

## BIBLIOGRAPHIC DATA SHEET

1. CONTROL NUMBER

2. SUBJECT CLASSIFICATION (695)

PN-AAK-871

APCO-0000-G662

3. TITLE AND SUBTITLE (240)

Summary report of the NAS-LIPI workshop on natural resources in Indonesia; Jakarta, Indonesia,

4. PERSONAL AUTHORS (100)

11-16 September 1972

5. CORPORATE AUTHORS (101)

National Academy of Sciences  
Indonesian Institute of Sciences

6. DOCUMENT DATE (110)

1972

7. NUMBER OF PAGES (120)

40p.

8. ARC NUMBER (170)

9. REFERENCE ORGANIZATION (130)

NAS

10. SUPPLEMENTARY NOTES (500)

11. ABSTRACT (950)

12. DESCRIPTORS (920)

Indonesia  
natural resources  
meetings

13. PROJECT NUMBER (150)

--

14. CONTRACT NO. (140)

AID/cs -2584

15. CONTRACT TYPE (140)

16. TYPE OF DOCUMENT (160)

PN-AAK-871

Summary Report of the NAS-LIPI Workshop on  
NATURAL RESOURCES IN INDONESIA

Djakarta, Indonesia

11 - 16 September 1972

Jointly Sponsored by the  
Lembaga Ilmu Pengetahuan Indonesia  
(Indonesian Institute of Sciences)

and

The National Academy of Sciences  
United States of America

This report is a staff-prepared summary of the "Workshop on Natural Resources," held in Djakarta, Indonesia, September 11 - 16, 1972, under the joint auspices of the Board on Science and Technology for International Development of the National Academy of Sciences and the Indonesian Institute of Sciences. This report is submitted to the Agency for International Development under contract AID/csd-2584, Task Order 11.

A final report of the workshop has been prepared by the Indonesian Institute of Sciences; excerpts from the report are included in this document, and the entire report will be submitted separately to AID.

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## I

### INTRODUCTION

Since Indonesia's independence close and cordial relations have existed between the National Academy of Sciences of the United States (NAS) and the Indonesian scientific community. The Workshop on Natural Resources held in Djakarta, September 11 - 16, 1972, was the third in a series of workshops jointly sponsored by the NAS and the Indonesian Institute of Sciences (LIPI). In May, 1968, a Workshop on Food was held in Djakarta, followed by a Workshop on Industrial Research and Management held in Djakarta in January, 1971. These workshops are part of a series of bilateral and regional workshops and advisory panels that the NAS has undertaken in East Asia.

A major aim of NAS programs carried out by the Board on Science and Technology for International Development (BOSTID) is to bring together distinguished U.S. specialists with their counterparts in developing countries, joined by senior government officials from planning and technical departments, as well as leaders from the educational, industrial, and other interested communities, to discuss significant problem areas in the relationship of science and technology to economic and social development. In addition to the valuable exchange of information and experience inherent in such gatherings are the joint deliberations on the formulation of various alternative policies that might usefully be considered by the participating developing country, as well as external-assistance agencies.

The purpose of the Workshop on Natural Resources was to formulate recommendations addressed to one of Indonesia's most critical and complex problems: how to utilize the natural resources of the country in a manner consistent with the needs and rising expectations of a growing population, the harmonious relationship with a culture both old and vital, and the stewardship required to insure future generations their rightful heritage of resources while providing a healthy and productive life to members of the present generation.

Already the world's fifth most populous nation, Indonesia continues to experience a rapid increase in population, while productivity and per capita income remain at relatively low levels. The country has a resource base which in some parts is not fully utilized and in others not fully known. At the same time, certain resources are now exploited at explosive rates. Given these circumstances, given the constraints on capital, special skills, and physical infrastructure, and given the pressures and demands of a fast-growing, in many cases densely settled population, the wise use of the country's natural resources is essential to maintaining progress in social and economic development.

Based on these broad purposes, the workshop had these particular objectives:

1. To suggest policies and procedures for strengthening the integrated planning and utilization of natural resources;
2. To suggest scientific and technological inputs relevant and useful to the planning and utilization of natural resources; and
3. To provide a forum for a coordinated exchange of views by key scientists, policymakers, and administrators concerned with natural resources in Indonesia.

Planning for the workshop was under way for almost a year before the actual meeting. Dr. John Katili, Deputy Chairman (Natural Sciences) of LIPI, directed the planning activities in Indonesia, while Mr. John Hurley of the BOSTID staff was coordinator for the NAS.

In January, 1972, Mr. Hurley visited Djakarta to confer with Dr. Katili and staff of the AID mission on the basic objectives and approach of the workshop. Dr. Katili and Mr. Hurley were able to confer in Singapore in March in the course of attending a regional workshop on water resources. On a trip to Washington in early June, Dr. Katili spent a considerable amount of time on workshop matters, and Mr. Hurley made a final preparatory visit to Djakarta in mid-July, 1972.

Dr. Katili was assisted in his planning efforts by an Indonesian steering committee, composed of representatives from the principal government agencies concerned with natural resources. An organizing committee was formed, headed by Miss Samsiah Achmad of LIPI, to arrange for meeting facilities, a secretariat, and other administrative and logistical details.

After consultation with the Indonesian planning group, the NAS decided to select an eight-member NAS panel of specialists to participate in the workshop. Dr. Joseph L. Fisher, president of Resources for the Future, Inc., agreed to serve as panel chairman and worked closely with the planning coordinators during the final months before the workshop. The panel members, of whom about half had previous professional experience in Indonesia, spent 8 - 12 days in the country at the time of the workshop. Mr. Hurley provided staff support for the panel during the workshop.

On September 6, 1972, the NAS panel gathered in Washington for a briefing session to hear presentations by representatives of the U.S. Agency for International Development (AID), the U.S. Geological Survey, and a private consultant experienced in Indonesian forestry topics. The briefing gave the panel members a broad perspective on Indonesia's social, political, and economic situation, and a discussion of major issues related to the natural resource base. The agenda of the meeting is attached as Appendix A.

LIPI provided support for the organization and facilities of the workshop, and NAS panel participation and staff support were made possible through financial assistance from AID. Participation by representatives of third countries and international organizations was arranged by several countries and international agencies, including the governments of Australia, Canada, Malaysia, the Netherlands, Philippines, Singapore, Thailand, the United Kingdom, and UNESCO.

The proceedings of the Workshop on Natural Resources will be reported in detail in a Final Report prepared by LIPI. Volume I of the report covers the main themes of the week's discussions, presents the overall findings and recommendations of the workshop, and provides the more detailed recommendations of five sectoral working groups. Volume II will contain texts of major addresses, daily agendas, lists of participants and observers, and an index of more than 40 background papers prepared for use during the workshop. The Final Report of LIPI will be submitted to AID separately from this summary report, which is limited to highlights and essential information of interest to AID.

