



Cooperative Activities in Indonesia on Science, Technology, and Research Policy Development: End-of-Contract Statement (1984)

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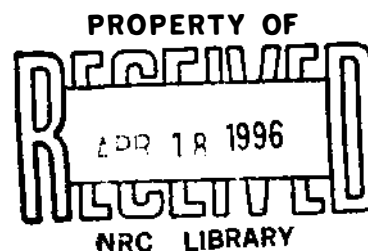
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Cooperative Activities in Indonesia on Science, Technology, and Research Policy Development

End-of-Contract Statement

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and

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This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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This end-of-contract statement has been prepared by the Board on Science and Technology for International Development, Office of International Affairs, National Research Council, for the Agency for International Development Mission to Indonesia and the Ministry of State for Research and Technology, Government of Indonesia, under Contract AID 497-79-100-23.

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PREFACE

From July 1979 to April 1984, the U.S. National Research Council (NRC), through its Board on Science and Technology for International Development (BOSTID), undertook a cooperative program with the Ministry of State for Research and Technology to assist organizations of the government of Indonesia in formulating effective policies and programs for the use of science and technology to improve the social and economic conditions of the Indonesian people. This program was funded by the U.S. Agency for International Development through a science and technology loan to the Indonesian Ministry of State for Research and Technology. Activities undertaken were determined jointly by that ministry, USAID officials, and NRC representatives during discussions in Indonesia and the United States.

These activities were a continuation of the National Research Council's involvement with various Indonesian scientific organizations. In 1968 a collaborative program was begun with the Indonesian Institute of Sciences (LIPI) involving a series of joint workshops.

- In 1968 a workshop on food policy resulted in several key recommendations on a food and national nutrition policy, which were incorporated in Indonesia's first 5-year economic development plan (REPELITA I). A direct workshop outcome was a study by a joint U.S.-Indonesian team of agricultural scientists to formulate a plan for a national agricultural research system, integrating universities, field stations, and research institutes.
- In 1971 a workshop on industrial and technological research produced recommendations dealing with research organizations and management, technical information, standardization, fiscal incentives, patents, small-industry extension services, and major industrial sectors such as chemicals, pharmaceuticals, food, textiles, and pulp and paper.
- In 1972 a workshop on natural resources was held to suggest policies and procedures for strengthening the integrated planning and utilization of natural resources and to suggest relevant and useful scientific and technological inputs.

Recommendations were submitted to Indonesia's National Development Planning Board for use in preparing the second 5-year development plan. Based on these recommendations, President Suharto established a Committee on the Environment, and the Indonesian Armed Forces held a meeting on security aspects of natural resources and presented a report to the Indonesian security council.

BOSTID began its collaboration with the Indonesian Ministry of State for Research and Technology (MSRT) in 1978. The first activity was a follow-up workshop on food policy to evaluate progress made since the original workshop in 1968 and to recommend future policies in light of new priorities and activities. Then in 1979 a workshop on technology for increasing rural productivity was held. This activity set the stage for future BOSTID/MSRT activities under the science and technology loan agreement between USAID and the government of Indonesia.

The activities undertaken during the period of the contract are listed below and are described in detail later in this report. The major meetings supported under this contract were:

1. January 1981: Workshop on Ethanol as an Alternative Source of Fuels. (Workshop report issued). Follow-up visits were arranged for BOSTID consultants Otto Doering III, Professor, Agricultural Economics Department, Purdue University, and Luther T. Wallace, Department of Agricultural and Resource Economics, University of California at Berkeley, to advise the Agency for the Assessment and Application of Technology (BPPT) on the next phase of development of an ethanol alcohol policy as well as on an agricultural systems approach for production of cassava, a feedstock for making alcohol.
2. June 1982 - June 1983: U.S.-Indonesia Marine Science Exchange Program. A series of visits were made by seven U.S. marine scientists to most of the institutions in Indonesia that conduct marine science research. (Summary report issued that includes individual trip reports.)
3. October 1982: Workshop on Technology for Increasing Rural Productivity in Indonesia. (Workshop report issued.) This was a follow-up to the workshop held in 1979.
4. November 1982: Panel Discussions on Science and Technology Planning and Forecasting for Indonesia: Special Emphasis on Manpower Development. (Proceedings of discussions issued.)
5. February 1983: Workshop on Single-Cell Protein. (Workshop report issued.) This activity, held in Jakarta, followed an ad hoc meeting on the potential of single-cell protein organized in Washington, D.C., for three BPPT staff members responsible for this project.
6. February 1983: Workshop on Systems Analysis. (Workshop report issued.)

7. **August 1983: Workshop on Planning, Monitoring, and Evaluation of Research and Technology in Indonesia.** (Workshop report issued.) This activity, held in Indonesia, followed an ad hoc seminar on research and technology planning in the United States organized in May 1983 for two senior Indonesian officials whose responsibilities included the coordination and administration of research in Indonesia.
8. **October 1983: Symposium on Potential Indonesian-U.S. Collaboration in Science and Technology.** (Symposium report issued.)

In addition to the meetings listed above, the following activities also were undertaken during this contract period:

- A 1-year study/training program was designed and administered for Panusunan Simanjuntak, reporter for the Indonesia Times, at Iowa State University and Ames Laboratory/Energy and Mineral Resources Research Institute.
- Arrangements were made for the National Science Documentation Center (PDIN) to serve as distribution center for BOSTID reports and other scientific materials requested by Indonesian residents. This new system was intended to strengthen outreach to and increase knowledge of the Indonesian science and technology community.
- Dr. Sylvan Wittwer, Director Emeritus of the Agricultural Experimental Station, Michigan State University, visited Indonesia to give the keynote address on July 25, 1983, at the National Symposium on Food and Nutrition organized by LIPI and to meet with officials of various agricultural institutes.
- Appointments were scheduled for senior Indonesian officials at appropriate institutions in the United States.
- BOSTID staff served as a source of information and material for the U.S. technical advisor to the chairman of BPPT.

This report was prepared by Rose Bannigan who served as principal BOSTID staff officer for the collaborative program with Indonesia. She was assisted by Ms. Carol Richmond, Administrative Secretary.

INTRODUCTION

Indonesia is a country with a large population spread over a vast archipelago. Its social and economic development opportunities and problems are proportionately large and complex and require sound and coordinated science, technology, and research policies and programs to make the most effective use of the nation's scientific and technical resources. The formulation of policies and programs must be done by the relevant agencies of the government of Indonesia, but the consideration of possible alternatives, the experience of policies and programs that have been tried elsewhere, and the views of specialists on particular topics can strengthen the formulation process. A valuable mechanism for adding perspective to policy formulation and program planning is to establish cooperative links with a broadly based, national-level scientific and technological institution with wide policy and program experience in both developed and developing countries.

Such a link was established in 1979, when a 5-year science and technology loan was provided to the government of Indonesia by the U.S. Agency for International Development (USAID). The main purpose of this cooperative venture was to strengthen the capacity of Indonesia's scientific and technological agencies to contribute to:

- Solutions of national development problems
- Creation of long-term linkages with U.S. scientific organizations and institutions
- Greater awareness of the potential and actual role of science and technology in achieving social and economic objectives.

Under that agreement, the minister of state for research and technology, who is responsible for the formulation and coordination of government policy in research and technology and its application to national development in Indonesia invited the National Research Council (NRC), through its Board on Science and Technology for International Development (BOSTID), to cooperate in planning a set of joint activities to assist him in carrying out this task.

