AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523

BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY
BATCH 47

1. SUBJECT CLASSIFICATION

A. PRIMARY
Food production and nutrition — AA00-0000-G662

B. SECONDARY
General--Indonesia

2. TITLE AND SUBTITLE
Keynote addresses, list of participants, and background papers

3. AUTHOR(S)
(101) Workshop on Food,Djakarta,1968

4. DOCUMENT DATE	5. NUMBER OF PAGES	6. ARC NUMBER
1968	125p.	ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS

NAS

8. SUPPLEMENTARY NOTES *(Sponsoring Organization, Publishers, Availability)*
(Vol.3 of the proc.of workshop jointly sponsored by Lembaga Ilmu Pengetahuan Indonesia and NAS) (Overall findings and recommendations:PN-AAC-953; Reports of the working groups:PN-AAC-954)

9. ABSTRACT

10. CONTROL NUMBER
PN-AAC-955

11. PRICE OF DOCUMENT

12. DESCRIPTORS
Food supply
Government policies
Indonesia
Meetings

13. PROJECT NUMBER

14. CONTRACT NUMBER
CSD-1122 GTS

15. TYPE OF DOCUMENT

AID 590-1 (4-74)

PN-AAC-955
CSD-1122 GTS
NAS

LEMBAGA ILMU PENGETAHUAN INDONESIA

AND

NATIONAL ACADEMY OF SCIENCES, USA,

WORKSHOP ON FOOD

A REPORT ON THE

LEMBAGA ILMU PENGETAHUAN INDONESIA -

NATIONAL ACADEMY OF SCIENCES, USA,

WORKSHOP ON FOOD HELD AT

DJAKARTA, INDONESIA

MAY - 1968

VOLUME - III

KEYNOTE ADDRESSES, LIST OF PARTICIPANTS,

AND BACKGROUND PAPERS, ETC.

LEMBAGA ILMU PENGETAHUAN INDONESIA

AND

NATIONAL ACADEMY OF SCIENCES, USA,

WORKSHOP ON FOOD

A REPORT ON THE

LEMBAGA ILMU PENGETAHUAN INDONESIA - NATIONAL ACADEMY OF SCIENCES, USA, WORKSHOP ON FOOD HELD AT DJAKARTA, INDONESIA

MAY - 1968

VOLUME - III

KEYNOTE ADDRESSES LIST OF PARTICIPANTS, AND BLACKGROUND PAPERS, ETC.

Additional copies of this report may be obtained free, upon request, from the Indonesian Institute of Sciences, Djl. Teuku Tjhik Ditiro 43, Post Box 250, Djakarta, Indonesia, or from the Office of the Foreign Secretary, National Academy of Sciences, 2101 Constitution Avenue, Washington, D. C. 20418.

First Printing, November 1968

Printed by
PUSAT DOKUMENTASI ILMIAH NASIONAL
Lembaga Ilmu Pengetahuan Indonesia
Djalan Raden Saleh No. 43, Djakarta
I N D O N E S I A

LIPI - NAS WORKSHOP ON FOOD

Honorary Chairmen

Sarwono Prawirohardjo,
Chairman,
Indonesian Institute of Sciences

Frederick Seitz,
President,
National Academy of Sciences

Chairmen

Sudjono D. Pusponegoro,
Faculty of Medicine,
University of Indonesia

H.F. Robinson, Chairman,
Vice Chancellor,
University System of Georgia

Steering Committees

Sarwono Prawirohardjo,
Chairman

Sudjono D. Pusponegoro,
Vice Chairman

R. Amien Tjokrosoeseno,
Secretary-General,
Ministry of Agriculture

Poorwo Soedarmo,
Professor of Nutrition,
University of Indonesia

Kampto Utomo,
Professor in Rural Sociology,
Bogor Agricultural University

Otto Soemarwoto,
Director,
National Biological Institute

Sjarifuddin Baharsjah,
Chairman,
Dept. of Social Economics,
Bogor Agricultural University

H.F. Robinson,
Chairman

C.C. Murray,
Director,
Inter-Institutional Program of International Affairs,
University System of Georgia

Howard W. Beers,
Director,
Center for Developmental Change,
University of Kentucky

Over ----

Subekti,
Head,
Bureau for Evaluation & Analysis,
National Development Planning Board

Didin S. Sastrapradja,
Executive Secretary,
LIPI

Sjamsiah Achmad,
Acting Head,
Bureau for International Relations,
LIPI

Local Organizing Committees

Didin S. Sastrapradja, Chairman

Rio Rachwartono, Vice Chairman

Sjamsiah Achmad, Secretary

Moertini, Deputy Secretary

Kessy Ngalim, Protocol

M.F. Sumampouw, Logistics

Hasan, Finances

National Academy of Sciences Coordinator

William L. Eilers,
Associate Director,
Pacific Science Board,
Office of the Foreign Secretary

LIPI-NAS WORKSHOP ON FOOD

VOLUME III

Table of Contents

	Page
FOREWORD	v
WORKSHOP AGENDA	1
PANELISTS, RESOURCE PERSONS, OBSERVERS AND SECRETARIES	3
DISCUSSION OUTLINE FOR THE WORKING GROUPS	19
BACKGROUND PAPERS AND MATERIALS	33
OPENING CEREMONY ADDRESSES by:	
Professor Sarwono Prawirohardjo	35
Dr. Frederick Seitz	43
Major General Sutjipto	47
Sultan Hamengku Buwono IX	53
General Soeharto	57
KEYNOTE ADDRESSES	
Population Growth and Its Control, Food Requirements and Food Production by Dr. Kartono Gunawan	61
Problems of Food Supply in Indonesia by Professor Widjojo Nitisastro	81
Science and National Institutions by Frederick Seitz	87
CLOSING SESSION ADDRESSES by:	
Dr. Soedjono D. Pusponegoro	97
Dr. H. F. Robinson	99
Dr. Ivan L. Bennett, Jr.	101
Professor Sarwono Prawirohardjo	113

FOREWORD

A week-long Workshop on Food was held in Djakarta May 27 - June 1, 1968 to formulate recommendations addressed to Indonesia's most crucial current problem: how to overcome calorie deficiencies and achieve a more nutritious diet for the country's 117 million people. A joint effort of the Indonesian Institute of Sciences (LIPI) and the National Academy of Sciences of the United States (NAS), the meeting sought to assist Indonesia's National Development Planning Board (BAPPENAS) with respect to the development of a national food policy and the identification of budget requirement priorities in connection with the Five-Year Development Plan (1969-1973). In the selection of subjects recommended for concentrated research, an effort was made to list topics for which the country's scientific and technological resources could be mobilized fully to support the top priority national goal of increased food production.

This supporting material on the Workshop is Volume III of a three volume report. Volume I contains the over-all findings and recommendations of the Workshop, and Volume II the reports of the eight working groups.

The report was submitted in preliminary form to BAPPENAS immediately following the Workshop. A summary of the conclusions and policy recommendations was presented to President Soeharto and to his cabinet ministers responsible for economic and agricultural development programs.

A basic guideline for the discussions was the 18-month White House report on world food problems conducted by the U.S. President's Science Advisory Committee and published in May, 1967. The Chairman, Executive Director, and several panel members of this comprehensive study participated in the Djakarta Workshop. In addition to the Academy's panel of 25 specialists, there were ten experts representing Australia, Japan, the Netherlands, as well as regional and international agencies. The 86 Indonesian panelists, resource specialists, and observers were drawn from several ministries, universities, and research institutes.

This report is published with the expectation that the observations, findings, and recommendations presented will be of interest and value to a wide audience in Indonesia and the United States, and among planners, agriculturalists, and others in developing countries who are concerned with the increase of food resources, the organization of research, and application

of science and technology to economic and agricultural development.

Additional copies of this report may be obtained free, upon request to either the Indonesian Institute of Sciences or the National Academy of Sciences, the addresses of which are given on the title page.

LIPI - NAS

WORKSHOP AGENDA

LIPI-NAS WORKSHOP ON FOOD

Agenda

May 27, 1968 (Monday)

Opening Ceremony

Addresses:	Professor Sarwono Prawirohardjo Chairman, Indonesian Institute of Sciences
	Dr. Frederick Seitz President, National Academy of Sciences
	Major General Sutjipto Minister of Agriculture
	Sultan Hamengku Buwono IX Minister of State for Economic, Financial, and Industrial Affairs
	General Soeharto President, Republic of Indonesia

Meetings

General:	Briefing and Discussion of Working Group Procedures Professor Sarwono Prawirohardjo Dr. Soedjuno D. Pusponegoro Dr. H. F. Robinson
Working Groups:	Planning Session Chairmen, Rapporteurs, Secretaries
Keynote Addresses:	Population Growth and Its Control, Food Requirements and Food Production by Dr. Kartono Gunawan
	Problems of Food Supply in Indonesia by Professor Widjojo Nitisastro
	Science and National Institutions by Dr. Frederick Seitz

May 28, 1968 (Tuesday)

Meetings

Working Groups:	Morning and afternoon sessions of the eight separate Working Groups considering subjects suggested in the Discussion Outline.
May 29, 1968 (Wednesday)	Same as above.
May 30, 1968 (Thursday)	Same as above and preparation of reports.

May 31, 1968 (Friday)

Meetings

Working Groups:	Preparation of reports.
Joint Session:	Chairmen, Rapporteurs, Secretaries to discuss problem of integrating similar subjects in report.

Summary Presentation and Closing Session

Addresses:	Dr. Soedjono D. Pusponegoro Dr. H. F. Robinson Dr. Ivan L. Bennett, Jr. Deputy Director, Office of Science and Technology, Executive Office of President of the United States Professor Sarwono Prawirohardjo
Press Conference:	Professor Sarwono Prawirohardjo Dr. Ivan L. Bennett, Jr. Dr. Soedjono D. Pusponegoro Dr. H. F. Robinson
June 1, 1968 (Saturday)	Working Group Chairmen and Rapporteurs continued preparation of reports.