## II

### CONCLUSIONS AND RECOMMENDATIONS

After five intensive days of deliberation, the workshop participants met in a final plenary session on the sixth day to adopt a set of broad recommendations addressing the best use of Indonesia's natural resources. At the plenary session, presided over by Dr. John Katili, Chairman of the Workshop Steering Committee, it was pointed out that the recommendations "represent critical areas which embrace a variety of resources, disciplines, and public and private organizations." The recommendations are supported by more than one hundred detailed recommendations which suggest specific ways of implementing the general recommendations. These implementing recommendations are contained in the reports of the five working groups of the workshop--Land and Soil Resources, Forest Resources, Water Resources, Ocean Resources, and Mineral Resources.

The introduction to the statement of major conclusions and recommendations describes the important relationship between natural resources and Indonesia's social and economic development. It then summarizes the essence of the workshop's deliberations in the following statement:

The Workshop concludes, therefore, that the wise and efficient use of Indonesia's natural resources should receive priority attention from the highest levels of government to the individual citizen. The nation's information about its resources must be strengthened, and its policies and laws for regulating resource use continually evaluated in light of changing conditions and needs. Otherwise there is a danger that irreplaceable resources will be expended without the development of suitable replacements, or that potentially renewable resources will be lost unnecessarily.

The 10 general recommendations are stated briefly, followed by a short explanatory statement. Because they represent the essence of the basic themes of the workshop, the 10 recommendations are reproduced in the following pages.

#### Integrated Data Acquisition and Use

An integrated approach should be used in the gathering, storage, and dissemination of data on natural resources; a central facility should be established to coordinate the work and serve the various public and private users.

The acquisition of basic resource data and maps is a prerequisite for national planning of natural resources utilization. Good information is essential to the projection of resource reserves, and thus to relating supplies with future domestic and export demands. Resource information is necessary to guide decisions on future capital investment, on the training of various types of skilled manpower, and on the economic development of various regions of the country. As a nation with a relatively high level of foreign investment in its resources, Indonesia needs good sources of resource information to negotiate and monitor contracts effectively. These essential functions will best be served if Indonesia establishes priorities for data collection, and insures maximum coordination of information-gathering techniques among various governmental agencies. A central facility for the storage, analysis, and dissemination of resource information is essential. Arrangements should be continued and enlarged whereby data are collected from private as well as public sources, and, in exchange, information is furnished to both sectors.

### Multiple Purpose Planning and Management

The planning and management of Indonesia's natural resources should be approached in a comprehensive way, emphasizing the interrelations among resources and the effects development of one resource has on other resources.

Resources are part of the whole fabric of the earth and do not exist in isolation from one another. Poor management of a resource may well have adverse effects, not only on that resource but on others. The indiscriminate cutting of forests can lead to soil erosion, siltation of streams, destruction of wildlife, and a change in air movements and temperatures. Analogous examples could be cited for other resources. It becomes essential, then, to plan and manage resources in a comprehensive way, evaluating the costs and benefits of utilizing one resource in relation not only to economic factors, but also to possible impacts and costs to other resources. In many cases, comprehensive planning and management will require viewing resources in a regional context based on relevant ecosystems. Sound resource planning should also enable the establishment of priorities among competing uses for a particular resource. Such approaches to planning and management will require new types of multidisciplinary training, new organizational approaches, and new incentives.

### Environmental Quality

The growing and crucial importance of environmental quality should be recognized in all aspects of Indonesian life and throughout the government. A special study of these problems and means for dealing with them is desirable for use in preparing a basic law on the subject.

The protection and improvement of the natural environment of land, forest, water, seas, air, and wildlife have become necessary and will become more so as population and economic development proceed. This subject cannot

be considered as an afterthought. Eroded land and denuded forest areas make little contribution to the economy or to the livelihood of the people. Polluted streams and ocean areas are a hazard to the health of the people, to aquatic life, as well as an ugly nuisance. Air pollution already can be observed in the large cities where, in addition, lack of adequate planning of land uses for housing, transportation, industries, commercial buildings; and water, sewer, electric power, and communications lines hinders efficient urban development. Numerous environmental quality standards will have to be promulgated and enforced, covering water and air pollution, forest cutting practices, ocean dumping, location of urban facilities, handling of solid wastes, etc. A national commission made up of government officials, public health experts, scientists, resource managers, and others should be appointed to look into pollution and other environmental matters. This commission should prepare recommendations on how a higher-quality natural environment can be achieved. The conclusions and recommendations of this study could be the basis for a comprehensive national law and policy on environmental protection.

#### Foreign Participation in Resource Programs

Continued improvement in cooperative arrangements for resource development along lines that have been worked out by the government should be sought not only for energy and minerals but in forest products and other suitable fields.

The Indonesian mining industry should be expanded from the mining of ores to include intermediate processing and manufacturing of the final consumer products. The current climate of political and economic stability encourages the flow of outside capital and management skills that are available only in limited amounts within Indonesia. The minerals industry in particular requires massive investment. Long-term objectives should be two-fold: the

evolution from resource exploitation to fully integrated processing and manufacturing sequences within Indonesia, providing employment opportunities for a larger segment of the population; and decreasing dependence on foreign contractors, as the production of adequately trained personnel and the means to acquire capital equipment increase. For the nonmineral resources the capital mobilization required is smaller. Foreign participation through contracts with the appropriate government agency might be open on a basis patterned on the minerals model with Indonesian sovereignty as the guiding principle. A climate of long-term economic and political stability will contribute to success for these other natural resources as well.

#### Training of Resource Personnel

Additional personnel should be trained at all levels for research, planning and management of resources.

As the Indonesian economy grows and diversifies, the resource base for this development must be handled wisely. Additional skilled personnel will be needed for research, planning, management, and other important tasks. Among those needed will be more managers for land, water, and forest programs; conservation and environmental protection offices; lawyers and accountants skilled in contract negotiation and enforcement; and research scientists in biology, geology, soils, genetics, hydrology, oceanography, engineering, economics, anthropology, geography, and other fields. Especially important will be an adequate number of persons able to apply broad policies and plans of the government in the various sectors and regions of the country. Training facilities will have to be expanded and new teaching programs created in universities, institutes, schools, and elsewhere. In some instances more

teachers will be necessary. In the long run, resource conservation and development will depend more on the people charged with doing this work than on any other single factor.

#### Organization for Resource Development

The structure and functioning of resource agencies of the government should be examined to find ways of improving performance in planning, management, and other essential activities.