The contract, in the total amount of \$630,000, became effective July 1, 1979. It stipulated that under the guidance of a project steering committee, approximately eight separate activities would be scheduled. The activities would generally be held in Indonesia and

would include workshops, seminars, joint studies, and advisory groups. In the planning and conduct of the activities, the NRC was asked to maintain close liaison with the Indonesian project coordinator and the science and technology officer designated by USAID and the Indonesian government.

Due to staff changes in the Ministry of State for Research and Technology, a steering committee was never established. Continual oversight was maintained, however, by both the ministry and by BOSTID through written and oral reports to BOSTID members and by their participation in specific activities. Several program development visits were made to Indonesia by BOSTID staff to design and arrange details of the planned activities.

The following sections of this report provide more detailed summaries of the eight principal activities carried out through the contract with BOSTID, as well as related follow-up activities, and give information on program participants and relevant reports.

MAJOR ACTIVITIES

1. WORKSHOP ON ETHANOL AS AN ALTERNATIVE SOURCE OF FUEL

Background

Indonesia's Ministry of State for Research and Technology asked the Agency for the Assessment and Application of Technology (BPPT) to develop a pilot plant for the production of alcohol fuel. This project is related to a broad energy strategy that has been formulated in Indonesia. Although Indonesia is an oil exporter and a member of the Organization of Petroleum-Exporting Countries (OPEC), it is nevertheless a large, populous country that requires a great deal of capital to finance its economic and social development. As a result, the Indonesian government is seeking to diversify its domestic energy sources as much as possible to sustain maximum oil exports.

Indonesia's population is predominantly rural but is heavily concentrated on a few islands such as Java and Bali. For this reason, the government established a "transmigration" program to provide land on less densely settled islands such as Sumatra and Borneo to settlers who are willing to emigrate from crowded areas. However, the cost of the energy necessary to provide an infrastructure and develop new agricultural lands in the outlying islands is high because of transportation costs from the major commercial centers.

Indonesian scientists and planners considering alternative energy sources and the needs of rural development have found the use of biomass resources of particular interest. Among the biomass energy alternatives under consideration is the production of alcohol from root crops. Root crops have interesting possibilities for ethanol production in Indonesia. Indonesian farmers are experienced in growing crops such as cassava and sweet potato that do well in many of the areas where transmigration or other rural development projects are located; however, there are often major problems in marketing cassava and sweet potatoes in these areas.

The minister of state for research and technology has established a National Alcohol Committee to examine the broad implications of alcohol fuel production and has decided to build a pilot ethanol plant suitable for alcohol production in rural areas, thus providing Indonesia with technical and operational experience. The pilot project will be located

in a transmigration area at Tulang Bawang in Lampung province, southern Sumatra, using cassava and sweet potato as feedstock. The BPPT, chaired by the minister, was given responsibility for designing, constructing, and operating the 5-million liter/year pilot plant, to be built with Indonesian funds. In view of the considerable U.S. experience with ethanol plants (mainly using grain as the feedstock), BOSTID was asked to organize a workshop to review the ethanol pilot plant project and suggest ways in which it could be strengthened.

Activity Summary

The Workshop on Ethanol as an Alternative Source of Fuel, was held in Indonesia, January 14-21, 1981. The workshop began with a day in Jakarta during which Indonesian participants gave presentations on the background and objectives of the pilot plant project, and BOSTID participants provided a brief overview of the state of the art in alcohol production and the important issues and questions related to the pilot project. Four days of field visits followed, including a 2-day trip to the Tulang Bawang transmigration area, site of the pilot plant, and a 2-day visit to Kuningan in west-central Java to observe agricultural practices, especially sweet potato cultivation. Key Indonesian participants in the workshop took part in the field trips, which provided a valuable opportunity for informal interaction between the two groups.

After the field trips, a final 2 days of meetings were held in Jakarta during which participants discussed the alcohol project in four working groups: (1) agriculture and agronomy, (2) technology and engineering, (3) economy and marketing, and (4) transmigration and social impacts.

Following the workshop, two consultants were recruited to assist the Indonesians with the development of this activity. Dr. Otto C. Doering III, Professor, Agricultural Economics Department, Purdue University, was asked to make several return trips to Indonesia in order to (1) visit areas for proposed ethanol generation in Indonesia and assemble information on the agricultural implications of the need for root-crop feedstock for the plants and on utilization and marketing issues, and (2) assist with the design of economic and marketing studies by the Indonesian government on both the production and use of ethanol as an alternative fuel. In May 1982, Dr. Luther T. Wallace, Department of Agricultural and Resource Economics, University of California at Berkeley, accompanied Dr. Doering. His main contribution was to stress the importance of and assist with a systems approach for having a constant supply of root crops available as feedstock as well as to assist the Indonesians with the final draft of the report to the National Alcohol Committee.

A summary report was issued covering this activity.

2. U.S.-INDONESIA MARINE SCIENCE EXCHANGE PROGRAM, 1982-1983

Background

Indonesia's minister of state for research and technology, Dr. B. J. Habibie, has given high priority to developing a marine science capability in Indonesia because of the large role that marine resources (petroleum, metals, fisheries, tourism, etc.) play in the Indonesian economy and life-style. This role will expand even further as Indonesia exploits its new 200-mile exclusive economic zone. This zone adds the resources of over 6 million square kilometers of ocean to that already under Indonesian control.

In January 1982 the National Science Foundation sponsored a workshop in Indonesia on potential U.S.-Indonesian cooperative marine science research. One of the joint recommendations of that workshop was the desirability of a marine science exchange program. At the request of the Ministry of State for Research and Technology, BOSTID agreed to undertake this activity. As a first step, they asked Dr. Dirk Frankenberg, director of the Marine Science Program at the University of North Carolina and chairman of the NSF-sponsored activity to visit Indonesia in May 1982 to consult with the appropriate Indonesian officials on academic areas best suited for exchange and to seek advice on which Indonesian institutions should be visited by U.S. participants. These consultations and subsequent negotiations with potential U.S. participants led to the U.S.-Indonesia Marine Science Exchange Program.

Activity Summary

From June 1982 to June 1983, BOSTID sponsored a U.S.-Indonesia exchange program that provided support for visits by seven U.S. marine scientists to Indonesia. These scientists presented lectures on topics of interest to Indonesians, gained a better insight into the scientific phenomena of Indonesian waters, and discussed projects that could aid development of the marine sciences in Indonesia. An outline of their activities in Indonesia follows.

Lecturer 1

Topic: Primary Production Resource Limitation:
Research Needs vs. Current Technology

Date of Visit: September 1982

Lecturer: Dr. Hans W. Paerl, Institute of Marine Sciences,
University of North Carolina

Plan: Lectures on coastal productivity at the National
Institute of Oceanology, University of Brawijaya,
Gadjah Mada University, and Hasanuddin University

Contact: Professor Sumardi Sastrakusumah, Bogor Agricultural
University

Lecturer 2

Topic: Coral Reef Ecology, with an Emphasis on Indonesian Coral Reefs
Date of Visit: November 1982
Lecturer: Dr. James A. Marsh, Jr., University of Guam
Plan: Lectures on coral reef ecology at the National Institute of Oceanology, Hasanuddin University, Pattimura University, and Diponegoro University
Contact: Dr. Aprilani Soegiarto, National Institute of Oceanology

Lecturer 3

Topic: Marine Geology of Indonesia
Date of Visit: December 1982
Lecturer: Dr. Joseph R. Curray, Scripps Institution of Oceanography, University of California, San Diego
Plan: Lectures on marine geology of Indonesia at National Institute of Oceanology, National Institute of Geology and Mining, Gadjah Mada University, and Hasanuddin University
Contact: Dr. H. M. S. Hartono, Institute of Geology and Mining