PANELISTS,

RESOURCE PERSONS,

OBSERVERS

AND

SECRETARIES

Pages 3 - 18

PANELISTS, RESOURCE PERSONS, OBSERVERS, AND SECRETARIES

Indonesian Panelists

Saleh Afiff
Chief, Bureau of Agriculture and Estate
National Development Planning Board
Djakarta

Soegandhi Soerjo Amidharmo
Head, Directorate of Agricultural Extension Service
Ministry of Agriculture
Djakarta

Sjarifuddin Baharsjah
Chairman, Department of Social Economics
Bogor Agricultural University
Bogor

H. Basjarudin
Director, Forest Development Service
Directorate of Forestry
Ministry of Agriculture
Bogor

Dahro
Director
Research Institute for Horticulture
Ministry of Agriculture
Bogor

Soegeng Dirdjosubroto
Head, Department of Animal Diseases
and Veterinary Public Health
School of Veterinary Medicine
Bogor Agricultural University
Bogor

Kartono Gunawan
Director, Institute of Demography
Faculty of Economics
University of Indonesia
Djakarta

Lie Goan Hong
Head, Diponegoro Unit
Nutrition Institute
Ministry of Health
Djakarta

Jannes H. Hutasoit
Professor and Acting Rector
Bogor Agricultural University
Bogor

Joetono
Dean, Faculty of Agriculture
Gadjah Mada University
Jogjakarta

Johannes
Director
Directorate of Geology
Ministry of Mining
Bandung

Darwin Karjadi
Director
Nutrition Research Unit Sembodja
Bogor Institute of Nutrition
Ministry of Health
Bogor

Djatijanto Kertosastro
Agronomist, Directorate of Extension Service
Ministry of Agriculture
Djakarta

Sutardi Mangundojo
Director of Research and Society Service
Directorate General of Higher Education
Ministry of Education and Culture
Djakarta

Harimurti Martojo
Dean, Faculty of Animal Husbandry
Bogor Agricultural University
Bogor

Wijoto Martopuspito
Directorate General of Water Resources
Ministry of Public Works
Djakarta

Mubyarto
Head, Bureau of Economic Research
Faculty of Economics
Gadjah Mada University
Jogjakarta

D. Muljadi
Director, Soil Research Institute
Ministry of Agriculture
Bogor

Djumadias Abu Nain
Chief, Nutrition Education Service
Directorate of Nutrition
Ministry of Health
Djakarta

Dradjat D. Prawiranegara
Director, Nutrition Institute
Ministry of Health
Djakarta

Alhambra Rachman
Senior Staff, Bureau for Social Economic Studies
Ministry of Agriculture
Djakarta

Iso Reksohadiprodjo
Professor, Faculty of Agriculture
Gadjah Mada University
Jogjakarta

Mien A. Rifai
Mycologist, Herbarium Bogoriense
National Biological Institute
Indonesian Institute of Sciences
Bogor

Hamamy Saaman
Head, Division of Planning and Development
Directorate General of Basic Education
Ministry of Education and Culture
Djakarta

Hasanuddin Saanin
Chief, Bureau for Research and Evaluation
Ministry of Maritime Affairs
Djakarta

Susono Saono
Soil Microbiologist, The Botanic Garden
National Biological Institute
Indonesian Institute of Sciences
Bogor

Setijati Sastrapradja
National Biological Institute
Indonesian Institute of Sciences
Bogor

Achmad M. Satari
Assistant Professor in Soil Science
Soil Science Department
Bogor Agricultural University
Bogor

Achmad Djaeni Sediaoetama
Lecturer, Medical Faculty
University of Indonesia
Djakarta

Rudolf Sinaga
Junior Lecturer, Faculty of Agriculture
Bogor Agricultural University
Bogor

B. H. Siwi
Assistant Director
Central Research Institute for Agriculture
Ministry of Agriculture
Bogor

Pepet M. Sjafei
Head, Agronomic Department
Faculty of Agriculture
Bogor Agricultural University
Bogor

Poorwo Soedarmo
Professor in Nutrition, Medical Faculty
University of Indonesia
Djakarta

Irlan Soejono
Lecturer in Farm Management
Bogor Agricultural University
Bogor

Soemartono
Chief, Rice Mills Division
Directorate General of Agriculture
Ministry of Agriculture
Djakarta

Otto Soemarwoto
Director
National Biological Institute
Indonesian Institute of Sciences
Bogor

Soenardi
Entomologist
Directorate of Agricultural Extetension
Ministry of Agriculture
Bogor

Dardjo Somaatmadja
Director
Chemical Research Institute
Bogor

Sadikin Somaatmadja
Head, Sub-division for Cultural Practices
Central Research Institute for Agriculture
Bogor Agricultural University
Bogor

B.A.B. Sopacoa
Director, Badan Pimpinan Umum
Mekanisasi Pertanian
Djakarta

Soemartono Sosromarsono
Associate Professor of Economic Entomology
Bogor Agricultural University
Bogor

Ignatius Tarwotjo
Director
Academy of Nutrition
Ministry of Health
Djakarta

Amien Tjokrosoeseno
Secretary General
Ministry of Agriculture
Djakarta

Kampto Utomo
Professor in Rural Sociology
Bogor Agricultural University
Bogor

A. Wazir
Head, Food Crops Division
Central Institute for Agricultural Research
Ministry of Agriculture
Djakarta

Kartomo Wirosuhardjo
Head, Bureau of Research and Planning
Ministry of Education and Culture
Djakarta

United States Panelists

Ralph H. Allee
Associate, Agricultural Development Council
c/o University of the Philippines
College of Agriculture
Laguna, Republic of the Philippines

John E. Bardach
Professor, School of Natural Resources
and Department of Zoology
University of Michigan
Ann Arbor, Michigan

Howard W. Beers
Director, Center for Developmental Change
University of Kentucky
Lexington, Kentucky

Ivan L. Bennett, Jr.
Deputy Director
Office of Science and Technology
Executive Office of the President
Washington, D. C.

Orville G. Bentley
Dean, College of Agriculture
University of Illinois
Urbana, Illinois

Richard Bradfield
Research Associate
International Rice Research Institute
Los Banos, Republic of the Philippines

Robert F. Chandler
Director
International Rice Research Institute
Los Banos, Republic of the Philippines

Ralph W. Cummings
Associate Director
Agricultural Sciences
Rockefeller Foundation
111 West 50 Street
New York, New York

Egbert deVries
Professor of International Development
Graduate School of Public and International Affairs
University of Pittsburgh
Pittsburgh, Pennsylvania

Ralph A. Krause
Consultant
International Science and Technology
550 Battery Street
San Francisco, California

Donald L. McCune
Assistant to Manager of Agricultural
and Chemical Development
Tennessee Valley Authority
Muscle Shoals, Alabama

A. H. Moseman
Associate
Agricultural Development Council
630 Fifth Avenue
New York, New York

C. C. Murray
Director, Inter-Institutional Programs
in International Affairs
University System of Georgia
Athens, Georgia

Arnold C. Orvedal
Assistant Director
Soil Conservation Service
U.S. Department of Agriculture
Washington, D. C.

Arthur Paul
Regional Economic Adviser
The Asia Foundation
Hong Kong

H. F. Robinson
Vice Chancellor
University System of Georgia
Atlanta, Georgia

Daniel Rosenfield
Deputy Director, Agro-Business Group
International Agricultural Development Service
U.S. Department of Agriculture
Washington, D. C.

Vernon W. Ruttan
Head, Department of Agricultural Economics
University of Minnesota
St. Paul, Minnesota

Brooks Ryder
Project Specialist
Ford Foundation
Djakarta, Indonesia

Nevin S. Scrimshaw
Head, Department of Nutrition and Food Science
Massachusetts Institute of Technology
Cambridge, Massachusetts

Frederick Seitz
President
National Academy of Sciences
Washington, D. C.

John I. Spooner
Seldom-Rest Farms
Donalsonville, Georgia

Ernest W. Sprague
Agricultural Project Leader
The Rockefeller Foundation
c/o Kasetsart University
Bangkok, Thailand

George F. Sprague
Head, Corn and Sorghum Section
Crops Research Division
Agricultural Research Service
U.S. Department of Agriculture
Beltsville, Maryland

Harold L. Wilcke
Vice President and Director of Research
Ralston Purina Company
St. Louis, Missouri

Indonesian Resource Persons

Muchidin Apandi
Lecturer
Padjadjaran University
Bandung

Didi Atmadilaga
Secretary, Senate Professors
Padjadjaran University
Bandung

Sumadi Atmowidjojo
Plant Physiologist
National Biological Institute
Indonesian Institute of Sciences
Bogor

Harsja Bachtiar
Assistant Director
National Institute of Economic
and Social Research
Indonesian Institute of Sciences
Djakarta

Surjatna Effendi
Head, Irrigation Sub-division
Central Agricultural Research Institute
Ministry of Agriculture
Bogor

Supardi Goeswono
Lecturer in Soil Science
Bogor Agricultural University
Bogor

A. Grufron
Associate Professor
Institute of Technology
Bandung

Ismet Hakim
Staff Member, Directorate General of Agriculture
Ministry of Agriculture
Djakarta

A. Hidir
Associate Professor of Plant Pathology
Bogor Agricultural University
Bogor

Rusli Jahja
Head, Supply Division
Directorate General of Agriculture
Djakarta

J. A. Katili
Director, Institute of Geology and Mining
Indonesian Institute of Sciences
Bandung

O. Koswara
Assistant Professor of Soil Fertility
Soil Science Department
Bogor Agricultural University
Bogor

Ischak Lubis
Phytochemist, National Biological Institute
Indonesian Institute of Sciences
Bogor