In view of the rapidity of change in the responsibilities of the Indonesian government for a variety of resources and resource situations, it is not surprising that there is need from time to time to appraise the suitability of the existing governmental structure to meet needs and administer programs with increasing effectiveness. This is especially necessary as the pace of development quickens and as concern for the protection of the natural environment and the conservation of depleting resource stocks rises. Particularly pressing is the need for better coordination of the various ministries and agencies having responsibilities for single sectors and programs. Many of the nation's resource problems spread across older organizational boundary lines. The acquisition and storage of data, and to some extent its analysis and presentation, can be done centrally to good advantage. Land, water, and forest programs frequently are closely related, as are the various resources in and under the ocean. New problems of resource conservation and environmental pollution call for new responses in governmental organization. Planning is coordinated by the National Planning Board (BAPPENAS); this should be matched by similar coordination in administration and operation of programs. A study undertaken by a national commission focusing on problems of governmental organization for natural resources is recommended.

### Resource Science and Technology in National Planning

Science and technology for the development and conservation of natural resources should be emphasized in the Second Five Year Plan as providing the foundation for intelligent resource development. LIPI should be given the responsibility for furnishing analysis and recommendations on this subject to BAPPENAS.

The use of scientific and technological information and insights for national planning should be expanded and made as effective as possible. Nowhere is this more necessary than in planning for resource conservation and development. A beginning was made in the First Five Year Plan; more definite status should be accorded to research and development (R & D) in all its aspects in the Second Five Year Plan. Attention should be given to basic and, especially, applied research, to education and training of personnel, to necessary equipment and laboratories, to field experimental facilities, and to other required research infrastructure. Funds should be made available in appropriate amounts in the relevant sections of the Plan.

The concept of long-term planning is especially necessary because of the basic importance of science and technology to resource development and because of the long lead time between initial expenditures on R & D and the achievement of useful results. As the principal agency in the country for promoting science and technology, LIPI, in cooperation with other agencies concerned with science and technology, should clearly be charged with the task of advising with BAPPENAS on the R & D components of the national plan, as well as with other agencies having significant activities or need for R & D.

### Energy Policy

A comprehensive national energy policy should be established for Indonesia.

The energy industries, especially petroleum, have become exceedingly important in the Indonesian economy. About half the foreign exchange earnings of the country arise from this resource. Larger amounts of foreign capital are being invested in oil exploration and development. Possibilities exist for spreading economic gains through supplying inputs of materials and infrastructure, furnishing employment, and processing of resultant products, or using them in related industries. Although the various sectorial policies relating to energy resources are being improved, especially through the development of the work-contract system (Kontrak Karya) and production sharing, a need remains for greater coherence of the numerous elements of energy policy. The growth in demand for energy from the various consumer sectors projected into the future according to the national objectives and practical realities has to be related systematically to the estimated reserves and production possibilities, with appropriate allowance for sales in foreign markets.

Environmental constraints, increasingly important to all people, need to be worked out in a comprehensive and realistic manner through appropriate laws, regulations, and enforcement.

At the broadest level a national energy policy should aim at efficiency of development, through improved technology management, a proper rate of development (conservation), a sustainable balance between exploitation and environmental protection, fair treatment of foreign firms based clearly upon Indonesian sovereignty, and attention to the special problems of employment and stability.

The comprehensive national energy policy should consider all sources of energy including petroleum, natural gas, coal, hydroelectric, geothermal,

nuclear, and forest fuels and should strive to achieve a balance between them according to the potential contribution of each.

To implement progress toward a national energy policy, it is recommended that existing efforts by government officials be increased and expanded to analyze the problem and prepare necessary laws, administrative orders, and regulations.

### National Legislation

The proper development of several natural resources requires the adoption of integrated basic laws for each one.

At present, no comprehensive basic laws exist for the management of natural resources. The mining law of 1967 is added to several other laws; the basic law for ocean resources exists only in draft form. Land use, water, and forestry also lack comprehensive basic laws, as does environmental protection. For each natural resource a fundamental law is needed setting forth the national philosophy, aims, objectives, and development requirements to insure the orderly development of the natural resources in accord with fair and equitable guidelines covering the distribution of benefits, the sharing of costs, and the emphasis placed on different regions.

### Implementation of the Foregoing Recommendations

The major recommendations set forth in the preceding pages should be implemented in the Second Five Year Plan and other appropriate ways. As a follow-up to this workshop, LIPI and NAS should continue their cooperation in advancing the conservation and development of natural resources for the welfare of all Indonesians. LIPI, of course, will also wish to seek cooperation with scientific organizations in other countries--or with international scientific organizations--on natural resources problems.

The Five Year Plans are instruments by means of which the development problems and opportunities of a nation can be examined systematically and

put in long-term perspective. The workshop strongly recommends that each of the foregoing major recommendations be considered by the appropriate divisions or bureaus of the government (land, water, power, minerals, fisheries, forests, etc.) and of course by BAPPENAS, the overall national planning board. In some instances the implementation will have to be continued over more than one 5-year plan; in such cases a good beginning should be made in the Second Five Year Plan. To assist, LIPI and NAS should continue their cooperation, begun so well in this workshop, through appropriate follow-up activities, which might include consultations on special topics, joint evaluation of progress made along certain lines (for example, establishment of a resource data collection and analysis center, or a comprehensive resource training program), the fitting of resource sectoral and regional factors into national plans, etc.

\* \* \*

The workshop general recommendations, shown on the preceding pages, are backed up by the implementing recommendations of the working group reports, which are included in the Final Report prepared by LIPI. As an example of the manner in which the two sets of recommendations are complementary, the general recommendation on integrated data acquisition and use discusses the importance of good basic resource data and maps; the report of the working group on land and soil resources calls for the preparation of specific types of maps at specific scales for specific uses. A good balance exists between broad policy considerations and the kind of detailed suggestions which are helpful to an operating agency.

Following the workshop, the Chairman of LIPI was scheduled to make a

personal call on President Suharto to report on the findings of the workshop. A full report of the recommendations was also submitted to BAPPENAS and will be provided to all government agencies concerned with natural resources.

### III

#### AGENDA AND PANEL MEMBERS

##### AGENDA

Following is the schedule of the workshop; a detailed agenda of the plenary sessions and working groups will be included in the Final Report prepared by LIPI. The opening ceremony of the workshop began at 10:00 a.m., Monday, September 11, and the closing ceremony concluded at 1:30 p.m., Saturday, September 16. After the first day, the meetings were held from 8:00 a.m. to 5:00 p.m. daily.