Lecturer 4

Topic: Mollusc Aquaculture and Environmental Monitoring
Date of Visit: January and February 1983
Lecturer: Dr. Kenneth R. Tenore, Skidaway Institute of Oceanography
Plan: Lectures on mussel aquaculture at the National Institute of Oceanology, Bogor Agricultural University, Indonesian Institute of Sciences laboratory at Serang, Pattimura University, and University of North Sumatra
Contact: Dr. Aprilani Soegiarto, National Institute of Oceanology

Lecturer 5

Topic: Ocean Engineering and Technology
Date of Visit: May 1983
Lecturer: Dr. Robert Corell, University of New Hampshire
Plan: Lectures on ocean engineering at the National Institute of Oceanology, Institute of Technology at Surabaya, Institute of Technology at Bandung, Hasanuddin University, and Agency for Assessment and Application of Technology (BPPT)
Contact: Dr. Achmad Amiruddin, Agency for Assessment and Application of Technology

Lecturer 6

Topic: Coastal Zone Management in the United States, Major Oceanographic Research Projects
Date of Visit: May-June 1983
Lecturer: Dr. Dirk Frankenberg, Marine Sciences Program, University of North Carolina
Plan: Lectures on coastal zone management at the National Institute of Oceanology as well as the following universities: Diponegoro, Gadjah Mada, Pattimura, Hasanuddin, and North Sumatra
Contact: Dr. Aprilani Soegiarto, National Institute of Oceanology

Lecturer 7

Topic: Tropical and Coral Reef Fisheries
Date of Visit: May 1983
Lecturer: Dr. Nelson Marshall, University of Rhode Island
Plan: Lectures on tropical fisheries at the Department of Fisheries, Jakarta; Bogor Agricultural University; University of Indonesia; University of Sam Ratulangi, Manado; and University of Brawijaya
Contact: Dr. Sumardi Sastrakusumah, Bogor Agricultural University

The objective of this exchange program was to increase the knowledge of and the contacts between the participating Indonesian and U.S. marine scientists, all of whom donated their time to this program. During the course of the seven visits, U.S. marine scientists visited most of the institutions in which marine science is currently conducted in Indonesia. These visits and the discussions associated with them provided insight into the importance of marine science to Indonesia and the activities that might enable the Indonesian government to meet its goal of establishing a marine science capability.

A report of this activity was prepared by Dr. Frankenberg, the BOSTID consultant who arranged the project.

3. WORKSHOP ON TECHNOLOGY FOR INCREASING RURAL PRODUCTIVITY IN INDONESIA

Background

The most serious problem confronting Indonesia is its high rate of population growth, which affects all aspects of life and all social levels. In particular, this problem contributes heavily to the poverty of rural populations that constitute over 60 percent of Indonesia's total population. Java, Madura, and Bali are the most densely populated islands of the country. In efforts to solve or reduce problems caused by overpopulation in these areas, the government has undertaken a number of measures, including development programs for the river basins of Java and transmigration programs to relocate inhabitants of Java.

In connection with these transmigration and development programs, a Workshop on Technology for Increasing Rural Productivity was held in Jakarta in June 1979, sponsored by the Indonesian Ministry of State for Research and Technology and BOSTID. The participants concluded that rural productivity could be enhanced by disseminating and applying improved genetic resources, cropping techniques, and infrastructural development. They recognized, however, that improved rural productivity depends on successful programs for the sustainable transfer of these technologies and on suitable training, management, and leadership techniques.

Activity Summary

As a follow-up to the 1979 workshop, a second workshop was held in Jakarta, October 14-15, 1982, to determine what research is required to enhance rural productivity. At this workshop, two case studies of ongoing integrated rural development programs, sponsored by the government and carried out in conjunction with the Center for Environmental Studies, Bandung Institute of Technology, were used as a basis for discussion. The first case study--the settlement of Ciamis, located on West Java--is representative of the old settlements on the river basins, while the second case study--the settlement of Batumarta, located on South Sumatra in the vicinity of Baturaja--represents a transmigration area, or a new settlement established outside of Java.

Workshop participants had an opportunity to visit Ciamis, but weather conditions forced them to cancel the visit to the transmigration area of Baturaja and the Batumarta project. Cigaru, an old settlement in a rainfed area of West Java, was visited instead. Information gathered during these visits was used in the workshop discussions. This workshop was attended by Indonesian and U.S. participants with varied backgrounds to encourage a multidisciplinary approach toward finding solutions to the problems facing rural Indonesia. A report issued on this activity summarizes the discussions, includes the recommendations of the U.S. and Indonesian participants, and suggests priorities for research on technologies for rural productivity. In the category of production technology, priorities include soil conservation and improvement, water management and conservation, biological resources, and pest control. Other categories covered were postharvest technology, rural industry, and rural technology.

4. PANEL DISCUSSIONS ON SCIENCE AND TECHNOLOGY PLANNING AND FORECASTING FOR INDONESIA: SPECIAL EMPHASIS ON MANPOWER DEVELOPMENT

Background

The continuing economic growth of Indonesia is leading to increasing demands on science and technology. The country's future development will depend heavily on its ability to use science and technology effectively to make the best use of its natural resources.

The goals outlined in Indonesia's 5-year development plans pose a challenge: how to produce the large numbers of trained personnel required for programs designed to meet these goals. Achieving these levels of manpower development will be difficult. Indonesia must increase significantly its output of trained personnel and improve the quality of their training within severe constraints on time and resources. This problem can only be solved by making maximum use of existing manpower and institutional mechanisms, by creating new institutions where necessary, and by using the most suitable training technologies, both old and new.

Activity Summary

To examine these problems and needs, officials of the Ministry of State for Research and Technology and the Indonesian Institute of Sciences (LIPI) and an NRC panel held discussions in Jakarta, November 8-10, 1982, with the main purpose of recommending improvements in the process of planning science and technology in Indonesia. More specifically, their mandate was to identify measures for enhancing Indonesia's capacity for manpower planning, collecting the relevant data and analyzing relative strengths and weaknesses, determining science indicators and trends, and hence helping Indonesia establish near-term objectives and priorities.

In the opening plenary session, Indonesian participants described three aspects of Indonesian science and technology management: (1) science and technology institutional policymaking, (2) current planning of science and technology manpower development, and (3) the science and technology education system. Participants were divided into four technical working groups on:

- Biotechnology and agro-industry
- Water and environment
- Industrial development and microelectronics
- Marine science and underwater technology.

These groups gave special emphasis in their discussions to government policies and institutional needs, educational needs and mechanisms, manpower planning, R&D management and planning, transfer of technology, and linkages between universities, research institutions, and industry.

Working groups met for a full day following the first day's plenary discussions. At a plenary session on the third day, the working group chairpersons read the conclusions and recommendations that emerged from their groups and solicited comments from the other participants. These comments, as well as comments and suggestions made during a subsequent plenary session on cross-cutting issues such as government policy and institutional needs, were taken into consideration in formulating the final conclusions and recommendations.

The proceedings of these discussions are contained in a report issued by the National Academy Press.

5. WORKSHOP ON SINGLE-CELL PROTEIN

Background

In early 1982, BOSTID was asked by officials of the Agency for the Assessment and Application of Technology (BPPT) to assist them in introducing single-cell protein (SCP) production as part of their over-all plan for technological development, especially in transmigration areas. This element in the plan calls for the use of cassava and other root crops as the raw material for SCP production. The first part of the assistance offered by BOSTID involved an ad hoc meeting in Washington, D.C., of a small group of U.S. experts who met with three BPPT staff members responsible for this project. After an initial presentation of objectives and plans for achieving them by the Indonesian participants, a discussion of the project ensued, with primary focus on process design, plant design, and products and markets.