Winoto Martoadiprawito
Senior Lecturer, Faculty of Engineering
Gadjah Mada University
Jogjakarta

Moersidi
Climate Division
Meteorological and Geophysical Service
Djakarta

B. Napitupulu
Senior Official
Ministry of Agriculture
Djakarta

Tedjojuwono Notohadiprawiro
Associate Professor of Soils
Faculty of Agriculture
Gadja Mada University
Jogjakarta

I Gde Oka
Head, Division of Reforestation and Forest Protection
Directorate of Forest Management
Ministry of Agriculture
Bogor

Moeljono Partosoedarso
Director
Research Institute for Estate Crops
Bogor

Achmadi Partowijoto
Assistant Professor of Water Management and Irrigation
Bogor Agricultural University
Bogor

Azwar Rasjid
Central Bureau of Statistics
Djakarta

Soenarjo Reksodarmodjo
Coordinator, Technical Bureau
Ministry of Agriculture
Djakarta

I Made Sandy
Head, Research and Development
Directorate of Topography
Djakarta

Sumardi Sastrakusumah
Dean, Faculty of Fisheries
Bogor Agricultural University
Bogor

Ibrahim Sastramihardja
Lecturer and Head of Laboratory of Microbiology
and Food Technology
Institute of Technology
Bandung

M. Siregar
Staff Member of National Economic
and Social Research Institute
Indonesian Institute of Sciences;
Lecturer, Faculty of Economics
University of Indonesia
Djakarta

A. P. Siregar
Head, Department of Poultry Science
Central Research Institute for Animal Husbandry
Department of Agriculture
Bogor

Djoko Saptono Slamet
Lecturer in Food Science and Technology
School of Nutrition
Djakarta

Aprilany Soegiarto
Marine Biologist
Institute of Marine Research
National Biological Institute
Indonesian Institute of Sciences
Djakarta

Brig. Gen. Soehardi
Special Assistant to Army Deputy Chief of Staff

Soekardono Soeprapto
Head, Division of Protozoology
College of Veterinary Medicine
Bogor Agricultural University
Bogor

Subandi
Corn Breeding Division
Central Agricultural Research Institute
Ministry of Agriculture
Bogor

S. Suharto
Associate Director
Academy of Statistics
Djakarta

Mohamad Surjani
Assistant Director for Administration
National Biological Institute
Indonesian Institute of Sciences
Bogor

D. Sutidjo
Lecturer, Faculty of Agriculture
Bogor Agricultural University
Bogor

R. P. Utojo
Technical Staff Member to the Minister
of Agriculture on Education and Research
Djakarta

Panelists, Resource Persons or Observers from Other Countries and International Organizations

G. Bolhuis
Lecturer at the Agricultural High School, Wageningen, Holland; Chief of Agricultural Technical Cooperation Mission to Indonesia

T. S. Gill
F.A.O. Senior Agricultural Economist
Department of Agriculture
Djakarta

J. F. Kefford
Assistant Chief, Food Preservation Division
Commonwealth Scientific and Industrial
Research Organization
Canberra, Australia

Bhaki Lusanandana
Economic and Technical Assistance Division
Asian Development Bank
Bangkok, Thailand

James McDivitt
Director, UNESCO Regional Center for Science
and Technology for Southeast Asia
Djakarta

Max Milner
Senior Food Technologist
Food Conservation Division
United Nations Children's Fund
United Nations, New York

Takeshi Motooka
Professor, Agricultural Economics
Center for Southeast Asian Studies
Kyoto University
Kyoto, Japan

F. C. Pala
Deputy Director
UNESCO Regional Center for Science and Technology
for Southeast Asia
Djakarta

Mahendra Prasad
Acting WHO Representative
Djakarta

George Rosen
Deputy Director
Economic and Technical Assistance Division
Asian Development Bank
Bangkok, Thailand

Indonesian Observers

Gembong
Gadjah Mada University
Jogjakarta

Satrijo
Liaison Officer
Ministry of Defense and the Scientific Community

Rasjid Sukarja
Padjadjaran University
Bandung

Sudradjat Prawirakusuma
National Chemical Institute
Indonesian Institute of Sciences
Bandung

United States Observers

Herman I. Chinn
Asian Specialist, International Scientifi
and Technological Affairs
Department of State
Washington, D. C.

J. Karl Lee
Economic Adviser
Office of Asian Regional Development
American Embassy
Bangkok, Thailand

Philip Ruppert
Manager for Industry
Agency for International Development
American Embassy
Manila, The Philippines

Indonesian Secretaries

W. Hardjanto
Bogor Agricultural University
Bogor

Chairul Muluk
Bogor Agricultural University
Bogor

Asikin Natasasmita
Bogor Agricultural University
Bogor

Soemilah Sastroamidjojo
Lecturer, Department of Nutrition
Faculty of Medicine
University of Indonesia
Djakarta

Sjamsuddin
Lecturer in Pediatrics
Faculty of Medicine
University of Indonesia
Djakarta

Sjofjan
Head, Agro-Economic Survey Division
Ministry of Agriculture
Djakarta

Soebijanto
Central Agricultural Research Institute
Ministry of Agriculture
Bogor

Soedjadi
Soil Research Institute
Ministry of Agriculture
Bogor

Adi Sudono
Lecturer, Faculty of Animal Husbandry
Bogor Agricultural University
Bogor.

Lien Tobing
Staff, Bureau of Research and Planning
Ministry of Education and Culture
Djakarta

R. K. Utomo
Bogor Agricultural University
Bogor

Gelar Wiraatmadja
Chief, Division of Aquaculture
Faculty of Fisheries
Bogor Agricultural University
Bogor

DISCUSSION OUTLINE

FOR

THE WORKING GROUPS

Pages 19 - 33

DISCUSSION OUTLINE FOR THE WORKING GROUPS

Population, Food Needs and Nutrition

Strategies for meeting the total food needs of the Indonesian people require a thorough understanding of the current population by age and sex distribution and geographic location coupled with an evaluation of the productive capacity of the human resources now engaged or likely to be engaged in agriculture (food production). Careful attention must be given to projecting population statistical data for the future particularly to the target planning date. The need is for understanding population in dynamic terms, realizing that numerous factors can influence projection trends, e.g., health programs, nutritional well-being of infants, young children, improved nutritional status of pregnant and lactating women, and family planning programs. The nation's human resource constitutes its current and potential source of economic growth and social development. From the people will come the capacity to manage and mobilize natural resources needed to produce food as well as to consume it.

A second resource is the current food production capacity of the Indonesian farms and cultivators. Current data on food production must be evaluated and if it is not complete, and critical data is lacking, plans must be developed to obtain a continuing reliable data base for a national food resources inventory. The inventory needs to stress, beside quantity, both quality and distribution as influenced by seasonal variations and geographic locations. This latter consideration is highly relevant to demographic data, availability of transportation and storage facilities, i.e., the relationship of existing or potential food supplies to population centers (demand).

Quantifying food needs for the nation has several important dimensions. Gross food needs as expressed in terms of daily requirements for calories, protein, fat, vitamins, and minerals are needed. Implicit in such projects is an understanding of the nutritional well-being of the Indonesian population, again by age groups and by geographic regions. Significant in this evaluation will be review of information available from dietary and clinical surveys of nutritional status of various population groups from such health statistics

as may be available. Of particular value will be data on the food intakes, growth and development, and mortality of children of preschool age.

The interaction between malnutrition and infection is an important consideration. In individuals consuming inadequate diets, infections precipitate clinical malnutrition and increase food requirements. The importance of improving nutritional status in order to increase the resistance of the population to many of the common infectious diseases should also be discussed.

Dietary taboos and the lack of information about food preparation, preservation or nutritional quality are important factors in efficient utilization of available food supplies. These factors too must be given careful attention when projecting the potential of an improved or newly introduced food crop as strategies for increasing the national food supply.

Nutrition and national programs for fortifying or supplementing indigenous food supplies should be given careful attention; special protein concentrates, minerals and vitamins often in small amounts can be effective tools for balancing indigenous diets especially for special population segments as for growing children.

Nutrition education should be evaluated as applied knowledge of nutrition is a powerful strategy for improving the dietary practices and hence the nutritional well-being of the Indonesian people. Nutrition knowledge is highly relevant to programs for storage and preservation of food, new uses of existing food crops and animal or fish products, as is evaluation of introduced new food sources, and in public health and medical education programs. Family knowledge of nutrition is often lacking especially as it applies to infant and child feeding and as it applies to improving the efficacy of indigenous foods.

Public understanding of the dynamics of the population - food supply - nutritious inter-relationships will greatly enhance the effectiveness of government and other national programs in these areas. Health, food and human productivity, food and new agricultural technology, and food production and economic development cannot be set apart from science and education in biology, medicine and agriculture. Improved nutrition, adequate diets, and a progressive agriculture are challenging goals for every country but one that merits thoughtful attention by the scientific community. Like the

health of its people, the capacity of a nation to feed its people is a basic asset essential to its economic growth and social well-being.

Intensification of Production: Soils, Water, Fertilizers and Improved Agricultural Tools

I. Status of information on physical resources

A. Soils

1. Extent of areal coverage by soil surveys with soils classified and mapped so as to be useful in planning.

2. Data on crop yields along with systems of management and kinds of soils.

3. Extent of soils now under cultivation and general location.

4. Extent of soils now under cultivation but potentially arable, and general location.

B. Water

1. Rainfall. Data on rainfall and its distribution throughout the year, especially months with enough for plant growth.

2. Water for irrigation. Data on surface water, mainly streams, and groundwater sources.

C. Raw materials for fertilizers, herbicides, pesticides, and other chemicals

Data on sources of phosphorus, potassium, sulfur, nitrogen, calcium, and other elements needed in the manufacture of fertilizers and other chemicals and their availability to exploitation.