##### Monday, September 11, 1972

###### MORNING

###### Opening Ceremony

- Remarks by the Chairman of the Indonesian Institute of Sciences
- Remarks by the Chairman of the National Academy of Sciences Panel
- Address by the President of the Republic of Indonesia (delivered by the Minister of Mines)
- Keynote address by the Chairman of the National Academy of Sciences Panel
- Remarks by the Chairman of the Workshop Steering Committee

###### AFTERNOON

###### Plenary Session

Working Groups I - V in Session Concurrently

Tuesday, September 12, 1972

MORNING	Plenary Session
AFTERNOON	Working Groups
EVENING	Dinner by Chairman of LIPI

Wednesday, September 13, 1972

MORNING	Plenary Session
AFTERNOON	Working Groups
EVENING	Reception by Director of AID

Thursday, September 14, 1972

MORNING	Plenary Session
AFTERNOON	Working Groups

Friday, September 15, 1972

MORNING	Plenary Session
AFTERNOON	Working Group Chairmen and Rapporteurs Draft Summary Report of Each Group

Saturday, September 16, 1972

MORNING	Final Plenary Session
AFTERNOON	Closing Ceremony

Each of the first four plenary sessions was addressed to a different main topic. The topics were

1. Inventory of natural resources;
2. National analysis and planning of natural resources;
3. Managing natural resources for national development; and
4. Policy and legislative aspects of natural resources utilization and conservation.

Typically, a main topic would be introduced by brief presentations of several relevant background papers, followed by a panel discussion and finally by general discussion. Following the half-day plenary sessions, five sectoral working groups would meet concurrently for another half day. The working groups would cover the same topic that had been introduced in the preceding plenary meeting, but with specific reference to each sector. After the first day of the workshop, each plenary session was opened by brief reports summarizing the results of the most recent working group session.

The responsibility for chairing the plenary sessions was evenly divided between Indonesian and NAS participants. Indonesian chairmen headed the working group sessions, assisted by both Indonesian and NAS rapporteurs.

The five working groups were

- Group I - Land and Soil Resources;
- Group II - Forest Resources;
- Group III - Mineral Resources;
- Group IV - Water Resources; and
- Group V - Ocean Resources.

NAS PANEL MEMBERS\*

Joseph L. Fisher, Panel Chairman  
President  
Resources for the Future, Inc.  
Washington, D.C.

Leonard Berry  
Graduate Program of Geography  
Clark University  
Worcester, Massachusetts

Charles S. Dennison  
(Retired) Vice President  
International Minerals and  
Chemicals Corporation  
New York, New York

John M. Kelly  
Petroleum Consultant  
Washington, D.C.

Joseph Lintz, Jr.  
Professor of Geology  
Mackay School of Mines  
University of Nevada  
Reno, Nevada

Harry Perry  
Senior Staff Assistant  
Directorate of Licensing  
U.S. Atomic Energy Commission  
Washington, D.C.

William E. Towell  
Executive Vice President  
The American Forestry Association  
Washington, D.C.

[Eight NAS panel members were originally selected; because of illness, however, one member was unable to go to Djakarta.]

NAS Staff Officer

John G. Hurley  
Professional Associate, BOSTID  
Office of the Foreign Secretary  
National Academy of Sciences  
Washington, D.C.

The NAS panel members\*\* participated in the working groups as follows:

Group I - Land and Soil Resources

Dr. Berry

Group II - Forest Resources

Mr. Towell

Group III - Mineral Resources

Mr. Dennison  
Mr. Kelly  
Dr. Lintz  
Mr. Perry

Group IV - Water Resources

Dr. Fisher

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\*Indonesian participants (about 100) and those from third countries (about 12) are listed in the workshop Final Report prepared by LIPI.

\*\*The distribution by working group of Indonesian and third-country participants is shown in the workshop Final Report prepared by LIPI.

#### IV HIGHLIGHTS AND COMMENTS

##### Workshop Preparation

The time of preparation for this workshop was more than the time normally available for such projects. LIPI requested approval for the workshop from the President of Indonesia in a letter dated July 30, 1971, nearly 14 months before the workshop was held. During the remaining months of 1971, the Steering Committee was formed and tentative plans were made.

From January, 1972, to the time of the workshop, the travel commitments of the LIPI and NAS workshop coordinators made possible an extraordinary number of joint planning meetings. These meetings took place in January, March, June, and July; and in addition, the NAS staff coordinator arrived in Djakarta for final consultations 3 days before the opening of the workshop.

The planning time available permitted extensive discussion of the workshop objectives, agenda, and organizational structure. Furthermore, a series of very helpful background papers were prepared by selected Indonesian participants, while the NAS participants prepared papers on relevant experiences in the United States and on current developments in policies and technologies related to natural resources. The result of this considerable amount of preparation was a clear understanding of the workshop objectives and the production of a final report responsive to those objectives.

### Workshop Participation

Attendance at the workshop consisted of 7 NAS panel members, about 100 official participants from Indonesia, and about 20 representatives from third countries and various public organizations, including the Netherlands, United Kingdom, Australia, Canada, Japan, Philippines, Thailand, Malaysia, Singapore, United Nations Educational, Scientific and Cultural Organization, Food and Agricultural Organization of the UN, UN Development Programme, and the United States Geological Survey. Participation in the workshop was limited; the original plan called for about 50 Indonesian participants, but interest in the workshop was such that this figure had to be doubled. Despite the expansion, more requests for participation had to be denied to keep the numbers manageable. Because of the strong interest and selective participation, there was almost no absenteeism from the daily sessions.

Indonesian participants represented the following institutions:

1. Various departments of eight national ministries, including Agriculture, Communication, Industry, Mines, Justice, Home Affairs, Public Works and Electric Power, and Defense and Security.
2. Other governmental organizations, including National Planning Board, National Coordination Body for Surveys and Mapping, Naval Hydrological Service Army Topography Center, National Atomic Energy Agency, National Committee for Geodesy and Geophysics.
3. National industrial corporations, including the State Electricity Company, State Tin Company (P.N. Timah), State Gas Company, and State Oil Company (P.N. Pertamina).
4. Institutions of higher learning, including Bandung Institute of Technology, Bogor Institute of Agriculture, Gadjah Mada University, Padjadjaran University, and Teacher Training College, Bandung.

5. Research institutes, including Forest Research Institute, Power Research Institute, Institute of Hydraulic Engineering, Meteorological and Geophysical Institute, Institute for the Affiliation of Research and Industry, National Biological Institute, Cellulose Research Institute, Soil Research Institute, National Institute of Geology and Mining, National Institute of Oceanography, Marine Fisheries Research Institute, Institute for Industrial Research and Training, Armed Forces Research and Development Center, and the Regional Center for Tropical Biology.

6. Private sector organizations, such as the Indonesian Petroleum Association and the Association of Indonesian Engineers.

The Indonesian participants were an outstanding selection of the country's key operational staff, planners, and policy makers in connection with natural resources. Thus scientists, engineers, lawyers, economists, and administrators brought their varying approaches and experiences to the meetings. Private sector viewpoints were expressed beside those of the public sector, and the interests and policies of various institutions were vigorously stated. This amalgam of outlooks and opinions resulted in candid and straightforward discussions and assured a realistic and practical approach to the problems identified.