Following the meeting, arrangements were made for the Indonesians to visit several private industrial laboratories in the United States to discuss fermentation processes and the potential for the manufacture of SCP in Indonesia.

Activity Summary

In late 1982, BOSTID was asked by BPPT officials to bring a small team of experts to Indonesia in early 1983 to join Indonesian colleagues in reviewing the Indonesian government's plans to establish a rural SCP pilot plant in Tulang Bawang, Sumatra. The workshop was held February 1-5, 1983, and included U.S. and Indonesian scientists, engineers, economists, and administrators.

The workshop schedule began with a day in Jakarta in which Indonesian participants described the background and objectives of the SCP demonstration project, and BOSTID participants outlined briefly the state of the art in SCP production and utilization in the United States. Three days of field visits followed, including a 1-day trip to Sulusuban to see the Ethanol Biomass Energy Center, constructed with Japanese assistance, and a visit to Kabupaten Bantul near Yogyakarta to see food preparation and consumption practices utilizing cornmeal and cassava. Key Indonesian participants in the workshop joined the field trips, creating a valuable opportunity for informal exchanges between the two groups. The group had planned to visit the Tulang Bawang transmigration area in the province of Lampung, southern Sumatra, the site of the demonstration plant; however, because of flooding the group was only able to proceed as far as Sulusuban.

After the field trip, a half day of meetings was held in Jakarta. Participants discussed recommendations on SCP production in four working groups that focused on (1) the production process, (2) engineering, (3) the use of SCP as animal feed, and (4) the use of SCP as human food.

A summary report of the workshop has been issued.

6. WORKSHOP ON SYSTEMS ANALYSIS

Background

In 1982, Indonesia's Agency for the Assessment and Application of Technology (BPPT) invited BOSTID to join it in sponsoring a workshop on systems analysis (S/A). Held in Jakarta, Indonesia, February 8-12, 1983, the workshop explored the use of systems analysis as a tool for attaining development goals. The BPPT recently had introduced this methodology as a significant interdisciplinary team activity with the purpose of integrating research and technology more effectively within the Indonesian economy.

Systems analysis is a methodology that, when properly undertaken, permits policy decisions to be informed and based on the relative merits of alternative courses of action within complex areas of the Indonesian government's infrastructure. This methodology can also be used to reinforce the development of REPELITA IV, Indonesia's fourth 5-year plan (1984-89), and of master plans for implementing the courses of action chosen. BPPT organized the workshop to explore the overall applications of systems analysis as a tool in attaining development goals, focusing particularly on three studies being undertaken by BPPT: (1) solid waste management, (2) urban transportation, and (3) the Indonesian food system.

Activity Summary

During the initial plenary session, Indonesian officials stressed the need to develop a systems analysis capability in their country. Participants then broke into three working groups, each addressing a different problem area. The study team leaders in the three areas outlined their methodology and efforts, and the NRC panelists led discussions based on papers they had prepared on the utilization of systems analysis in those areas.

For the next 2 days, NRC panelists accompanied small groups of the Indonesian study team members on field visits. The solid waste management group visited a composting plant, the solid waste improvement program pilot project, the open dumping and sanitary landfill in Jakarta, and the composting plant and waste disposal equipment center in Surabaya. The urban transportation group visits included the Jakarta area and the Tool Road and Sidoarjo Corridor in Surabaya. The food system group made site visits to rice producers, cooperatives, and distribution centers in the Yogyakarta region. These visits allowed firsthand observations and discussions at field sites and intensive interaction with Indonesian study members.

To address some of the general principles of systems analysis and their applications to problem solving, the chairman of the NRC panel gave an informal lecture at BPPT upon his return from Surabaya on the morning of February 11. That afternoon, working group sessions were continued at the BPPT to formulate recommendations which were presented the next morning at the final plenary session.

A report has been issued that includes a summary of recommendations as well as presentations made at the workshop.

7. WORKSHOP ON PLANNING, MONITORING, AND EVALUATION OF RESEARCH AND TECHNOLOGY IN INDONESIA

Background

In early 1983, two senior Indonesian officials expressed interest in meeting with appropriate U.S. officials involved in research and technology planning during their May 1983 visit to the United States. It was thus decided that BOSTID would arrange a brief ad hoc seminar for invited U.S. experts and the Indonesian visitors to focus on how science and technology is planned and coordinated in the United States at the national level, within specific government agencies, at profit-making and nonprofit research advisory institutions, within university R&D institutes, and in private industry.

Following that seminar and as a next step, BOSTID was asked to cosponsor a workshop in Jakarta on planning, implementation, and evaluation of research and technology mainly at the national level. Specifically, the workshop was intended to examine methodologies for deriving a research and technology plan from the relevant portions of the fourth 5-year development plan (REPELITA IV) and to discuss how different methods of planning, implementation, monitoring, and evaluation can be used as a basis for the next year's planning.

Activity Summary

The workshop was held in Jakarta, August 23-26, 1983, following a day of site visits by the NRC panelists to Bandung, the Ministry of Agriculture, and appropriate offices in the Indonesian Institute of Sciences. In his opening remarks, the Indonesian chairman highlighted the government's need to refine the basic criteria for planning, monitoring, and assessing all research and technology activities. Other Indonesian participants discussed the R&D organization in the government sector in Indonesia; the Ministry of Health and the Agency for Agricultural Research and Development were described in detail. After the response of the NRC chairman, a series of papers were presented by the U.S. participants describing research and technology in the U.S. government, specifically in the National Science Foundation and the Department of Agriculture. A presentation was also given on how a method of detailed project planning used by U.S. industry might be applied in Indonesia.

All workshop participants then focused on three specific topics relating to research and technology: (1) planning, (2) implementation, and (3) evaluation.

On the third day, brief working group sessions were held to draft conclusions reached in the three areas, and they were presented the following day to all workshop participants for comments.

A report of the workshop summarizing the conclusions and including the presentations was issued by the National Research Council.

8. SYMPOSIUM ON INDONESIA: POTENTIAL INDONESIA-U.S. COLLABORATION IN SCIENCE AND TECHNOLOGY

Background

In November 1982, Minister Habibie requested that the NRC hold a symposium in Washington, D.C., in 1983 to serve as a catalyst in bringing together individuals from the U.S. academic, government, and industrial sectors to meet with a number of his Indonesian colleagues. The symposium would provide an opportunity for participants to look at potential U.S.-Indonesia collaboration in areas of major concern to Indonesia. The timing of the symposium was intended to coincide with completion of preparations for the government of Indonesia's next 5-year development plan, which begins April 1984. The areas to be considered would be selected by the Indonesians and agreed to by the NRC as being the most appropriate for mutual consideration.

Activity Summary

The symposium was held in Washington, D.C., October 3-5, 1983, under the joint sponsorship of BOSTID and the Indonesian Ministry of State for Research and Technology. It was intended to serve as a forum for exchanging information and identifying opportunities for mutually beneficial collaboration in the following areas:

- Marine sciences
- Postharvest technology, farm mechanization, and agro-industry
- Industrialization
 - Engineering and machine tool industries
 - Telecommunications and electronics
 - Land transportation industries
 - Energy industries

At the opening plenary session, participants were welcomed by the president and the foreign secretary of the National Academy of Sciences. They were followed by an opening address by the Indonesian ambassador to the United States and the head of the Indonesian delegation, who stressed the importance of the topics under discussion to the Indonesian people and their government. He also described the important role that the government has played in Indonesia's industrial development by guiding the planning and policymaking for future development and providing protection from foreign competition.