D. Areal coverage by air-photos, and topographic, geologic, vegetation, and other maps useful in planning

II. Ways for increasing agricultural production

A. On soils now cultivated

1. Multiple cropping

2. Use of farm chemicals, especially fertilizers, but also herbicides and pesticides

3. Water management

4. Improved crop varieties

5. Cultural practices - seedbed preparation, weed control, harvesting, etc.

B. By expanding onto soils not now used

1. Land clearing

2. Drainage

3. Irrigation

C. Fertilizers

1. Responses (cost-benefit ratios) by kinds of soil and kinds of crops

2. Fertilizer needs, how to estimate

3. Sources of fertilizers: Present, indigenous and imported; Potential, indigenous and imported.

4. Necessities for increasing fertilizer use: Research and demonstration; Distribution and marketing; and Credit

D. Water management

1. On soils without irrigation - to control erosion and to conserve water for use by crop plants

2. Drainage

3. Irrigation

E. Improved agricultural tools

1. Hand tools and animal-drawn implements

2. Small power tools and implements

III. Evaluation of possible alternatives

A. Importance of the principle of interactions and the proper combination of inputs. Example: To get full benefit

from fertilizers, more responsive crop varieties may be needed; to get the full benefit of fertilizers and improved crop varieties, more (or possibly less) water may be needed, the time and method of planting, or both, may have to be changed, etc.

B. Setting priorities

1. Reasonable alternatives that apparently can be implemented immediately for a quick step-up in production (such as introduction of improved crop varieties along with increased fertilization and better water management).

2. Reasonable alternatives that require considerable time for planning, research, and implementation (such as bringing unused soils into production in areas lacking both transport facilities and people).

Intensification of Production: Food Crops and Animals

The problems of population growth and an adequate food supply are inseparable. A substantial increase in food production offers the greater promise for the immediate future. Studies aimed at increasing food production must involve the fullest possible utilization of the best information on efficient use of soil and water resources, improved varieties, cultural practices and the adequate utilization of fertilizer, insecticides, fungicides, and herbicides. It is assumed that all phases of the breeding and production studies will proceed concurrently with continuous modification of each as new information accumulates.

A. Rice

1. Breeding. It has been the general experience that native varieties, through long periodc of natural selection under conventional production methods, have only limited capacity to respond to improved cultural conditions or increased quantities of fertilizers. Extensive work has already been done on the introduction and evaluation of types from similar ecological zones. If superior types are found they can be utilized commercially while still better types are being developed. Hybridization and pure line selection should be done under conditions of optimum management. Special emphasis needs to be given to resistance to insect and disease pests and to the palatability and acceptability of new types.

2. Production. Plans need to be developed for the review of all cultural practices with each new variety introduced.

This evaluation would include a range of ecological sites, time of planting, population level, time, rate and manner of fertilization, and response to disease and insect pests.

B. Maize

1. Breeding. A substantial increase in maize production would be desirable. What are the factors which currently limit maize production? Improvement efforts should be based on the formation of broad-based composites adapted to the potential areas of maize culture. Such composites can be subjected to population improvement through the use of simple recurrent selection schemes. Commerical use may involve these improved populations or their first generation hybrid progeny.

2. Production. If data are not currently available, special tests will be required to establish the relative economic importance of time of planting, population densities, rates of fertilization and weed control.

C. Other Food Crops

Studies on the potential for various multiple cropping schemes should be expanded. Supplemental crops such as sorghum, soybeans, peanuts may be feasible and contribute materially to an increase in food supply.

D. Seed Production

The development of seed production and distribution facilities will be required to utilize the plant breeding developments. Provision for certification will also be required to maintain varietal purity, viability standards, as well as freedom from seed borne diseases.

E. Animal Foods

Considerations involving the establishment of an enlarged animal industry require answers to several questions. What special production problems are involved? Animal health and disease problems become of importance as well as the availability of feeds required. Projections will be necessary as to the potential market to be served. These and other questions will vary with the class of livestock being considered.

F. Extension

Extension activities are most effective when a combination of practices is involved and the total benefit to the

farmer is sufficiently great as to be readily apparent. Where adequate background information is not already available it will become available from studies mentioned above. Special training will be required for extension personnel to make the most effective use of demonstration plantings.

Sources of Protein Foods

In order to define the availability of protein foods from indigenous sources, attention should be given to major protein resources currently utilized such as fish, soybeans, peanuts, and other legumes. Although rice is not high in protein, it is consumed in such large amounts that it is the major source of dietary protein. Information is needed on factors limiting the production, conservation, and use of these resources. Another topic should be the feasibility and desirability of upgrading the quality of existing protein staples by various forms of enrichment and fortification to supply essential nutrients in which they are deficient.

Fish are an extremely important source of high protein food for Indonesia. The working group needs to look at the constraints and expansion possibilities of marine fisheries, as well as those of fresh and brackish water fisheries. It will be important to consider factors which would make any one sector of the fish production industry amenable to immediate or long-range increases.

Attention should be given to evaluating other potential protein resources. For example, what are the possibilities for increasing the production and use of poultry and eggs? How can the protein of oilseed meals best be introduced into human diets? Are coconuts a neglected protein resource? Are there areas where cereals other than rice could be grown more advantageously?

Less conventional sources of protein such as fish protein concentrate and food yeast or other forms of single-cell protein also need discussion; the obstacles to their production and use on a significant scale for human feeding should be examined in detail with special reference to their feasibility for Indonesia.

In discussing programs to increase the supply of available or potential protein resources, planners need to know the type of processing required to convert the resources into foods which fit Indonesian food consumption patterns, and which are acceptable to the groups in need of increased dietary protein.

In the utilization of protein resources and the distribution of protein-rich foods, the relative role of public and private sectors should be examined. The nature of the food and the methods of distributing and promoting it will depend upon the population groups for which it is intended. Particular emphasis needs to be given to ensuring adequate protein foods for vulnerable segments of the population, particularly the preschool children and pregnant and nursing mothers.

Processing, Marketing and Utilization of Foods

No human food is of any value until it is consumed by the individual or until it is available for export. Therefore, the successful marketing and distribution of food is the focal point of the entire food system; it is the end toward which all other inputs are focused. The development of a viable, economically sound food industry is essential to the production of food products on a continuing basis. This means that the food industry must represent an integrated system, with a sensitive balance between production, processing, and all of the steps necessary for orderly distribution and marketing.

Transportation must be provided to move to the production area the necessary inputs such as fertilizer, seed, tools, implements, and chemicals; and to move the resulting crops to processing plants, markets, or ship-side.

The following subjects are suggested for discussion:

The possibility of improving water transportation docks, canals, warehousing at seaboard, etc.

The possibility of extending useable roads.

The possibility of making available the necessary trucks, boats, barges, and ships.

Supplying necessary repair parts.

Processing should be kept at a minimum consistent with efficient and economical use of food products to save fuel and power, to avoid unnecessary expense, and to conserve labor. Methods to be considered:

Air drying. Effects of rainfall, temperature, etc.

Forced dehydration - economy, fuel costs, types of fuel.

Canning plants. These must be in an integrated system where crops are grown specifically for processing by this method. They cannot operate efficiently on a surplus basis.

Salting - distribution problems involving salt.

Refrigeration - the economy and practicability and repair of obsolete or inoperative plants.

Alternate methods.

Possible health or cultural problems which may result from the use of preservatives, chemicals, etc

More efficient and extensive utilization of by-products.

Distribution and marketing are the final steps in getting the food to the consumer or the export point. Some of the factors involved are:

The place and function of the broker or middleman.

The adequacy of terminal warehousing in terms of kinds and capacity to provide orderly movement of food supplies.

The control of insects and predators to prevent spoilage and wastage.

The status of markets in respect to proper food handling.

Standards for quality, weights, packaging, etc.

Inspection of foods for wholesomeness and quality.

Market reports to help insure an orderly supply of food products.

The investment of capital will be required in order to provide the necessary facilities for transportation, processing plants, warehousing, markets, etc. The extent of availability of funds from government, private industry, and foreign sources, and the amounts required in any given period of time may be calculated following decisions on volume.

Production Incentives and The Use of Technical Inputs

Agricultural development depends, in the final analysis, on the production decisions and actions of a nation's farmers. The factors that influence farmer incentives to produce are of three types. Some flow from the general cultural, political and economic characteristics of each country or region. Some are effects of policies and programs designed to serve agricultural development but not primarily to affect incentives. Some are programs undertaken to directly influence farmers' decision making.

The most important of the policies designed to directly influence farmer incentives to produce are those designed to make more productive inputs such as higher yielding crop varieties, fertilizer, insecticides and herbicides, and others available to the farmers; and policies which directly affect the prices that farmers pay for inputs purchased from the non-farm economy or the prices farmers receive for the products that they sell. Both sets of policies are most effective when reinforced by well developed input and product markets.

If a working group to identify problems, assemble knowledge and discover alternatives which would be useful in motivating producers of food in Indonesia to increase their production, is established, the group might want to focus their discussion around the following points:

The pattern of incentives for economic effort lies in a system of interacting forces and conditions rather than in any single policy or practice.

Prevailing patterns of incentives are a part of the established culture (traditions) values, social organization in any group, province, or nation. Indonesia includes a variety of cultures, regions and provinces, with corresponding varieties in incentive patterns.

The traditions and laws of land tenure are important influences upon incentives to produce, but they do not seem to present widespread or insurmountable problems in Indonesia, as they do in some parts of the world.