The highest levels of government showed an interest in the workshop. Approval to hold the workshop was received from the President of Indonesia, and the Presidential Office complex was the site of the meeting. At the opening ceremony on September 11, the President was scheduled to make an address, but illness prevented his personal appearance, and the address was delivered by the Minister of Mines. One of the keynote addresses at the

first session was presented by the State Minister for National Development Planning, Dr. Widjojo Nitisastro. The opening ceremony was attended by the ambassadors of several participating countries, including Ambassador Francis J. Galbraith of the United States.

#### Workshop Structure and Organization

Among several major objectives of the workshop (stated in the Introduction of this report), one was "to suggest policies and procedures for strengthening the integrated planning and utilization of natural resources." Because the workshop planning groups in LIPI and the NAS both felt that the concept of integrated planning and utilization of resources was vital, the structure of the agenda reflected this view.

A traditional approach to the subject matter probably would have resulted in a workshop with several sectoral working group sessions sandwiched between opening and closing plenary meetings. The workshop planners felt, however, that such an agenda would not be conducive to an emphasis on integrated approaches to natural resources. They decided, therefore, to schedule alternating plenary and working group sessions to strike a good balance between comprehensive, integrated considerations and practical, sectoral matters. Section III of this report outlines the principal topics discussed in the plenary and working group sessions.

The device of holding alternating plenary and working group sessions presented some difficulties. The distinctions between topics such as "inventory," "analysis and planning," and "management" are, at best, slight. Obviously, these topics overlap somewhat, and lines drawn for purposes of discussion are rather arbitrary. At first, some participants were made

uncomfortable by distinctions they felt were artificial or abstract. In the course of discussions, however, it was pointed out that the main topics should be viewed simply as guidelines, not rigid compartments, and that their purpose was to indicate the flow of activities occurring in the development of natural resources.

In retrospect, the conceptual approach to the workshop structure seems to have been useful. The plenary sessions did encourage an integrated outlook toward resource problems and permitted the airing of a variety of stimulating ideas that probably would not have appeared in a more fragmented working group approach.

The workshop, which used English as the working language, emphasized discussion rather than academic presentations. Most of the background papers were distributed and not actually presented. The few papers that initiated plenary discussions were summarized and discussed by the authors rather than read in full. Because of the emphasis on discussion, and the relatively small size of the working groups, all participants had full opportunity to become involved in the meetings.

The workshop meetings took place at the Presidential Offices, Bina Graha, near the center of Djakarta. The facilities were excellent. Plenary sessions were held in a large, air-conditioned room equipped with an excellent sound network and projection equipment. Smaller meeting rooms were available for the working group sessions. Lunches were catered for all participants at the meeting site. Overseas participants stayed at the Kartika Plaza Hotel, and LIPI provided transportation to and from the daily meetings.

A secretariat of LIPI staff members established their offices at Bina Graha during the workshop, and provided excellent supporting services.

Typing and mimeographing services were available and were done quickly and well. The secretariat performed a difficult job with impressive efficiency and helpfulness.

All in all, LIPI and the Steering Committee did an admirable job in preparing for the workshop and administering it smoothly. One possible complaint is that the schedule was tiring. Daily sessions ran from 8:00 a.m. to 5:00 p.m., with individual working groups sometimes continuing past 6:00 p.m. Most evenings were occupied with some scheduled event, or--later in the week--with drafting and editing chores. The NAS panel worked extremely hard and were quite tired by their time of departure. The workshop might have been just as productive had the daily sessions been shortened by an hour or two and had there been a half-day break in the middle of the week.

In planning the workshop, no field trips in advance of the meetings were scheduled for NAS panel members. It is difficult to assess whether such trips would have been useful. It can be argued that it is more important to read a background paper describing the statistics of timber production and outlining the extent of conservation problems than to spend time visiting only a few of a great many logging operations; on the other hand, it is often helpful to get a "feel" for real-life situations and to talk to field staff as well as departmental officials. With regard to future workshops or similar activities, a compromise would probably be useful between extensive field trips and background papers--perhaps 2 days of advance field trips with full briefing papers still available.

In this workshop special attention was given to arrangements for the preparation of a final report. One motivating factor was that the Chairman of LIPI was expected to make a report on the workshop to President Suharto

during the week following the meetings. In addition to this important factor, the question of psychological impact was involved. A workshop generates concern, public attention, and stimulates the thinking of participants. If a long time intervenes between the workshop and the publication of the final report, some of the sense of urgency and importance of the recommendations is lost.

The LIPI and NAS workshop planners decided at the outset that the expeditious production of a final report must be a matter of top priority. Arrangements were made to assign drafting responsibilities for various sections of the overall report during the final 2 days of the workshop. A standard format was developed for working group reports, and the chairmen and rapporteurs of the groups were given deadlines for submission of their sectoral reports. Additionally, Dr. Fisher, Dr. Lintz, and Mr. Hurley of the NAS contingent arranged to stay in Djakarta for several days after the workshop to work with Dr. Katili and the LIPI staff on final drafting, polishing, and editing. As a result, a complete, edited draft of Volume I of the Final Report of LIPI was ready in the week immediately following the workshop. Volume II, consisting of texts of addresses, participant lists, agendas, etc., will be prepared by LIPI as the final step in the report.

#### Press Coverage

The local press covered the workshop extensively, and related newspaper stories appeared almost daily during the meetings. Dr. Katili, Chairman of the Steering Committee, appeared on television during the week before the workshop to explain its objectives. The opening ceremony was covered by television and film news reporters, and immediately after the closing ceremony

the Chairman of LIPI, Chairman of the Steering Committee, one of the Steering Committee members, and the Chairman of the NAS panel held a press conference to summarize the week's events.

Selected stories from the English-language press are reproduced in Appendix B.

### Perspective

Indonesia seems to have weathered the political and economic difficulties that beset the country in the recent past. Yet, the course ahead will still be difficult, although the problems will likely be different. Economic growth is needed, and in the absence of widespread industrialization, much of that growth will come from the exploitation of natural resources for export. Population pressures and the expansion of industrialization will exert further pressures on the resource base for domestic production, building materials, and energy. The country faces a great challenge, therefore, in developing what the workshop final report describes as "the stewardship required to insure future generations their rightful heritage while providing a healthy and productive life to members of the present generation."

Fortunately, the government of Indonesia seems to be very much aware of both the importance of the country's natural resources and the need to strengthen their internal capability to plan and manage resources effectively; the workshop itself attests to this concern. The dates of the workshop were picked to reinforce the governmental concern with the resource base. During this year, inputs are being made into the Second Five Year Development Plan, REPELITA II (1974/75 - 1978/79). A major purpose of the workshop has been to produce recommendations that will prove to be timely and important

contributions to the Second Five Year Plan, in terms of both overall policy and specific sectoral and departmental plans.