Other members of the Indonesian delegation then summarized background papers they had prepared for the next day's working group discussions.

On the second day of the symposium, five working groups were assembled. With the exception of the marine sciences group, all participants met with the deputy chairman for industrial development, BPPT, for a short session that focused on Indonesia's industrial policies and plans for the coming decade. He outlined the various conditions that

Indonesia must consider so that forthcoming industrialization will benefit a greater number of the Indonesian people. The working groups, which met for the balance of the second day, were asked to give special attention to technologies found in the United States that would be useful to Indonesia in meeting its development goals.

This symposium was open to all concerned individuals in the public and private communities. Approximately 150 people attended.

A report was prepared by the NRC that includes the Indonesian presentations and a summary of the working group sessions.

OTHER ACTIVITIES

STUDY/TRAINING PROGRAM FOR INDONESIAN SCIENCE WRITER

At the specific request of Minister Habibie to the USAID mission and the American Embassy in Indonesia, arrangements were made for Panusunan Simanjuntak, a reporter with the Indonesia Times, to spend a year in the United States on a study/training program on science writing. Arrangements were made by BOSTID staff for him to enroll at Iowa State University and, at the same time, be attached to the Office of Information under the guidance of its director, Mr. Burton Gleason, at Ames Laboratory/Energy and Mineral Resources Research Institute, located on the Iowa State University campus.

His year in the United States enabled him to broaden and deepen his knowledge about science and technology information systems in the United States, to observe U.S. mass media coverage on science and technology, and to generate ideas about how he, as a journalist, could facilitate the diffusion of science and technology in Indonesia. In addition to attending classes and working at the Ames Laboratory, he visited several industrial companies engaged in work of interest to Indonesia, such as Bell Helicopter Plant and Texas Instruments, Inc., and talked with a number of science writers.

During this period he interviewed a number of individuals for articles which were sent back to Indonesia for publication in the local press. Several of his articles also appeared in the publication issued by the Indonesian Embassy in Washington, D.C. Arrangements were also made for Mr. Simanjuntak to witness the launching of Challenger which orbited the Indonesian Palapa communications satellite in May 1983. He also participated in the NRC-sponsored symposium on potential Indonesia-U.S. collaboration in science and technology, held in Washington, D.C., in October 1983.

The progress reports and articles prepared by Mr. Simanjuntak are listed in Appendix B.

DISTRIBUTION OF BOSTID REPORTS BY THE NATIONAL SCIENTIFIC DOCUMENTATION CENTER

During a program development visit in May 1982, BOSTID staff officer Rose Bannigan informed the USAID mission officials about the large

number of requests by Indonesians for BOSTID publications, approximately 3,000 per month. BOSTID could not possibly respond to all these requests, because only a limited number of copies of BOSTID reports are available and because there are no means of determining the legitimacy and appropriateness of the requests. During the discussions it was suggested that LIPI's National Scientific Documentation Center (PDIN) might be able to distribute BOSTID reports. Such an arrangement would not only provide outreach to the scientific community but would also enable the reports to reach the appropriate libraries and individuals in Indonesia.

After negotiations with Dr. Didin Sastrapradja, deputy chairman for natural sciences, LIPI, and Ms. Luwarsih Pringgoadisurjo, director of PDIN, the following arrangements were made:

- BOSTID would send a complete set of its available reports to the PDIN for information and their bibliographic records.
- BOSTID would furnish a supply of current reports in print and thereafter would forward all requests from Indonesia to the PDIN for action.
- A notice would be inserted in each future publication stating that residents of Indonesia could request copies directly from the PDIN.

Approximately 200-300 copies of each of the following BOSTID reports were shipped to the PDIN for distribution:

- More Water for Arid Lands: Promising Technologies and Research Opportunities
- Underexploited Tropical Plants with Promising Economic Value
- Energy for Rural Development: Renewable Resources and Alternative Technologies for Developing Countries (plus the Supplement)
- Methane Generation from Human, Animal, and Agricultural Wastes
- Making Aquatic Weeds Useful: Some Perspectives for Developing Countries
- Guayule: An Alternative Source of Natural Rubber
- Tropical Legumes: Resources for the Future
- Leucaena: Promising Forage and Tree Crop for the Tropics
- Firewood Crops: Shrub and Tree Species for Energy Production
- Microbial Processes: Promising Technologies for Developing Countries
- Postharvest Food Losses in Developing Countries
- U.S. Science and Technology for Development: Contributions to the UN Conference
- Food, Fuel, and Fertilizer from Organic Wastes
- The Water Buffalo: New Prospects for an Underutilized Animal
- Sowing Forests from the Air
- The Winged Bean: A High Protein Crop for the Tropics (second edition)
- Proceedings, International Workshop on Energy Survey Methodologies
- Alcohol Fuels: Options for Developing Countries

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- **Producer Gas: Another Fuel for Motor Transport**
- **Little-Known Asian Animals with a Promising Economic Future**
- **Butterfly Farming in Papua New Guinea**
- **Crocodiles as a Resource for the Tropics**
- **Mangium and Other Fast-Growing Acacias for the Humid Tropics**
- **Calliandra: A Versatile Small Tree for the Humid Tropics**

In addition, a supply of all joint NRC-Indonesia workshop and panel reports were provided to the PDIN for internal distribution.

VISIT OF DR. SYLVAN H. WITTWER

At the request of Dr. Didin Sastrapradja, deputy chairman of LIPI, BOSTID arranged for Dr. Sylvan H. Wittwer, Director Emeritus, Agricultural Experimental Station, Michigan State University, to give the keynote address at a national symposium on food and nutrition sponsored by LIPI, July 25, 1983. In addition to his keynote address, Dr. Wittwer visited several agricultural research institutes in Indonesia and gave several seminars at various agricultural centers in Bogor.

Dr. Wittwer prepared a narrative account of his visit to Indonesia, as indicated in Appendix B.

In addition to the above activities, BOSTID staff set up appointments on request for officials from the ministry and BPPT visiting in the United States, and served as a resource for scientific and technological information and materials to Dr. A. B. Van Rennes, U.S. technical advisor to the chairman, BPPT.

APPENDIX A

Participants in Joint Activities

WORKSHOP ON ETHANOL AS AN ALTERNATIVE SOURCE OF FUEL
(JANUARY 1981)

Indonesian Participants

Department of Agriculture

Ir.* Jafri Jamaluddin, Direktur, Bina Produksi Tanaman Pangan
Ir. Kasmu, Ka. Subdit. Palawija, Ditjen Tanaman Pangan
Ir. H. Moh. Soenaryo Hardjodarsono, Direktur, Lembaga Penelitian
Hasil Hutan
Wargiono, B.Sc., L.P.P.P., Bogor
Mr. M. Sayuti
Drs.* Hartoyo, Lembaga Penelitian Hasil Hutan
Ir. Lina Rusliana, Lembaga Penelitian Hasil Hutan

Department of Defense

Otty Soekotjo, Ka. Puslitbang Hankam

Department of Finance

Dr. H. Hutabarat, Ka. Pusat Penelitian
Muhadar Hardi, Ka. Subdit Bea Cukai
Sarudin

Department of Industry

Ir. Santoso Kismomihardjo, Ka. Subdit. Industri Agrokimia,
Dit. Evaluasi dan Standardiasi Industri Kimia Dasar
Ir. Silaen, Subdit Industri Agrokimia

*Ir. (Insinyur), Drs. (Doctorandus), and Dra. (Doctoranda) are academic titles used in Indonesia.