Incentives to apply better technology are essential wherever increased food production is sought: use of better seed, new practices in cultivation, fertilization, pest and disease control, harvesting, storing, marketing and transportation are all parts of the relevant technology.

Increased food production is more likely to occur where agreements between producer - seller and processor - buyer take the form of respected contracts than where they are only informal or casual in nature.

The freedom of peasants to enjoy the material benefits of higher personal income, without encroachment by "authorities" is an important aspect of production incentives.

Availability of attractive purchasable goods, for both production and consumption engenders interest in increased income.

Availability of packaged inputs, including seed varieties, fertilizers, pesticides, technical guidance, credit, and access to an assured market strengthen production incentives.

Policies that assure a continuous flow of new and more efficient technical inputs that are fully available to individual farmers in each producing region are more consistent with over-all development objectives than policies that attempt to induce greater production by price incentives alone. When such inputs are available, however, price policies represent effective instruments to induce farmers to adopt the new inputs, and to encourage the flow of resources into the production of high priority agricultural commodities.

Biology Basic to Agriculture

Agriculture is meant here to comprise the production on an intensive scale of plant and animal crops, mainly but not exclusively for human nutrition. Fisheries, including those of the high seas are included. Biology is here meant in the sense of ecology and concerns itself also with environmental parameters.

Basic scientific investigations are essential for the advance of agriculture and the success of agricultural development can be correlated with the degree to which such research is deemed important by any society and the extent to which such research endeavors are supported and respected by that society.

Equally important is the organization to use the results of that research. This panel should, therefore, discuss the strategy and tactics of creating institutional and organizational channels to apply research results to the "field" and

to integrate the efforts of various research organizations among themselves as well as with the users of the research. For instance: channels and practices need to exist for results obtained at the center to be tested in the field (development research) and if indicated, for appropriate innovations to be disseminated through extension channels. Thus the area of concern of this panel overlaps with that on institution building and others.

From a subject matter point of view the field of Biology Basic to Agriculture may be subdivided as follows (this list is not exhaustive and presents a suggestion for over-all organization rather than a topic outline):

I. Resource Substrate Related

A. Aquatic

1. Limnology

2. Oceanography

Especially assessment of basic productivities of unmanaged and managed ecosystems, with attention to cost effectiveness in terms of production of various management inputs. Resources inventory may also be necessary under 2.

B. Terrestrial

1. Soil Studies

The soil biota especially N fixing organisms - soil physics; balance of macronutrients and studies of trace elements as possible limiting factors in plant and animal production.

C. Climatic

1. Macro and microclimatology

Such knowledge will permit rational selection of sites and best allocation of certain inputs.

2. Hydrology related to surface runoff soils, irrigation, reservoirs, etc.

II. Crop Organism Related

A. Genetics and breeding, including special techniques,

e.g., hypophyzation for spawning of fish.

B. Animal nutrition, including use of indigenous materials; correction of trace mineral deficiencies.

C. Plant and animal diseases and parasites

1. Chemical control

2. Biological control

Institution Building and Resource Development

A definition of institution building, covering not only the finite organizations such as schools, universities, research facilities, etc., but also, and perhaps at higher priority, the integrated systems to make all resources effective, including a system of communication to farmers, etc. is suggested.

In regard to the relevant organizations, it is requested that the Indonesian participants have ready for the Academy panel up-dated lists of:

University and technical training institutions involved in the scientific and technical fields relative to food and agricultural development; key personnel;

Scientific and technological research facilities and their fields of specialization; and

Communication system between training, research, and other government service, and the users.

Note: The review of facilities should be broader than those directly concerned with agriculture since personnel trained in related fields and research in other fields contribute to over-all agricultural development.

The panel would like guidance as to the mechanisms used to insure that governmental planning decisions are translated into assigned tasks to the institutions of training, research, or production.

The panel recalls that the UNDP had a program of assistance to agricultural institutions in Indonesia which was

placed in abeyance. The panel suggests discussion of reactivating this program of aid.

The panel suggests discussion relating to bringing new areas into production which implies a comprehensive government program of technical and economic feasibility, resettlement, establishment of processing, distribution and marketing with a system of subsidies based on national development objectives.

In the field of resources development, the panel considers this to include human resources - that is the development of adequate cadres with professional, technical, and management skills - and the physical resources, which include subjects such as utilization and conservation of natural resources, the agricultural related minerals (phosphates), oil and gas for petro chemicals.

The panel considers that communication is a most important consideration to insure that government studies and decisions are transmitted to the institutions of education and research and that technical developments and information are transmitted effectively to the farmer and that the system has effective feed back.

The panel notes the success of the International Rice Research Institute and suggests discussion of the feasibility of establishing a similar institution in Indonesia.

BACKGROUND MATERIALS

BACKGROUND MATERIALS

The basic source document and discussion guide used in the Workshop was the three volume Report of the Panel on the World Food Supply, a study prepared by the President's Science Advisory Committee (U.S.). Other basic reference works for the meeting were: Feeding the Expanding World Population: International Action to Avert the Impending Protein Crisis, a report to the United Nations from the Advisory Committee on the Application of Science and Technology to Development; A. T. Mosher, Getting Agriculture Moving: Essentials for Development and Modernization, Frederick A. Praeger, Publishers, 1966; Max F. Millikan and David Hapgood, No Easy Harvest, Little Brown and Company, 1967; and Symposium on Prospects for the World Food Supply, National Academy of Sciences, 1966.

The 37 background papers prepared under the auspices of the Indonesian Institute of Sciences treated a wide range of problems considered by the working groups. Included were subjects as varied as estimates of food needs and population projections, bottlenecks in rice production, plant and animal sources of protein, seaweed resources, symbiotic nitrogen fixation by leguminous plants, conservation, socio-economic factors in food production, and problems of integrating research, education, and extension work in the agricultural field.

While background papers were not prepared by the panel members representing the National Academy of Sciences, other nations and international agencies, about 35 monographs, articles, and reports were reproduced and distributed to all participants by the Academy. These included some material previously published by the U.S. participants considered directly relevant to the Workshop. The papers provided general background on Indonesia, broad discussions of world and Southeast Asia agricultural problems and the development process, specific treatment of agriculture and food production in Indonesia, and related subjects such as family planning, shipping, infant malnutrition, and marine resources.

Academy panel members who met in Washington, D. C. on April 26 and 27, 1968, for a general briefing also prepared a suggested outline for Workshop discussions (pp. 19-32).

OPENING ADDRESSES

Pages 35 - 60

OPENING ADDRESS
by
Professor Sarwono Prawirohardjo
Chairman, LIPI

Your Excellencies,
Ladies and Gentlemen:

It is indeed a great honor and privilege for me to present this address on the occasion of the Opening Ceremony of the first workshop, sponsored by the National Academy of Sciences of the United States (NAS) and the Indonesian Institute of Sciences (LIPI). As Chairman of the host organization of this workshop, it gives me great pleasure to bid you all welcome. A special welcome I should like to extend to the participants of the workshop, who will have a very busy week before them and from whom we hope and expect that something really important will come through this workshop. In this connection I should like to stress how much we Indonesians appreciate the attendance at this workshop of such a strong NAS delegation under the leadership of Dr. Frederick Seitz, the President of the Academy, of representatives of the scientific community in Australia, Japan, the Netherlands, and of experts from the FAO, UNICEF, UNESCO, WHO, and the Asian Development Bank.

The idea of having this NAS-LIPI Workshop came up during my visit in January of this year to Washington, D. C. Discussions were being held with officers and staff members of the Academy on the topic of how to strengthen the relations between the scientific communities in the United States and Indonesia in general and between the NAS and LIPI in particular. As the Academy has already conducted successful workshops before with other developing countries, it was proposed to me to organize a workshop sponsored by the National Academy of Sciences and the LIPI, which would discuss matters of great importance for Indonesia. I accepted this proposal with great pleasure, and in considering what should be the subject for discussion at the proposed workshop, I suggested that we should discuss the food problems which Indonesia, and probably also the neighboring countries, were facing. This suggestion was based on the fact that at that time the food problem--and especially the rice problem--was problem number one for Indonesia. Besides that, I was aware of the President's Science Advisory Committee of the United States issuing a report in 1967 on the World Food Problem, based on a one year study of many aspects of this problem; this wealth of knowledge could be of great help for Indonesia in its efforts to find the right solution for its food problems.

The suggestion to have an NAS-LIPI Workshop on Food received a favorable response from the American side and it was agreed that--subject to approval from the Indonesian Government--a NAS-LIPI Workshop on Food should be held in Djakarta, probably in 1968. After my return to Indonesia I discussed the matter of the workshop with the Minister of Agriculture and the Chairman of the National Planning Board (BAPPENAS) and both officials gave their wholehearted support to the idea of having a NAS-LIPI Workshop on Food.

The Chairman of BAPPENAS even urged me to hold the workshop as early as possible so that the recommendations and conclusions of the workshop could be considered for inclusion in the Five-Year Development Plan, 1969-1973, which has to be submitted before next August. When Dr. Harold J. Coolidge of NAS was here last February to discuss further details of the workshop, we had the good fortune to be received in audience by President Soeharto and the President graciously gave his consent for the holding of the workshop.

Finally, it was decided to hold the NAS-LIPI Workshop on Food from 27 May - 1 June, although there was some concern that the time for preparation was too short.

Your Excellencies,
Ladies and Gentlemen:

The food problems, which Indonesia is facing, are not unique for this country alone, but are part of a greater problem affecting large parts of the world. We should therefore be aware that many factors which are influencing the nature and magnitude of these world food problems, are also relevant to Indonesia. A view on the world food situation might therefore be of some value.