No matter how inherently sound recommendations may be, their long-range value is minimal if they are not put into effect. Political considerations, financial and manpower resources, and other factors often pose constraints to change. It seems important, therefore, that AID, NAS, and other sources of technical assistance continue to take an interest in the problems of natural resource planning and utilization in Indonesia and seek opportunities to reinforce and follow up the recommendations of the workshop.

APPENDIX A

WORKSHOP ON NATURAL RESOURCES IN INDONESIA

NAS Panel Briefing Meeting  
Wednesday, September 6, 1972  
Room 500-A, Joseph Henry Building

9:30 A.M.      Opening Remarks - Dr. Joseph Fisher, Panel Chairman

AID Interests in Science, Technology, and Development -  
                  Mr. Glenn Schweitzer, AID

Workshop Background and Objectives - Mr. John Hurley, NAS

Current Political and Economic Conditions in Indonesia -  
                  Dr. Alexander Shakow, AID

Remarks on Professional Experiences in Indonesia -  
                  Dr. Stephen J. Gawarecki, USGS  
                  Dr. Montis R. Klepper, USGS  
                  Mr. Burnett H. Payne, forestry consultant

Workshop Agenda and Role of Panel - Dr. Fisher, Mr. Hurley

Travel and Administrative Arrangements - Mr. Hurley

1:00 P.M.      Adjourn

APPENDIX B

SELECTED PRESS COVERAGE OF WORKSHOP ON NATURAL RESOURCES  
DJAKARTA, INDONESIA

September 9 - 19, 1972

## 140 Scientists to Hold Int'l Workshop on Natural Resources

A number of 140 scientists from half a dozen nations will hold a six-day workshop here to discuss Indonesia's natural resources at the Bina Graha Executive building.

The workshop to be held September 11-16 will cover land and soil use, forestry, minerals, and water and sea resources and will go over the means to analyse, plan, use and regulate the potential of each field, touching also the legal aspects related. The aim of the meeting is to acquire a deeper understanding in the more efficient application and preservation of these natural resources.

National Potential Prof. Dr. J.A. Katili as chairman of the steering committee explained to newsmen Friday that natural resources as a national potential must be transformed to a social potential the usefulness of which can be directly enjoyed by the people.

He said the future of natural resources must also be considered, in its use by modern technology and

in its continued preservation.

He added the workshop will set forth recommendations to be used by the government for the second Five Year Plan to start in 1974.

The Workshop is jointly sponsored by the Indonesian Institute of Sciences - LIPI - and the National Academy of Sciences, USA

Of the 140 natural science experts to participate, twenty are from abroad - namely from the United States, nine; Australia, two; Singapore, two; and one each from Britain, the Netherlands, Japan, Malaysia, the Philippines, Thailand, Canada and representatives of the UNDP, FAO and UNESCO in Indonesia.

According to Katili, two years have gone for the preparation of this meeting. Foreign experts have been invited to share their experience in how they use and preserve natural resources in their countries.

It is reported that forty papers will be read in the workshop. — KNI

## PRESIDENT EMPHASIZES IMPORTANCE OF NATURAL RESOURCES

Jakarta, Sept. 11 (IO)

In a written speech which was read by Minister of Mines, Prof. Soemantri, at the opening of the workshop of natural resources today at Bina Graha, President Soeharto said that development of the means of getting greater benefit from natural resources should be intensified. "We should be aware that our knowledge of Indonesia's natural resources is very limited, while geological map only covers 5 per cent of our territory."

The President said that aside from the forest, the off-shore area of about 800,000 square miles or two-thirds of our country, including the fishes, other sea animals and minerals, are still unknown to us. So we have to make a proper and complete list to determine the methods of employing and controlling the natural resources, as well as the preservation measures.

The data gathered during the first five-year development should be processed to determine which area should be given first priority in the second five-year development and to determine what kind of technology is most suitable. The data-processing of natural resources helps much in determining areas of priority for the second five-year development, said President Soeharto.

He added that it would be unwise and would be lack of responsibility if the natural resources are scrapped out according to one's desire. It is a good idea to hold this workshop on natural resources.

The Djakarta Times  
Saturday, September 9, 1972

Indonesian Observer  
Tuesday, September 12, 1972

# US Makes Major Energy Policy Adjustments

Explaining the US experience in the management of natural resources a US expert told the third day session of the Workshop on Natural Resources at Bina Graha here that the US with a 6% of the world's population consumed about 35% of the world's energy.

There was no apparent concern until recently about supplies and energy was available in the many diverse forms that were required at low cost. The US people first relied on abundant supplies of wood, then on coal, later oil, gas, and finally on atomic energy.

This favourable supply condition appeared now to have come to an end, said Dr. Harry Perry, of the US Congressional Research Service Library of Congress. The reasons were varied and complex:

- firstly, demand increase at 1½ times the normal growth rate in the last five years.
- secondly, temporary fuel supply shortage,
- thirdly, the sudden eruption in national concern about the environ-

ment. With the favourable conditions with respect to energy supply until the past few years, the US had no energy policy, since the general philosophy prevailed that it was best to have Government intrude in commerce only when it must. But Government must be involved in energy matters as they impact on national security, economic development, monopoly practices and the environment. Government is involved also through its wide ownership of fuel resources, its heavy involvement to regional development through production of low cost electric energy at multipurpose dams. There was a long list of Government energy actions indicative of how complex the US Government activities were in the fuel economy even without a national energy policy.

In summarizing his view Dr. Perry said that the US had now passed from a nation with no real concern about energy supplies to one that must make major adjustments, if the clean energy needed to assure continued economic growth was to be available. — Ant.

## Workshop on Natural Resources

## Peoples Have Sovereignty

— Says

Dr. Kusumaatmadja

Rector of Padjadjaran University of Bandung Prof. Dr. Mochtar Kusumaatmadja told the fourth day session of the Workshop on Natural Resources Thursday "the sovereignty of peoples over natural resources found within their national boundaries is enshrined in UN General Assembly Resolution no. 1515 (XV) of December 15 1960 and 1803 (XVIII) of December 14, 1962." Among other things it was stated in General Assembly Resolution no. 1803 (XVIII) that "The right of people and nations to permanent sovereignty over their natural wealth and resources must be exercised in the interest of their natural development and of the well-being of the people of the State concerned." The free and beneficial exercise of the sovereignty of peoples and nations over their natural resources must be furthered by the mutual respect of States based on their sovereign equality, it was stated in Paragraph 5 of the same resolution.

The function of law is to provide the framework and to structure the process of natural resources management. The basis for

Government initiative and right to manage resources is to be found in international law as well as in national Constitution.

### Role of forest

Dr. William E. Turner, Executive Vice President of the American Forestry Association, told the day (Continued on page VIII)

## People Have Sovereignty

(Continued from page 17) day plenary session "Forests are too important to the welfare of any nation to be harvested without conservation purposes and design" He continued "No where in the world can we afford reckless or ignorant resource exploitation. Even developing countries should avoid the mistakes of countries that became rich through unwise use of their natural resources."

