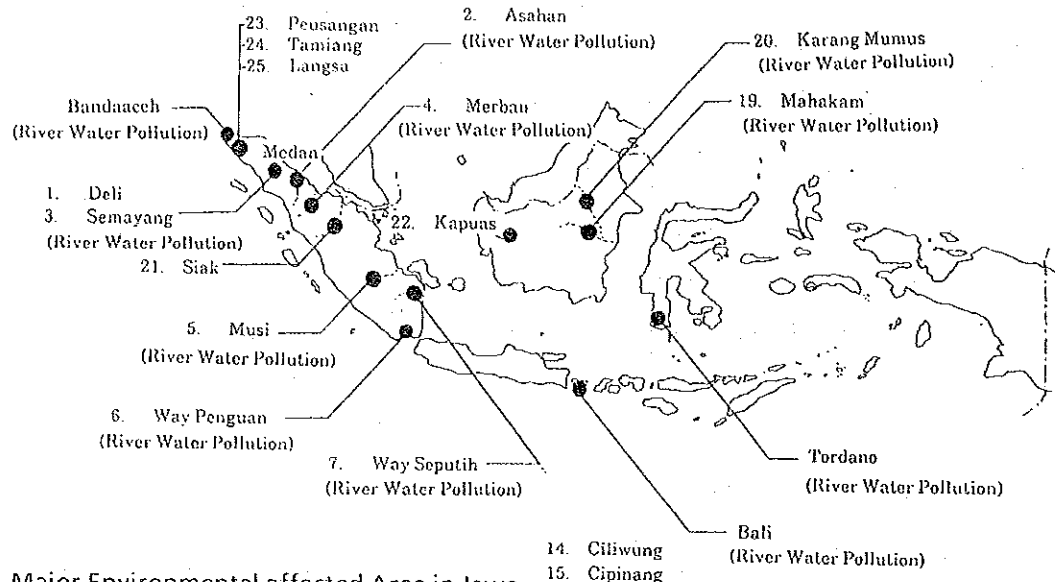
(2) Environmental Conditions in Indonesia

In Indonesia, environmental pollution is caused mainly by increased environmental loads as mentioned in Table 2-1-4. Increase in loads aggravates environmental pollution, posing serious problems of water pollution, air pollution, toxic substances, solid waste management, noise and vibration, as well as environmental disruption.

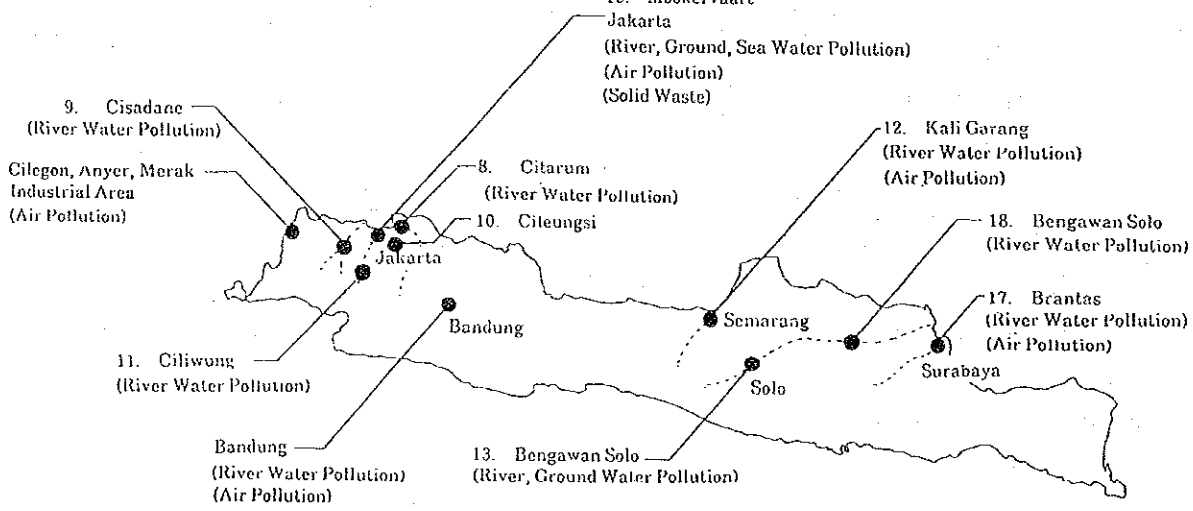
Every corner of the country is faced with environmental problems, though they are different from region to region. In urban areas including Jakarta and Surabaya, where socioeconomic activities are rapidly expanding, environmental disruption is especially considerable.