When we look at the food situation of the world as a whole, it appears that there is at present no world-wide shortage of food in terms of quality or quantity. However, when we study the matter more carefully, it becomes apparent that the problems lie in the uneven distribution of the per capita food supplies in the different regions of the world. In the developing countries, with a population of about 71% of the total world population, the available food supply is about 43% of the total world food supply. For the Far East--including the mainland of China--these figures are respectively about 53% and 28%. Viewed in terms of levels of consumption, in the developing countries the main daily per capita intake of calories is about 2,105 with a consumption of about 58 grams of protein (9 grams of which is of animal origin), compared with

about 3,060 calories, including 90 grams of protein (44 grams of which is of animal origin) in the advanced countries. It has also become evident from surveys that the poorest 25% people in developing countries consume diets with calorie and protein contents that are only 3/4 of the country's average and fall far below calculated requirements. Dr. B. Sen, the former Director-General of the Food and Agriculture Organization, said in this respect: "The fact that 1,000-1,500 million people in the developing countries are either hungry or malnourished and that their numbers are likely to grow with the accelerating growth of population unless there are adequate increases in food supplies, gives us some idea of the major task before developing countries."

The magnitude of this task has been clearly described by Dr. M. Swaminathan in the following summary of his monograph "Nutrition and the World Food Problem":

> "Hunger, poverty, and stagnation form a vicious circle. More than half of the world's population is undernourished or malnourished. The situation is being aggravated by rapid population growth. The food production in the less-developed countries will have to be increased by about 50% by 1975, if the population is to be fed on a reasonably good diet. If the population is allowed to increase unchecked, the world's total food supplies will have to be trebled and the total food supplies for the less developed countries will have to be quadrupled by 2000 to provide a reasonable adequate level of nutrition. By the application of modern techniques of agriculture, animal husbandry, fishing, food science and technology, and by rapid industrialization, the less-developed countries may be able to double their present food production and national income by 2000. If population growth is not controlled, the food situation is likely to become very critical in 2000 despite the best efforts to increase food production."

If we consider now the situation in Indonesia, the nutritional status of its population does not differ much from the overall-picture, which has been described earlier for the developing countries. The word "hunger edema" is not a strange word anymore in the Indonesian vocabulary. In the hospitals, especially those in Java, "kwashiorkor" and "xerophthalmia" are diseases frequently to be observed. In the Children's Hospital of the Gadjah Mada University in Jogjakarta it has been reported that in 1961 18% of the admitted children below one year and 40% above one year were suffering from malnutrition.

On the basis of nutrition surveys, carried out between 1950 and 1966, Dradjat Prawiranegara came to the conclusion that calorie deficiency was prevalent in some areas in Indonesia and among certain groups of the population, that protein and vitamin deficiency occured frequently among preschool children, and that endemic goiter was on the increase.

With regard to the food supply, for the greater part of the Indonesian population rice is the staple food, although there are places where this is corn or corn mixed with rice, or sago or manioc. It has been evident during many years that Indonesia was not able to produce enough rice to meet the needs of its people. For this reason, rice has been imported in the following amounts: 1958 - 707,200 tons; 1959 - 607,900 tons; 1960 - 966,500 tons; 1961 - 683,600 tons; 1962 - 536,200 tons,

It has become painfully evident, especially during the months near the end of 1967, that rice was not only important as the main staple food, but it also played a significant role as the price leader of the Indonesian economy. Due to the long draught during the second half of 1967, the rice harvest in the dry season fell far below the estimated targets. As the price of rice was tied to the price index, the shortage in the supply of rice has caused a substantial increase in the price of many other commodities.

In relation to the consumption of protein, the daily intake of protein is below standard, and this protein is in large part of vegetable origin. That a large part of the Indonesian people and many of the children are not able to consume the amount and quality of protein as required, should be of great concern to all of us. If protein-calorie malnutrition affects many children and especially those in their early years, it might determine the physical and intellectual qualities of a large part of the future generation.

In connection with the deliberations on the nutritional and food situation in Indonesia, something should be said also concerning the population situation. Indonesia had an estimated population of about 110 million in 1966, while the estimates of the annual population growth rate vary between 2.3 and 2.8%. This growth rate, which implies that the population will double within the next 25 to 30 years, has a great and grave impact on the food situation now and in the future.

A special aspect which should be mentioned with regard to the population, is the uneven distribution of the people within the boundaries of Indonesia. Java and Madura, covering 7% of the whole area of Indonesia, are inhabited by 65% of the

population. The high population density in Java and Madura is creating serious problems, which not only affect the matter of food, but other matters as well. While Java is one of the most densely populated agricultural areas in the world, we have also within Indonesia areas with low to very low population density.

Your Excellencies,
Ladies and Gentlemen:

I have given you a rather gloomy picture on the present situation with regard to food and other closely related matters in Indonesia. In viewing the days ahead, there is, however, reason to believe that Indonesia has the potentialities to feed its population adequately.

Although in Java there is no excess of arable land anymore to extend the area for food-production, there is still the possibility to increase the yield of agricultural products per unit of the available land. In rice production the average yield per hectare has increased from about 20 quintals to about 28 quintals dry stalk padi during the last 16 years, but with improved methods and tools of agricultural farming and the systematic introduction of socio-economic measures for the benefit of the farmers, it should be possible to obtain much higher yields in the near future.

With regard to the other islands outside Java, only a small part is now under cultivation. Although the soil in general is not as fertile as in Java, there are still millions of hectares of land available which, after the necessary exploration, could be utilized for agricultural farming.

Serious consideration needs to be given to the lack of protein in the diet of the Indonesian people. Even without taking into account the possibility of increasing the protein supply from unusual sources, there are still great potentialities in increasing the production of protein-rich food from conventional sources. Indonesia is a nation of islands, surrounded by the sea. It is therefore obvious to think, that the products of the sea could provide, to a large extent, the protein needs of the people. Hasan Saanin has stated i this respect, and I quote,

> "In regard to Indonesian seas it can, for example, be mentioned that the present yield--derived only from onshore and inshore waters--amounts only to 17% of the potential as estimated by scientists on the basis of results of surveys on marine biology, ichthyology, and on the primary productivity

of the seas. So from the seas only, three million tons of fish could be yielded without endangering the fish stocks, provided that the intensity of exploitation of the respective water or sea areas is in conformity with their potential capacity."

However, at present we should fully realize that what has been said about the increase of food production in order to have enough food supply to satisfy the nutritional requirements of the Indonesian population, are still possibilities and not yet realities. There is still a long and hard way to go to reach this goal. Careful planning based on reliable data is indispensable, dedication and know-how are necessary prerequisites for a successful implementation of these plans, and the necessary funds must be found for their financing. In this whole process research, education and extension have to play a significant role.

Efforts to increase food production would become a battle which never could be won, if excessive population growth, which is a major factor in creating the food crisis in most developing countries, could not be curbed. With regard to Indonesia it has already been mentioned that the annual population growth rate is estimated to be between 2.3% and 2.8%, which means that the population will double about every 25-30 years, if conditions remain unchanged. This also means that, just to maintain the present nutritional status of the people, the food supply has to be increased about 100% every 25-30 years. Looking at these figures, it becomes evident that efforts to control the population growth should be a part of the program to provide enough food for the people.

To do something to control the population growth, even to speak about it, has been for many years taboo in Indonesia. Efforts to introduce family planning met with little success in the previous years. It was, therefore, encouraging that the present regime has taken a different attitude towards family planning. In his Address before Parliament on 16 August 1967, H. E. the President of the Republic of Indonesia stated, and I quote,

"Looking into the future, we should courageously face the fact that the increase of population is not in balance with the increase of available food supplies, whether produced at home or imported. We should therefore pay serious attention to efforts in birth control through methods of planned parenthood, which are justified by the ethics of religion and the ethics of

Pantjasila. This is a principal problem which will affect the fate of our future generation. Therefore, its implementation should be studied and planned very carefully."

It is the intention that the national program for family planning, whereby much stress will be laid on the densely populated areas in Indonesia, will start in 1969. During the first stage, family planning activities will cover the cities; gradually these activities will then be extended to the rural areas. In the forthcoming Five Year Development Plan provisions will hopefully be made to ensure a successful implementation of the program.

In evaluating the situation on family planning at present, I would like to state, as my personal opinion, that what has been achieved in less than two years, has been beyond the wildest hopes of those who have been working in this field. But we should be aware that old beliefs and old convictions do not die easily, and for many groups family planning in itself and family planning in relation to the control of population growth is still a delicate matter. So family planning programs have to be conducted with the utmost care. On the other hand we should also be aware that time is running out. From experiences in other countries we know that it takes time before national family planning programs have a real impact on the population growth; so it is therefore quite important to start a good program as early as possible.

Your Excellencies,
Ladies and Gentlemen:

Coming back now to the NAS-LIPI Workshop on Food, it is proper that for the benefit especially for our foreign friends, many of whom have come from the other end of the globe to participate in the workshop in order to help us, that we from the Indonesian side should clearly define what we expect to come out of this workshop. A wealth of knowledge and experience on many aspects of the food problems of the world--including the developing countries--and which among others has found its expression in the Report of the President's Science Advisory Committee of the United States on the World Food Problem, will be brought in by the foreign participants. It is expected that the Indonesian participants will bring in with them the knowledge and experience, which are at their disposal concerning the conditions in Indonesia with regard to the different aspects of the food problem. Plans concerning the increase of food production, the processing, marketing and utilization of

food should be freely discussed, so that an objective and scientifically based evaluation of these plans could be achieved. The lack of knowledge about factors, which might adversely influence the planning and the implementation of programs in the field of food, should be clearly brought out, so that areas of needed research could be determined. Education to train the necessary manpower at all levels and extension activities to bring modern technology closer to the farmer and fisherman and to help them in their endeavor to produce more food, should be carefully scrutinized.