### Energy problem.

Director of the Public Research Institute (LMIK-PLN) of the Department of Public Works and Power, Dr. A. Arismunandar in his paper entitled "Energy and Energy Resources for the Future of Indonesia" said that the role of energy resources in the industrialized countries differed from that in developing economies. The problems in developing countries were generally more acute.

## Interdept. body needed for environmental management says Wahjudi

Jakarta, September (I.O)

In the years to come it is anticipated that there will be an increase in the development and utilization of our natural products through agriculture, mining, fisheries, energy production, etc., it was stated last week by Wahjudi Wisaksono, in his paper entitled "Environmental Considerations in Natural Resources Utilization in Indonesia" presented to the third-day plenary session of the Workshop on Natural Resources at Bina Graha.

Wisaksono, therefore, in view of the above made statement, found it is important to identify some of the negative side effects arising out of these developments in several sectors of the economy. In the process of the development, he continued, these side effects should not become detrimental to other natural resources. The environmental considerations must be considered seriously in the planning, development and utilization of nature's resources.

Side effects, according to the functionary of the Directorate General of Oil and Gas of the Department of Mining, can be grouped into a number of categories:

- chemical pollution,
- physical disruption,
- environmental and resource deterioration,
- biological pollution resulting in human disease, animal and plant pests.

As long as the volume and the nature of man's production activities remained small, the environment could tolerate and assimilate these waste products. But with highly increased utilization, the side effects would become more and more serious, if now counter measures were taken.

In 2000 Java will have  
175 million people

The Indonesian Government has responded positively toward the problem of the environmental quality by attending the Stockholm Conference on the Human Environment (UNCHE) in June 1972. At ministerial level several statements could be noted in favour of an integrated approach.

At a recently held conference the Minister of Agriculture explained that by 2000 the land area in Indonesia will be populated by 2000 million people. If nothing stands in the way of transmigration and resettlement 175 million people will occupy the already densely populated island of Java. One cannot afford to allow waste and deterioration of land through irresponsible use and incompetent management, not even at the present time when there is still arable land available for agriculture.

Wisaksono then stated that in order to implement all these policies, a coordinating interdepartmental body should be established to set priorities and actions to be taken.

Wisaksono did not doubt the environmental awareness in top decision making circles in Indonesia, but the environmental management of natural resources utilization was a very complex business. Great emphasis must be put on data collecting, because a good and fair management based on cost benefit relations data were essential. In the proposed UNCHE recommendations long-term as well as short term goals were covered.

The speaker, however, was of the opinion that at present it was not necessary yet to have a centralized environmental agency in Indonesia. A coordinated approach of all departmental efforts would be adequate for the time being, he said.

# Business & Finance

## Workshop on Natural Resources winds Up

Jakarta, September 17 (Ant) The workshop on natural resources which started here last Monday was closed on Saturday with 100 recommendations being submitted to the government.

Jointly organized by the Indonesian Institute of Sciences (LIPI) and the U.S. National Academy of Science (NAS), the workshop was attended by 140 participants, comprising 110 Indonesians and 30 foreigners of various world bodies.

Some of the recommendations involve the overall planning and management of natural resources integrated use of fund for natural resources exploitation and the role of foreign entrepreneurs in the processing of the resources in Indonesia.

Prof. Dr. A. Kartili, Chairman of the Steering Committee of the workshop, told newsmen at a press conference at the close of the discussion that the country had recoded 30 to 34 million hectares of cultivated land since the Dutch rule, however 16 million hectares of the total had now become areas grown with sedge.

He disclosed that the main subject pondered during the weeklong meeting was the development and management of Indonesia's abundant natural

resources for the welfare of the population.

According to Kartili, the exploitation of the resources should not bring any harm to the environment, natural beauty and public health.

Meantime, LIPI Chairman Prof. Dr. Sarwono warned against the dangers posed by air pollution which was not be mere result of the growing industry, but also the increasing number of motorea vehicles particularly in the capital city.

Fortunately, he said, Indonesia had learned from the experiences of other advanced countries in coping with the problem.

Sarwono also indicated that there were two main causes of the deterioration of the country's natural resources, namely the dense population in Java and the lack of rehabilitation work in the regions outside Java.

Chairman of the NAS team Dr. Fischer meanwhile stated that Indonesia would largely be dependent on her natural resources both for the development of her economy and the promotion of her people's well being.

He expressed his optimism about the prospects of cooperation in this field between the United States and Indonesia.

In the paper entitled "Legal Aspects of Natural Resources" .. "Mineral Resources" Prof. Mochtar said the aim of natural resources management is the prevention of waste. Although the philosophy underlying the ownership of mineral resources and its exploitation centers on the concept of state ownership of mineral resources, said Dr. Mochtar the Government since 1967 has followed a policy of welcoming foreign participation in the development of its mineral resources.

Only the State or on its behalf a state enterprise can have an authority to mine, said Prof. Kusumaatmadja. The authority to mine, he explained, comprised all stages of mineral development and included; general survey, exploration, production and refining, transportation and marketing (or sale).

Speaking about the mechanism of foreign capital participation,

Prof. Mochtar explained that the State is the custodian of the people's right to mineral resources has the exclusive right on authority to mine does not mean that foreign capital and technology is absolutely excluded. There were many ways in which foreign capital could be participated; through a Work Contract Agreement (such as in the case of Shell, Stanvac and Caltex), through the Production and Profit Sharing Agreement. Speaking about State mining Corporations, Prof. Mochtar said that their existence was a direct consequence of the Indonesian concept on the State as a custodian of the people's right over mineral resources. There are three State Corporations having the authority to mine: P.N. Tambang Timah in the case of tin mining, P.N. Batu bara for coal mining and P.N. Aneka Tambang for other minerals.

The State Corporation in charge of oil and gas, PERTAMINA, is governed by a separate and special law (Law no. 8, 1971) distinguishing it from the category of other state enterprises. There are also mining companies owned and run by regional or provincial governments.

The management of mineral resources by the Government have several aspects, which can be grouped into two main tasks, which are essential for the development of mineral resources: making available knowledge of the geology of the country, especially its mineral potential, and the collection, interpretation, presentation and dissemination of such information.

and resources must be exercised in the interest of their natural development and of the well-being of the people of the State concerned". The free and beneficial exercise of the sovereignty of peoples and nations over their natural resources must be furthered by the mutual respect of States based on their sovereignty equality. It was stated in Paragraph 5 of the same resolution.

### THE PRINCIPLE

The function of law is to provide the framework and to structure the process of natural resources management. The basis for Government initiative and right to manage resources is to be found in International law as well as in the national Constitution.