Department of Manpower and Transmigration

Kadarusno, Dirjen Transmigrasi
Ir. Amir Hasan Muthalib, Direktur Binagram, Ditjen Transmigrasi
Ir. Asfian, Subdit. P.B.L.N., Ditjen Binagram
Ir. Zuberdi M., Subdit. Binagram
Ir. Ani S., Subdit. Binagram
Dra. Tuti Kustur

Department of Mining and Energy

Prof. Dr. Samaun Samadikun, Dirjen Ketenagaan
Dr. F. Tambunan, Ka. Subdit, Ditjen Ketenagaan
Ir. M. Panjaitan, Ka. Subdit, Ditjen Ketenagaan
Ir. T. Sitanggang, Ka. Subdit Petrokimia, Dirjen Minyak dan Gasbumi
Ir. Endang Lestari, PPTMGB Lemigas
Ir. Irzal Chatab

Department of Public Works

Ir. Syarifuddin Akil, Dirat Tata Kota dan Tata Daerah

Ministry of Research and Technology

Ir. Wardiman Djojonegoro
Ir. Koeswandi Wasito
Ir. Kumhal Djamil

University of Brawijaya

Prof. Dr. H. Soetono, M. Agr.
Ir. Salyo Sutrisno

University of Gadjah Mada

Dr. Ir. Bambang Suhendra
Drs. B. Sudibya, MBA, AK

University of Indonesia

Sardjono Jatiman, S.H., Fak. Ilmu-ilmu Sosial
Dr. Na Peng Bo, Fak. I. Ilmu Pasti dan I. Alam
Dipl. Ing. N. Soenarto, Fak. Mesin

Institute of Agriculture Bogor

Dr. H.H. Sitompul

Institute of Technology Bandung

Prof. Dr. Ir. H. Kho

B.P.P. Teknologi

Dr. S. B. Joedono
Dr. Soerya Harto
Ir. Dwipurwo Pangaroo
Dra. Ina Miryanti
Ir. Sofyan Rasyad
Ir. Tri Setya Budi
Ir. Trihono
Ir. Didie Herkamto
Dra. Susanti
Ir. Joko Prihastoto
Dipl. Ing. Todo Tambunan
Ir. S.H. Nasution
Ir. Darmawan
Ir. Cecilya Malik
Ir. A. Rafiq
Ir. M. Rasyid
Ir. Komaruddin
Ir. Endang Suwarna
Dra. Comaria S.
Ir. Enang Supena
Dra. Endang S.
Ir. Prihadi Waluyo
Ir. Iman Sudarwo
Dr. L. Pangabean
Ir. Ibrahim
Ir. Fritz. S.
Ir. Hari Suharyono
Ir. Budoyo

PERTAMINA

R. Lucas, Dit. Perbekalan Dalam Negeri
Nyoman S., Ka. Bid Ekonomi, Litbang
Ir. Pramono, Litbang
Poerwoto
Nurani, M.

Alcohol Association

Drs. Untung Basuki, Direktur, BKS
Ir. N.K. Nurai, Direktur, P.S. Madukismo
Mr. Suyoto

United States Participants

Dr. Elmer L. Gaden, Jr., Professor, Department of Chemical Engineering,
University of Virginia (Chairman)

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Dr. Ramon de la Pena, Superintendent, Kauai Branch Station, College of Tropical Agriculture and Human Resources, University of Hawaii
Dr. Otto C. Doering, III, Associate Professor, Agricultural Economics Department, Purdue University
Dr. Donald I. Hertzmark, Senior Analyst, Agriculture and Transportation Group, Solar Energy Research Institute
Dr. William Hughes, Director, Energy Engineering Laboratory, Oklahoma State University
Dr. Alfred Jones, Research Geneticist, U.S. Department of Agriculture
Dr. Paul R. Middaugh, Alcohol Fuel Consultant, Northwest Pacific Energy Company, Inc.
Dr. Antonio Moreira, Assistant Professor, Department of Agricultural and Chemical Engineering, Colorado State University
Mr. John Hurley, Staff Officer, Board on Science and Technology for International Development, Office of International Affairs, National Research Council

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WORKSHOP ON TECHNOLOGY FOR INCREASING
RURAL PRODUCTIVITY IN INDONESIA
(OCTOBER 1982)

Indonesian Participants

Sajogyo, Institut Pertanian Bogor, Bogor, Chairman
S. Adiosoemarto, Lembaga Biologi Nasional (LIPI), Bogor
Affendi Anwar, Institut Pertanian Bogor, Bogor
Poerwo Arbiyanto, Pusat Studi Lingkungan Hidup, Institut Teknologi Bandung, Bandung
Zulkifli Azzaino, Institut Pertanian Bogor, Bogor
Iding Chaidir, Badan Pengkajian dan Penerapan Teknologi, Jakarta
A. Gunadi, Badan Perencanaan Pembangunan Daerah, Ciamis
Hardjanto, Institut Pertanian Bogor, Bogor
Koesnadi Hardjasoemantri, Kantor Menteri Pengawasan Pembangunan dan Lingkungan Hidup, Jakarta
Hartoyo, Departemen Pekerjaan Umum, Jakarta
Darwin Karyadi, Pusat Penelitian dan Pengembangan Gizi, Bogor
S. Kuncoro, Badan Pengkajian dan Penerapan Teknologi, Jakarta
Maryadi, Balai Pengkajian dan Penerapan Teknologi, Jakarta
K. Mattjik, Badan Perencanaan Pembangunan Daerah Sumatera Selatan, Palembang
Muchdie, Balai Pengkajian dan Penerapan Teknologi, Jakarta
Hasan Poerbo, Pusat Studi Lingkungan Hidup, Institut Teknologi Bandung, Bandung
Rachlan, Badan Perencanaan Pembangunan Jawa Barat
S. Sadjad, Institut Pertanian Bogor, Bogor
I. Made Sandi, Direktorat Tata Guna Tanah, Departemen Dalam Negeri, Jakarta
J. Sulianti Saroso, Departemen Kesehatan, Jakarta

S. Sastrapradja, Lembaga Biologi Nasional (LIPI), Bogor
D. Sembiring, Badan Penelitian dan Pengembangan Perhubungan, Jakarta
Doli Siregar, Badan Pengkajian dan Penerapan Teknologi, Jakarta
H. H. Sitompul, Institut Pertanian Bogor, Bogor
A. Soeharjo, Institut Pertanian Bogor, Bogor
Irlan Soejono, Institut Pertanian Bogor, Bogor
Suharso, Lembaga Ekonomi Nasional (LIPI), Jakarta
Pamugari Sutomo, Balai Pengkajian dan Penerapan Teknologi, Jakarta
James Tarrant, Pusat Studi Lingkungan Hidup, Institut Teknologi
Bandung, Bandung
Abas Tjakrawiralaksana, Institut Pertanian Bogor, Bogor
F. G. Winarno, Institut Pertanian Bogor, Bogor
N. Wulijarni-Soetjipto, Lembaga Biologi Nasional (LIPI), Bogor

United States Participants

Dr. Hugh Popenoe, International Program in Agriculture, University of
Florida, Gainesville, Chairman
Dr. Robert P. Bates, Food Science and Human Nutrition Department,
University of Florida, Gainesville
Dr. Harold B. Clark, Gainesville, Florida
Dr. William D. Lontz, Lansing, Michigan
Dr. David Pimentel, Department of Entomology, New York State College of
Agriculture and Life Sciences, Cornell University
Dr. Michael G. C. McDonald Dow, Board on Science and Technology for
International Development, National Research Council, Washington,
D.C.