It is hoped that from this workshop will come practical recommendations on many aspects of the food problems in Indonesia, which could serve our Government in providing guidance in the formulation of a national food policy and which then could have its direct implementation in the forthcoming Five Year Plan. However, we should be aware that Indonesia will not be able to solve all its problems concerning food within the period of five years, so that a more long range view on these problems will be highly appreciated. Last but not least, the workshop should take a careful look at the areas of research which it deems necessary for the execution of a successful food program--whether for the solution of immediate problems or as a prerequisite for careful planning and its implementation. In this regard the existing research potentials should be objectively assessed and suggestions should be made to ensure, that scientists working in Indonesia, would be able to meet the challenging task to build a sound foundation for programs to satisfy the need for adequate food--quantitatively and qualitatively--for the Indonesian people.

Your Excellencies,
Ladies and Gentlemen:

At the conclusion of this Address it is my pleasant duty to express our heartfelt thanks to all who in one way or another have helped us in the preparation of this workshop. In this connection we would like to thank especially the Minister of Agriculture, the Minister of Mining, the Minister of Estates, the Chairman of BAPPENAS, whose financial support has lightened the burden of LIPI in organizing this workshop, the Ford Foundation for its gift of needed reproduction equipment, and the Governor of Bank Indonesia for the use of this building. We also wish to express our gratitude to our counterpart in this venture, for its willingness to have the first NAS-LIPI Workshop on Indonesian soil.

WORLD FOOD PROBLEMS

by

Dr. Frederick Seitz, President,
National Academy of Sciences

It is a very great privilege for both me and my colleagues from many countries, including the United States, and such agencies as the UNICEF, WHO, UNESCO, FAO, and the Asian Development Bank to join with LIPI in a discussion of the vital problems related to food and food production. Moreover, it is a privileged honor for our National Academy of Sciences to be given the opportunity to exchange views and information on a topic that is so important to the entire world, not only for our time but for the indefinitely foreseeable future. We know that we shall learn much from you through your own experience. It is our hope that we may in turn contribute at least a fraction as much as we learn through our own experience.

As everyone knows today, food is far more than a routine necessity. It is more than the staff of life of the individual. It is, in fact, the staff of national and indeed international well-being. No government, regardless of how excellent it may be in other respects, can hope to deal adequately with the problems of its peoples if they are denied access to the essential minimum of required food. Thus, all nations, regardless of how well-off they may be at the moment, owe a responsibility to all others to work cooperatively with them in providing for adequate food if they value the political stability which is essential for world peace. It is a matter of simple self-interest that they cooperate with their colleagues in other lands.

As scientists, both pure and applied, we can take great pride in the fact that the methods of science are highly relevant to the problem of food supply. As the experience in selective breeding which has made possible both the Mexican wheats and the new high-yield (miracle) rices demonstrates, the methods of science can, within a generation or even less, have an enormous effect on aspects of the outlook in relation to food. At a minimum one can buy valuable time for the industrialization of a developing nation; at a maximum one can hope to find relatively permanent long-range solutions to food shortages.

The fact that science can play such a significant role, when properly applied, indicates in turn that all nations should in their own way form a partnership with science, supporting it within their means with the expectation that it

will in turn yield highly important national dividends. I should emphasize, of course, that the problem of selecting appropriate areas of scientific exploration suitable to a given country is not a trivial one. It involves, in fact, the application of great wisdom on the part of both internal and external advisors who are called upon to help.

The problem of increasing food production is not merely one of selecting new strains of grains or livestock, or improved fishing. For whatever road one may follow, one soon finds that agronomy becomes paralyzed unless it is backed by the fruits of industry. Thus, the parallel establishment of a strong industrial and a strong agronomical base is crucial to economic development. In the long run, any nation which wishes to increase its food supply on a continuing basis must expect to mobilize its entire economic effort and to develop subsidiary industry, not least the fertilizer industry, in ways which will react upon agronomy.

In a complementary way, any program of industrialization must recognize that, at least in the primary stages of industrialization, industry must keep the problems of agriculture well in mind. Any five-year program for economic development must include agricultural development as a significant component.

Let me turn now to the workshop which is about to start. We must all recognize that this is a cooperative enterprise in which we join together in the earnest hope that we can reach a more complete understanding of your problems and, with good fortune, emerge with recommendations which can be put into effective use in the period immediately ahead. I should emphasize that our group from the United States, and I am sure from the other countries, will enter into the discussions in a spirit of humility. Many of us have not been to your beautiful and historic country previously. Moreover, those of us who have been close to agricultural problems have in many cases dealt with different soils, climates and latitudes of the world. This means that if we are to be of help to you, we must first and foremost be good listeners. We must learn from you as much as we possibly can of your problems and your successes. Any conclusions either general or specific that we ultimately reach will necessarily be the product of discussion and cooperation between the scientists of both countries. Moreover, the recommendations which are achieved, must in the last analysis be those which you in Indonesia believe are correct and proper because the problem of bringing about future advances will in the main rest in your hands.

I would at this point like to emphasize that the scientists who have accompanied me from the United States participate in this study as independent free individuals. Our Academy, although it does have a charter from our government dating from 1863, which was given to us by President Abraham Lincoln, is a completely private organization which expects those who serve on its committees and working groups to free their minds in their work from all constraints except those of science and the practical realities stemming from science. In brief, it is our hope to be able to help you, within the framework of our own technical competence, on your terms, not ours. Should it appear in the course of the discussions that there are ways in which our government might be of help to you in your work, we shall do our best as private individuals to help your country in formulating policies which will be of benefit to you.

In approaching the workshop, it is our recommendation that the working groups devote some of their attention to the report of the Panel on the World Food Supply of the Science Advisory Committee associated with the executive offices of the President of the United States, that is, the so-called President's Science Advisory Committee. The panel which produced the report devoted two years to its preparation and attempted to distill into it the combined wisdom of many individuals associated with the relevant components of society, that is, food scientists, agronomists, industrial planners, economists, and so on. Not least the report has drawn on the extensive wisdom of those in the private philanthropic foundations, which have supported programs in agriculture in many parts of the world.

It was a particular pleasure for us to learn that it was indeed the desire of the Indonesian scientists that we use this report as at least a crude blue print for the study which is about to start. We all recognize, however, that if our study here is successful, it will inevitably contribute new and more refined guidelines than can be found in any existing report. Thus, we should enter into our work in the spirit of creative scientists with engineering minds who are guided by the work of the past but who hope to contribute significant new ideas. If our work is done well, the report of our study group will be one of the guide posts to be used by other study groups throughout the world.

Although our Academy has cooperated with the scientists of many countries, this is the first time within my knowledge that we have been called upon to work in this highly specific way on a truly urgent national problem posed by another country. I

trust you will understand that we not only consider your request a very great honor but also feel a very great sense of responsibility toward the challenge you offer. If in the coming days the scientists of both our countries can see ways of helping Indonesia, all of us will be in a better position in the future to help other people in other lands in similar ways. Perhaps above all, however, those of us from the United States will feel adequately rewarded if in some way, though small, we are able to inspire our Indonesian colleagues to additional accomplishments in dealing with the problems of your land.

OPENING ADDRESS
by
Major General Sutjipto
Minister of Agriculture

Mr. President
Distinguished Participants of the Workshop
Ladies and Gentlemen

We are grateful for the opportunity of meeting in person this select group of food scientists who are assembled here to discuss and evaluate the various problems relating to food production in Indonesia, and who will give their recommendations to our Government.

This is a joyful event for us. Through this workshop the International Intelligentsia, who are very well up in matters of food production, will again furnish the proof that the food situation in the world is really facing a dark future, and that the slightest negligence will be fatal to the world at large. Its impact on the international political situation will also be felt in this part of South East Asia, particularly in Indonesia.

It was made known at the Fourteenth Conference of the United Nations Food and Agriculture Organization last November that at present there are no less than 300 million people starving in various parts of the world, and that in 1985 there will be a shortage of 250 million tons of grains. Such are the prospects if the trend in population growth and food production increase is left to take its own course.

Surely, you know this better than we do. The whole world is confronted with a problem that is hard to solve. In another report it is stated that the surplus of the world capital - if it is conventionally invested - will not be sufficient to keep pace with the high rate of population increase. In respect thereof we suggested to the international forum in Rome last year that this capital surplus be invested in countries with the fastest and highest rate of production. The system of allocations of funds to countries that need them most but are not in a position to improve the total supply and demand, should be put to an end.

It is apparent from the supply and demand of rice in South East Asia that the rice-exporting countries like Burma and Thailand are decreasing in capacity every year. The rice-importing countries like Malaysia, Indonesia, and the

Philippines are still striving to increase their production. The Vietnamese countries are still busy stabilizing their politics, leaving the food supply and demand in an uncertain position which greatly endangers the rice balance in South East Asia.

Continental China is a considerable potentional for food production, but since there is as yet no balance between her politics and agro-economy she cannot steadily contribute her production to the neighbour countries.

Taiwan, Korea, and Japan are a separate group in the matter of food; they have attained stability although they still have to import millions of tons of wheat from America and Canada, especially Japan. In the western part of South East Asia, in India, food shortage is still prevailing despite the imports which amount to nearly ten million annually.

In view of the food climate, especially the rice situation as we have just sketched, which shows an alarming trend in prices in the world market, Indonesia has decided to make every possible effort to produce for herself the required quantum of rice within not too long a period of time, and if possible to meet also the demands of the neighbouring countries which are not in a position to increase their production.

RICE PRODUCTION IN INDONESIA

In Indonesia intensification of rice productivity in the rice-producing areas, i.e. in well irrigated regions, has been carried out for several years.