The principle of national sovereignty over natural resources is found also in the 1945 Constitution, in which Paragraph (8) of Article 33 said :

"(3) The land, water and natural resources contained there in are under the sovereignty of the state and utilized for the maximum prosperity". While the Basic Mining Law (Law No. 11 1967) in Article 1 provides that "All minerals found within the legal mining territory of Indonesia which constitute natural resources as the blessing of God Almighty are the national Wealth of the Indonesia, which for that reason is controlled and utilized by the State for maximum prosperity of the people.

The last day plenary session today had four working papers on "Policy and Legislative Aspects of Natural Resources Utilization and Conservation". The four papers were written by Dr. A. Arismunandar, Director of the Power Research Institute, the Department of Public Works and Electric Power; Prof. Dr. Kusumaatmadja, of Padjadjaran University; the Directorate General of Chemical Industries, the Department of Mining, and Dr. William E. Towell Executive Vice President of the American Forestry Association.

## ONLY THE STATE HAS AUTHORITY TO MINE

JAKARTA, Sept. 17 (ANT). Rector of Padjadjaran University of Bandung Prof. Dr. Mochtar Kusumaatmadja told the Workshop on Natural Resources "the sovereignty of people over natural resources found within their national boundaries is enshrined

in U.N. General Assembly Resolution No. 1515 (XV) of December 15, 1960 and 1503 (XVIII) of December 14, 1962". Among other things it was stated in General Assembly Resolution no. 1503 (XVIII) that "The right of peoples and nations to permanent sovereignty over their natural wealth

APPENDIX C

WORKSHOP ON NATURAL RESOURCES  
DJAKARTA, INDONESIA  
SEPTEMBER 11 - 16, 1972

Background Papers

- I. Natural Resources and Economic Development in Indonesia  
Widjojo Nitisastro
- II. Natural Resources and Economic Development: A Global Perspective  
Joseph L. Fisher
  1. Perspective of Natural Resources Inventory in Indonesia  
Pranoto Asmoro
  2. Integrated Approaches to Resource Surveys  
Joseph Lintz
  3. The Resources Planning Process in Indonesia  
Purnomosidhi Hadjisaroso
  4. Social and Economic Implications of Natural Resources Planning  
Leonard Berry
  5. Environmental Considerations in Natural Resources Utilization in  
Indonesia  
Wahjudi Wisaksono
  6. Current U.S. Energy Resource Issues  
Harry Perry
  7. Energy and Energy Resources for the Future of Indonesia: Problems and  
Policy  
A. Arismunandar
  8. Legal Aspects of Natural Resources Management  
Mochtar Kusumaatmadja
  9. Policy of Natural Resources Utilization with Special Reference to Synthetics  
and Substitutes  
Directorate General of Chemical Industries  
Ministry of Industry
  10. Policy and Legislative Aspects of Forest Utilization and Conservation  
William E. Towell
  11. Some Notes on Social and Economic Background of Regional Land Use in the  
Upper Solo River Basin  
A. L. McComb and M. Hatin Soedarma

12. Land Use Surveys in Indonesia  
I. Made Sandy
13. Land Resources and Agricultural Development in Indonesia  
D. Muljadi
14. The Role of Forest Resources in National Development  
M. Hatin Soedarma, Zufri Hamzah, Jon Sudiono, Gatot Subagjo and  
Hasan Basjarudin
15. Exploration and Conservation of the Undeveloped Genetic Resources in  
Indonesian Forests  
S. Sastrapradja and Mien A. Rivai
16. Maximizing Agricultural Production on Limited Land Resources in Singapore  
Lim Ewe Hock
17. Some Notes on Mineral Resources Development in Indonesia  
Soetarjo Sigit
18. Notes on Present and Future Development of Petroleum Resources in Indonesia  
Ismet Akil and G. A. S. Nayoan
19. Geological Mapping in Indonesia at Present  
Rab Sukanto
20. Towards a Balanced Development between Western and Eastern Indonesia  
Ambyo Mangunwidjaja, Rochadi Gapar and M. T. Zen
21. Role of the Private Sector in Natural Resources Planning and Use: Some  
Observations  
Charles S. Dennison
22. Development of Petroleum Resources in the United States: Future Policy  
and Legislative Issues  
John M. Kelly
23. Mineral Resources  
David E. Roney
24. Planning and Programming the Development of Indonesia's Water Resources  
W. S. Srimoerni Doelhomid
25. Problems in the Collection of Basic Hydrological Data in Indonesia  
Rachmat Tirtotjondro and Gilbert W. Caughran
26. Ground Water in Indonesia  
M. M. Purbo-Hadiwidjojo
27. Research in Relation to the Development of Marine Resources in Indonesia  
K. Romimohtarto, A. G. Ilahude and A. Nontji

28. Status of Oceanography in Indonesia  
Gordon W. Groves and Mulia W. Sidjabat
29. Extract from the Summary Report on the Informal Advisory Meeting on  
Oceanology, Ambon, October 16 - 19, 1971  
Sponsored by LIPI and UNESCO
30. Ocean Resources and the Marine Sciences in Australia  
Ian S. R. Munro
31. Prospects of Nuclear Power in Indonesia  
Budi Sudarsono
32. The Role of Solar Energy and Other Renewable and Non-Polluting Energy  
Sources in Indonesia  
R. V. Dunkle and S. Joyosuparto
33. Nuclear Techniques for Inventory, Utilization and Conservation of  
Natural Resources  
Budi Sudarsono
34. The Future of Synthetic Fibers in Indonesia  
Prastowo Nambar
35. Synthetics and Substitutes in the Economy of Indonesia  
Ida Bagus Agra
36. The Role of the Chemical Service in the Scientific and Technological  
Infrastructure in Singapore  
M. C. Dutt
37. Data Available on Existing and Potential Manpower in Natural Resources  
Compiled by A. A. Machrany
38. Manpower and Research Requirements in Mineral Resources Development  
R. P. Koesoemadinata
39. Rational Development of Natural Resources: Integration of Resources  
Surveys, or Integrated Survey of the Environment?  
UNESCO Field Science Office for Southeast Asia, Jakarta
40. Some Concepts of Mineral Inventory and their Application in Canada  
K. A. Ewing
41. Water Resources Inventory in Indonesia  
Soenarjono Danoedjo
42. Geothermics in Indonesia  
Djajadi Hadikusumo and L. Pardyanto

43. Water Resources Development Policy  
Indraswari H. Goeritno
44. Thailand's Natural Resources: The Present Situation and the Future  
Plan for Development  
S. Suensilpong
45. A Brief Survey on Patterns of Natural Resources Management  
Mohd. Ghazali bin Hj. A. Rahman
46. Notes of Mineral Prospecting and Exploration Conducted by the Geological  
Survey of Indonesia  
Exploration Division, Geological Survey of Indonesia
47. Indonesian Forests as a Fibrous Resource  
Rochjati Joedodibroto