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PANEL DISCUSSIONS ON SCIENCE AND TECHNOLOGY
PLANNING AND FORECASTING FOR INDONESIA:
SPECIAL EMPHASIS ON MANPOWER DEVELOPMENT
(NOVEMBER 1982)

Indonesian Participants

Prof. Sukadji Ranuwihardjo, Assistant for Coordinating Formulation and
Policy Evaluation for Research and Technology Programs, Ministry of
State for Research and Technology, Chairman
Dr. Alfian, Director, National Institute for Cultural Studies,
Indonesian Institute of Sciences
Prof. Amiruddin, Rector, Hasanuddin University
Dr. Aprilani Soegiarto, Director, National Institute of Oceanology,
Indonesian Institute of Sciences
Dr. Arjuno Brojonegoro, Director, National Institute for Chemistry,
Indonesian Institute of Sciences
Dr. Didin S. Sastrapradja, Deputy Chairman for Natural Sciences,
Indonesian Institute of Sciences
Dr. H. M. Eidman, Dean, Faculty of Fishery, Bogor Agriculture University

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- Dr. Hasbi Tirtapradja, Dean, Faculty of Agriculture, Padjadjaran University
- Dr. Fred Hehuwat, Director, National Institute for Geology and Mining, Indonesian Institute of Sciences
- Dr. Kasijan Romimohtarto, Head, Center for Ecological Research, National Institute for Oceanology, Indonesian Institute of Sciences
- Dr. A. A. Loedin, Head, Agency for Health Research and Development, Ministry of Health
- Mrs. A. S. Luhulima, Special Staff for R&D Management, Indonesian Institute of Sciences
- Ms. Luwarsih Pringgoadisurjo, Director, National Scientific Documentation Center, Indonesian Institute of Sciences
- Dr. Mien A. Rifai, Assistant Director for Scientific Matters, National Biological Institute, Indonesian Institute of Sciences
- Prof. Moerjanto Ismadi, Faculty of Medicine, Gadjah Mada University
- Mr. Mohammed Ridwan, Deputy Director General, National Atomic Energy Agency
- Dr. Muhammadi Siswo Sudarmo, Deputy Chairman for Technology, Indonesian Institute of Sciences
- Dr. Nilyardi Kahar, Assistant Director for Scientific Matters, National Institute for Physics, Indonesian Institute of Sciences
- Maj. Gen. Oty Soekotjo, Head, Research and Development Center, Ministry of Defense and Security
- Dr. Pranoto Asmoro, Chairman, National Coordinating Agency for Surveys and Mapping
- Dr. Puruhito, Department of Surgery, Faculty of Medicine, Airlangga University
- Dr. Purwo Arbianto, Department of Chemistry, Institute of Technology, Bandung
- Prof. Sajogyo, Department of Social Economics, Bogor Agriculture University
- Prof. Samsud Sadjat, Faculty of Agriculture, Bogor Agriculture University
- Dr. Setijati Sastrapradja, Director, National Biological Institute, Indonesian Institute of Sciences
- Dr. Soemaryato Kayatmo, Director, National Institute for Electrotechniques, Indonesian Institute of Sciences
- Brig. Gen. Soemitro Soehardjono, Deputy, Research and Development Center, Ministry of Defense and Security
- Dr. Soenartono Adisoemarto, Head, Muzeum Zoologicum Bogoriense, National Biological Institute, Indonesian Institute of Sciences
- Dr. Soetono, Faculty of Agriculture, University of Brawidjaja
- Prof. Somadikarta, Dean, Faculty of Mathematics and Natural Sciences, University of Indonesia
- Dr. Subagjo Soemodihardjo, Head, Bureau of Coordination and Science Policy, Indonesian Institute of Sciences
- Dr. Suharso, Director, National Institute for Economics and Social Research, Indonesian Institute of Sciences
- Ign. Suharto, Director, National Institute for Chemistry, Indonesian Institute of Sciences

- Dr. Sumardi Sastrakusumah, Faculty of Fishery, Bogor Agriculture University
Dr. Suwanto Martosudirdjo, Director, National Research Center, Indonesian Institute of Sciences
Dr. D. A. Tisna Amidjaja, Director General of Higher Education, Ministry of Education and Culture
Mr. Trisura Suhardi, Chief, Agency for Research, Ministry of Industry
Dr. F. G. Winarno, Director, Faculty of Technology Development Center, Bogor Agriculture University

United States Participants

- Prof. Walter A. Rosenblith, Foreign Secretary, National Academy of Sciences, Chairman
Dr. John Andelin, Assistant Director, Science, Information, and Natural Resources, Office of Technology Assessment, U.S. Congress
Dr. Ernest J. Briskey, Dean, School of Agriculture, Oregon State University
Dr. Dirk Frankenberg, Director, Marine Science Program, University of North Carolina
Dr. Roland J. Fuchs, Chairman, Department of Geography, University of Hawaii at Manoa
Mr. William A. W. Krebs, Vice President, Arthur D. Little, Inc.
Dr. James Marsh, Jr., Marine Scientist, Marine Laboratory, University of Guam
Dr. Walter W. McMahon, Professor of Economics and of Education, University of Illinois
Dr. Daniel A. Okun, Department of Environmental Sciences and Engineering, School of Public Health, University of North Carolina
Dr. George Schillinger, Associate Professor of Management and Operations Research, Management Division, Polytechnic Institute of New York
Dr. William R. Sharp, Scientific Director and Executive Vice President, DNA Plant Technology Corporation
Mr. William L. Stewart, Deputy Director, Division of Science Resources Studies, National Science Foundation
Mrs. Rose Bannigan, Staff Officer, Board on Science and Technology for International Development, Office of International Affairs, National Research Council
Ms. Sabra Bissette Ledent, Proceedings Editor

Other Participants

- Dr. Jerome Bosken, Director, Office of Science, Technology & Energy, U.S. Agency for International Development, Indonesia
Dr. Katherine Schmeding, Consultant, Office of Science, Technology & Energy, U.S. Agency for International Development, Indonesia
Dr. A. B. Van Rennes, U.S. Technical Adviser to the Chairman, BPPT, Jakarta, Indonesia

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AD HOC MEETING ON SINGLE-CELL PROTEIN
(FEBRUARY 1, 1982)

Indonesian Participants

Mr. Koesnandar, (Animal Husbandry), Jakarta, Indonesia
Miss Saraswati, (Microbiologist) Lecturer, University of Surabaya,
Jakarta, Indonesia
Mrs. Titiresni, (Microbiologist), Jakarta, Indonesia

United States Participants

Dr. Elmer Gaden, Department of Chemical Engineering, University of
Virginia, Charlottesville, Virginia, Chairman
Dr. Marcel Faber, Cacyon, Princeton, New Jersey
Dr. Joseph Fontenot, Department of Animal Sciences, Virginia Polytechnic
Institute, NSU, Blacksburg, Virginia
Dr. John Litchfield, Battelle Memorial Institute, Columbus, Ohio
Dr. Gerald Reed, Milbrew Inc., Milwaukee, Wisconsin

Agency for International Development (AID)

Mr. Lloyd R. Frederick, Bureau for Development Support, Office of
Agriculture

NRC Commission on Natural Resources

Dr. James E. Tavares, Board on Agriculture and Renewable Resources

BOSTID

Rose Bannigan, Assistant to the Director (Meeting Coordinator)
Michael G. C. McDonald Dow, Deputy Director
John Hurley, Deputy Director
David Mog, Professional Associate
Carol R. Richmond, Administrative Secretary
E. Griffin Shay, Professional Associate

* * *

WORKSHOP ON SINGLE-CELL PROTEIN
(FEBRUARY 1983)

Indonesian Participants

Ir. Suleman Wiriadidjaja, Deputy Chairman for Systems Analysis, BPPT,
Chairman
Drh. Agus Nugroho, Agency for Animal Research Disease, Bogor
Dr. Aisjah Girindra, Bogor Agriculture University