Fig. 2-1-1. Major Environmental Affected Area in Indonesia (Location of PROKASIH River)

(1) Major Environmental Affected Area except Jawa



(2) Major Environmental affected Area in Jawa



(3) Table of PROKASIH River

Province	River	Main City Along the River	Province	River	Main City Along the River
North Sumatora	1. Deli	Medan	Jakarta	14. Ciliwung	Jakarta
	2. Asahan	Tanjung Balai		15. Cipinang	Jakarta
	3. Semayang	Medan		16. Mookervaart	Jakarta
	4. Merbau	Labuhanbatu	East Jawa	17. Brantas	Surabaya
South Sumatora	5. Musi	Palembang		18. Bengawan Solo	Ngawi
Lampung	6. Way Penguan	Bandar Lampung	East Kalimantan	19. Mahakam	Samarinda
	7. Way Seputih	-		20. Karang Mumus	Samarinda
West Jawa	8. Citarum	Bandung	Riau	21. Siak	Pakanbaru
	9. Cisadane	Tangerang	West Kalimantan	22. Kapuas	Pontianak
	10. Cileungsi	Bekasi	Aceh	23. Peusangan	Lhokseumawe
	11. Ciliwung	Bogor		24. Tamiang	-
Central Jawa	12. Kali Garang	Semarang		25. Langsa	-
	13. Bengawan Solo	Solo			

The following are descriptions of environmental conditions in Indonesia.

1) Water pollution

Water pollution is the most serious environmental problem now facing Indonesia. Water pollution has spread through rivers, ground water, and seawater. River water is generally contaminated with organic substances, waste, bacteria, and insoluble suspended solids. In urban areas including Jakarta, Bandung, and Surabaya, household waste water treatment facilities are still very few and sewer systems have yet to be established in many areas, and consequently household waste water causes pollution by organic substances. Waste water is discharged to rivers through open conduits in most cases, which fact causes concentrations of coliform in rivers to be raised in dry seasons. Thus floods of polluted waters in rainy seasons adversely affect the people's health.

In industrial zones, hazardous organic chemicals and heavy metals are mixed in waste water, because laws and standards specifying the obligation to build industrial waste water treatment facilities have yet to be enforced.

In Indonesia, well water is used for household water by 60%, on the average, of the rural population, and 26% to 86% of the residents in Jakarta, West Java, Central Java, and East Java. Detergents, nitric acid ions, organic substances, coliform, etc., have been detected in shallow wells, as a result of industrial and household waste water permeating soils.

Seawater pollution is caused by organic substances in household and industrial waste water flowing into the sea through the Ciliwung and the Cipinang rivers in Jakarta. It is also caused by hazardous substances flowing into harbor areas including Tanjung Priok Port, waste oil discharged from ships, recklessly discharged fuel, and unprocessed fish catches in coastal fisheries. Especially in Jakarta Bay, the largest pollution source is industrial waste water. Copper, lead, mercury, chromium, DDT, and PCBs have been detected in fish samples in quantities exceeding the WHO standards.

The Government of Indonesia has been taking measures such as the Clean River Program (PROKASIH) for the disuse of open-conduit sewer systems, the construction of waterworks, the spread of toilets in rural regions, improvement in living conditions in urban slum quarters, and industrial waste water control. Still, these measures have produced few results.

2) Air pollution

In urban areas including Jakarta and Surabaya, very heavy automobile traffic is the major source of air pollution. Health examinations of tricycle taxi drivers in Jakarta's busy quarters have made it clear that the concentrations of CO and lead in their blood and lead concentrations in their urine are doubled during their business hours on account of NOx, CO, and SPM (suspended particulate matter), substances included in automobile exhaust gas. In many cities in Java, SPM exceeds the environmental standard (260 micrograms/m^3).