- Prof. Achmad Amiruddin, Deputy Chairman for Basic and Applied Sciences, BPPT**
- Prof. Dr. R. Anggorodi, Department of Animal Nutrition, Faculty of Animal Husbandry, Bogor Agriculture University (member of steering committee)**
- Drh. Askam, PT. Charoen Pokphand Animal Feedmill Co., Jakarta**
- Ir. Bachtiar Hidayat, Staff of Deputy for Industrial Development, BPPT**
- Drh. Maria Bintang M.S., Bogor Agriculture University**
- Hastari Z. Biran, Ministry of State for Research and Technology, Jakarta**
- Ir. Budi Priyanto, Staff of Deputy for Technology Development, BPPT**
- Ir. Candra Y. PT. Sinta Prima Feedmill, Jakarta**
- Dra. Churiyah, Staff of Deputy for Technology Development, BPPT**
- Ir. Darmawan S., Staff of Deputy for Technology Development, BPPT**
- Ir. Didiek Rahmadi, University of Diponegoro, Semarang**
- Ir. Djokosutrisno, Gadjah Mada University, Yogyakarta**
- Prof. Dr. Djokosudarmo, Faculty of Veterinary Medicine, Bogor Agriculture University**
- Dra. Donowati, Staff of Deputy for Technology Development, BPPT**
- Ir. Dwipurwo Pangarso, Director, P.D. ASEN, Surabaya; Senior Scientist, BPPT**
- Drh. Yanuarso Eddy, Staff of Deputy for Technology Development, BPPT**
- Ir. Eman Kustaman, Bogor Agriculture University**
- Drh. Diah Asri Erowati, Staff of Deputy for Technology Development, BPPT**
- Ir. R. D. Esti Sri W., Staff of Deputy for Technology Development, BPPT**
- Dr. Indrawati Gandjar, Faculty of Sciences and Mathematics, University of Indonesia; Senior Scientist, BPPT (member of steering committee)**
- Dra. Habsari Kuspurwahati, Staff of Deputy for Systems Analysis, BPPT**
- Dr. E. T. T. Hasibuan, Oil and Gas Technology Development Center, Jakarta**
- Ir. Sri Hastuti, Staff of Deputy for Technology Development, BPPT**
- Drs. Henky Isnawan, Staff of Deputy for Technology Development, BPPT**
- Drh. F. Indradjaja, PT. Cargill Indonesia, Feedmill, Bogor**
- Ir. Indyah Nurdyastuti, Staff of Deputy for Technology Development, BPPT**
- Dra. Isworo Rukmi Kuntjoro, Faculty of Sciences and Mathematics, University of Indonesia, Jakarta**
- Prof. Ir. Joetono, University of Gadjah Mada, Yogyakarta**
- Ir. R. B. Kasmidjo, Faculty of Agriculture Technology, University of Gadjah Mada, Yogyakarta**
- Prof. Dr. K. H. Kho, Department of Chemical Technology, Bandung Institute of Technology; Senior Scientist, BPPT (member of steering committee)**
- Ir. Koesnandar, Staff of Deputy for Technology Development, BPPT**
- Ir. Koeswandi Wasito, Project Manager, Ethanol Pilot Plant and Energy Farming, BPPT**
- Drs. Achmad Komara, Staff of Deputy for Technology Development, BPPT**
- Lie Goan Hong, M.D., Nutrition Research and Development Center, Bogor**
- Ir. Maman Surachman, Staff of Deputy for Basic and Applied Sciences, BPPT**
- Drh. Mansjoer Hawab M.S., Bogor Agriculture University**
- Mifta Roswita, Faculty of Sciences and Mathematics, University of Indonesia, Jakarta**

Ir. Syah Djohan Nasiri, Staff of Deputy for Technology Development, BPPT
Drh. Ngepkep Ginting, Agency for Animal Research Disease, Bogor
Dr. S. Parlin Napitupulu, Vice Chairman, BPPT
Dra. Pertamawati, Staff of Deputy for Technology Development, BPPT
Ir. H. D. Puspongoro, Deputy Chairman for Technology Development, BPPT
(member of steering committee)
Dr. I. Putu Kompiang, Agency for Animal Research, Bogor
Dra. Rachmaniar, Staff of Deputy for Basic and Applied Science, BPPT
Ir. Rahardi Ramelan, Deputy Chairman for Industrial Analysis, BPPT
Dr. Sabana Kartasasmita, Assistant to the Minister of State for
Research and Technology
Ir. Firman L. Sahwan, Staff of Deputy for Technology Development, BPPT
Ir. Saraswati, Senior Scientist, BPPT; Faculty of Chemical Engineering,
Surabaya Institute of Technology (member of steering committee)
Ir. Dodo, R. Sastra, Staff of Deputy for Technology Development, BPPT
Dra. Dewi Sabita Slamet, Nutrition Research and Development Center,
Bogor
Dr. Slamet Sudarmadji, Faculty of Agriculture Technology, Gadjah Mada
University
Dra. Sulistiyani, Bogor Agriculture University
Dra. Sri Susanti, Staff of Assistant to the Minister of State for
Research and Technology
Dr. Susono Saono, National Biological Institute, Indonesian Institute
of Sciences, Bogor
Dr. Sutarman Mihardja, Faculty of Animal Husbandry, Padjajaran
University, Bandung
Dr. Maggy Thenawidjaja, Bogor Agriculture University
Dra. Titiresmi, Staff of Deputy for Technology Development, BPPT
Drh. Umi Cahyaningsih, Bogor Agriculture University
Dr. Untung Iskandar, Project Manager Basic Human Needs, BPPT (member of
steering committee)
Dra. Nina Utami, Staff of Deputy for Basic and Applied Science, BPPT
Ir. Sri Wahjuni, Staff of Deputy for Technology Development, BPPT
Ir. Wardiman Djojonegoro, Deputy Chairman for Administration, BPPT
Ir. Witono Basuki, Staff of Deputy for Technology Development, BPPT
Prof. M. T. Zen, Deputy Chairman for Natural Resources, BPPT

United States Participants

Dr. Gerald Reed, Vice President for Corporate Development, Milbrew Inc.
Amber Labs, Chairman
Dr. Henry R. Bungay, III, Professor of Chemical and Environmental
Engineering, Rensselaer Polytechnic Institute
Dr. Joseph Fontenot, Professor of Animal Sciences, Virginia Polytechnic
Institute and State University
Dr. John N. Udall, Jr., Assistant Director, Clinical Research,
Massachusetts Institute of Technology
Mrs. Rose Bannigan, Staff Officer, Board on Science and Technology for
International Development, Office of International Affairs,
National Research Council

Other Participants

Dr. Jerome Bosken, Director, Office of Science, Technology and Energy,
U.S. Agency for International Development, Indonesia
Mr. H. Itoga, Mitsubishi Corporation, Jakarta
Dr. A. B. Van Rennes, U.S. Technical Adviser to the Chairman, BPPT
Jakarta, Indonesia

* * *

WORKSHOP ON SYSTEMS ANALYSIS
(FEBRUARY 1983)

Indonesian Participants

Ir. Suleman Wiriadidjaja, Deputy Chairman for Systems Analyses, BPPT,
Chairman, Workshop Organizing Committee
Ir. Wardiman Djojonegoro, Deputy Chairman for Administration, BPPT,
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SYMPOSIUM ON POTENTIAL INDONESIA-U.S. COLLABORATION
IN SCIENCE AND TECHNOLOGY
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APPENDIX B

Bibliography

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