In Jakarta, Bandung, and their peripheral areas, no measures have been taken for controlling SO_2 discharged from factories and soot and dust discharged from steam power plants. The Ministry of State for Population and Environment (KLH) is making preparations for enforcing regulations on gas exhausts from automobiles and factories in September 1991.

3) Solid wastes

Solid waste management and contaminated river water are currently another serious problem in urban areas. Solid waste is collected and treated on a provincial basis, and collected solid waste is discharged in specified disposal sites for reclaiming. The reality is, however, that inadequate collecting and treating systems cause half of the solid waste to be dumped into rivers. Solid waste thus dumped into rivers causes water pollution, prevents effective use of river water, and has the possibility of adversely affecting the health of the people living in river basins.

In Jakarta, for instance, the quantity of solid waste increases by about 10% annually, and it is deemed necessary to introduce twice the number of garbage trucks and sanitation men to treat it. Industrial waste, which is treated similarly to garbage, can also cause pollution of river water and ground water.

Up to now, the administration of solid waste in Indonesia has been handled by the Department of Public Works, Directorate General of Human Settlement, Environmental Hygiene. However, with the establishment of BAPEDAL, all administration concerning hazardous solid waste will be handled by BAPEDAL.

BAPEDAL is working energetically to prepare legislation regarding the disposal of hazardous solid waste, and to implement appropriate disposal methods. Expansive improvements can be from now into the future.

4) Toxic substances

The use and discharge of toxic substances greatly affect citizens' health and the environment through polluted water, soil, and crops. Indonesia's most serious pollution due to toxic substances is caused by agricultural chemicals. Agricultural chemicals currently used in Indonesia are mainly organic-chlorine and organic-phosphorous chemicals, and DDT, whose use is prohibited in Japan, is used too.Most of these agricultural chemicals, being chemically stable, flow into rivers through soils and water conduits, after being sprinkled over fields and paddy fields, and cause the downstream ecosystems to be changed. Residual agricultural chemicals have increased in quantity year after year. Especially the residual amount of DDT sometimes exceeds the standards specified by WHO/FAO.

In these circumstances, the Government of Indonesia prohibited the use of 57 kinds of agricultural chemicals in 1986 in accordance with a Presidential Decree. But the government grants subsidies to agricultural chemical manufacturing and its measures for controlling the use of agricultural chemicals have produced little effect thus far.

Regarding heavy metals, their presence in fish, as well as DDT and PCBs detected in Jakarta Bay, as mentioned earlier, and heavy metals in vegetables have posed problems awaiting urgent solution.

5) Noise and vibration

Noise and vibration have become a problem in urban areas including Jakarta, Bandung, and Surabaya, toward which the gravitation of population is considerable, similar to the situation with water pollution and air pollution. Noise and vibration are mainly caused by traffic, construction work, and machine manufacturing. With no regulations being enforced for noise and vibration control, high traffic density and construction work day and night cause noise and vibration to attack city structures not primarily constructed so as to prevent noise, making the citizens' lives uncomfortable.

(3) Present Condition and Problems in Environmental Monitoring Activities

Main monitoring activities currently carried out in Indonesia include industrial waste water monitoring and river water quality monitoring under the Clean River Program (PROKASIH) and air pollution monitoring conducted in 16 cities.

Monitoring activities regarding other pollution sources and precise monitoring are conducted in ministries and agencies, provincial governments, and universities (environmental study centers), but these activities are insufficient because of limited budgets and equipment.

Problems in monitoring activities are mentioned below.

- Monitoring items and measuring standards do not satisfy monitoring objectives.
- The duration of monitoring, selection of monitoring places, and sampling are not standardized.
- Different analysis methods prevent comparisons of data.
- Data collected sometimes greatly differ because of insufficient technical capability of technicians engaged in analysis and measurement.
- Monitoring activities, which are not systematically carried out, prevent efficient utilization of data.