Guided intensification accelerates the maturity of the wet ricefield farmers to grasp the new cultivation techniques and to utilize the modern farm supplies like fertilizers, pesticides, and improved seed. This is known as BIMAS, an abbreviation of "bimbinagan massal" which literally means "mass guidance". In the rainy season of 1967-1968 alone, i.e. from November 1967 until April 1968, the intensification program covered more than one million hectares of which 450,000 hectares were put under the BIMAS scheme.

In the dry season starting this month, which usually brings in 20 percent of the total production, an area of 400,000 hectares are to be cultivated through BIMAS with domestic varieties, and 21,000 hectares with the IRRI varieties IR-5 and IR-8, known here as PB-5 and PB-8. The non-BIMAS fields will cover 200,000 hectares. The intensificatior

area will be further expanded, and with the growing popularity of PB-5 and PB-8 more and more seed of the "miracle rice" will be used.

In the presence of this forum we wish to extend our appreciation to the International Rice Research Institute at Los Banos, Philippines, for their successful crossings which have given us the miraculous rice varieties.

It would also not be exaggerating if, on this occasion, we extend our thanks to the Indonesian farmers who have given such a ready response to our seed campaign.

We are also much obliged to the countries and international organizations and banks for their assistance in making the rice production program a successful operation.

At the beginning of this year foreign assistance has accumulated to such an extent that we could barely handle it properly. We have asked the assistance of an FAO expert to make an analytical study of the grants received to prevent overlapping and unnecessary mistakes in their application.

We are especially grateful to the Asian Development Bank for the analyses on the major problems and the recommendations to overcome them. The International Bank for Reconstruction and Development - International Development Association has been very helpful in providing funds for the rehabilitation of the irrigation system which, when finished, will enable an additional double cropping in the dry season.

Of the 3 million hectares of irrigated fields in Java only one million hectares are suitable for double cropping. If the entire 3 million hectares can be rehabilitated and thus made suitable for double cropping, Java alone will have a harvested area of 6 million hectares. Outside of Java the harvested area is one million hectares so that the total harvested area is 7 million hectares. Rehabilitation to this extent will take two five-year plans.

When half of the harvested area can be planted with PB-5 and PB-8 with an average production of 4 tons per hectare, and the other half with domestic varieties with an average production of 2½ tons per hectare, the domestic production will be

3,500,000 x 4 tons	= 14,000,000	tons
3,500,000 x 2½ tons	= 8,750,000	tons
	22,750,000	tons
Remaining 2 million hectares of upland and rain-fed fields	2,500,000	tons
Total	25,250,000	tons

If Indonesia has a population of 148 million in 1978, the annual supply per capita will be 136½ kilograms, compared to the 86 kilograms per capita per year in 1967.

EXPANSION OF THE RICE ACREAGE

Many improvements should be attempted to increase the rice productivity. The population growth will not cease. Acreage expansion outside Java is therefore intensively carried out. Inventory of fertile soils and pre-investment surveys are done in Sumatra, Kalimantan, Sulawesi and the Moluccas with the assistance of survey teams sent by the FAO/UNDP, the Government of the Netherlands, and the Government of the Federal Republic of West Germany. We are very grateful for this assistance. This inventory prepares the way for a steady transmigration from densely populated regions like Java, Bali, and Lombok. The transmigrants will not meet with failure in the new agriculture regions. Transposition of poverty from Java to the outer islands will be prevented through preceding surveys.

PRODUCTION OF MAIZE AND TUBER CROPS

Although rice production and the increase of rice productivity are most important in the agricultural program on account of their economical, social and political function, the production of the other food crops should not be overlooked. Besides rice, nearly the whole production of maize, tubers, sago, and pulses are consumed.

If the rice productivity must be increased with 5½ percent annually or 3 percent above the rate of population growth, the production of maize, tubers and the others must be sped up with at least 2½ percent, equalizing the increase rate of the population. If the maize and tuber production remains stationary, there will be a per capita decrease every year, and the production increase of rice will lose its significance as the total supply of carbohydrates will not be sufficient to meet the needs.

When the rice production meets the demand there will be a surplus of maize, prices will go down, and export will expand, as is the case in Thailand where the rice supply per capita is no less than 200 kilograms, rendering every production of maize or cassava a surplus for consumption and turning these crops into export commodities.

PRODUCTION OF PROTEIN

With regard to protein, there is at present a surplus of cows every year; because the national income and purchasing power of the people are too low to procure and consume more meat or other animal protein foods. For these reasons our present policy is to increase production for export purposes, and when the infrastructure has improved, also for consumption in those parts of the country where purchasing power is higher but cows or other cattle are scarce.

Although poultry farming is generally well known in Indonesia, enterprises set up on economic basis are sporadic, and mainly located in the vicinity of the larger towns. The production of eggs and poultry meat can be increased up to 40 percent. In order to improve and develop poultry farming the Government has taken the following measures:

Extension service directed to intensification;

Provision of medicines and better breeds;

Better facilities for the procurement of poultry farming supplies;

Other measures of improvement to change the poultry industry from a by-industry into a main industry.

THE IMPORTANCE OF INCREASING FOOD PRODUCTION

In viewing the problem of food production, expecially rice, we should take into consideration the standard of living of the Indonesian people, the development of the infrastructure, and the capability of the Indonesian Government to provide the funds.

The problem is not only to increase production for the consumption needs of the people, but also for the procurement of funds directly or indirectly, for the economical development of the country. Agriculture in Indonesia is, therefore, the very basis of the national economy at present. This may not be the case in countries of our foreign guests attending this workshop, where - contrariwise - the farmers receive government subsidies in the form of absolute minimum prices..

In Indonesia the policy measures that must be taken in order to create a favorable climate for the producers, are therefore very limited. Indonesia does not have fund-producing industries for agricultural development, which is generally

in a weaker position compared to the industrial sector, such as is found in Japan, America and Europe. In these countries agriculture is a government supported industry, or it enjoys the patronage of other industrial and commercial sectors.

GENTLEMEN,

In view of the aforesaid arguments, we are very happy to have this Workshop on Food, the results of which will surely help us find better ways and means to solve the food problems and to overcome the difficulties.

We wish you every success with the workshop, and for the participants who are here for the first time we would like to add the hope that your stay may be an enjoyable one.

Thank you.

OPENING ADDRESS
by
Sultan Hamengku Buwono IX
Minister of State for
Economic, Financial, and Industrial Affairs

Mr. Chairman,
Distinguished friends

It is a great delight to me indeed to be with you this morning in the capital city of the Indonesian nation to discuss the currently most important problem of our country: Food for 115 million people.

When the chairman of LIPI, the Indonesian Institute of Sciences, reported to me that LIPI, with the support and cooperation of the National Academy of Sciences of the United States of America (NAS), was planning this workshop on food, I could not think of any subject more pressing for a solution than Indonesia's food situation of today and in the years to come. I therefore wish to express my high appreciation for the courageous initiative taken by LIPI and NAS to organize this very important workshop.

Like most of the less developed countries in the world, Indonesia has a population principally engaged in agriculture. More than 70% of the people on the more than 3,000 islands of this republic live in the rural areas and are dependent upon agriculture, particularly agricultural food production, for their living. And yet food is no abundant commodity in this part of the world.

The food situation looks more serious if looked at against the background of the people's preference to consume rice above any other kind of food. Being a prestige consumption, good rice has been sought after by more and more people, including those previously used to other staple food products like maize, cassava, and sago. The increasing significance of rice in the people's diet received a stronger impetus after political independence was proclaimed in 1945. In fact Indonesia's present food problem is essentially a rice problem. This fact, and the 2.6% annual rate of population growth, make rice the principal commodity the nation is concerned with.

The Minister of Agriculture has given you the annual figures of rice production, which fell short of rice consumption demand, and thus must be supplemented by rice imports. In spite of all the efforts we exerted last year to obtain a

full supply of rice to meet the people's needs, the country suffered a deficit of approximately 417,000 tons.

The dominant position of food, and of rice in particular, in the nation's economy can be estimated with the following figures. A survey of low and middle income households, carried out three years ago day-by-day for thirty consecutive days in each sample household, indicated that expenditures on food occupy between 65% to 70% of the family budget. Of this percentage, it is safe to assume that more than two-thirds is spent on rice.

With this fact in mind, it is not surprising to observe that any change in the price of rice exercises a considerable effect on both the family and national economy. It is often said that rice functions as a general price leader in the Indonesian economy. I tend to believe this is true and will remain so as long as income per capita is low and rice continues to be our principal staple food.

Last year's experience provides a bitter evidence of that fact. In its serious implementation of the economic rehabilitation and stabilization program, the nation was successful in pulling the 650% inflation rate of 1966 down to well below 50% at the end of September 1967. But then the unexpectedly long dry season not only made our rice harvest fail with 20%, but it also added two long months of rice scarcity in large parts of the country. Rice prices rose steeply, followed by prices of other food and non-food commodities, and finally created a new inflation of around 112% at the turn of the year.

Only the late rice harvests, starting in April of this year, were powerful enough to tone down the inflationary forces which already had a seriously disrupting effect on the nation's economic and political stability.

It is a widely known measure, practiced since more than a decade, that in order to counteract the decreasing effect of the monetary inflation, salaries and wages in Indonesia are partly paid in kind. For this purpose the government has to make an allocation of more than 50% of its routine budget, leaving much less than 50% for all other public routine expenditures.

All these facts justify the large attention the Indonesian government is paying to rice as the most essential part of the country's food and economic problem. The goals the government wants to attain in this respect are threefold: to increase rice production beyond the national consumption

demand; to improve the nation-wide distribution; and finally to secure a fair share of the production increase for the farmer's benefit.

The first objective is included in what we call the BIMAS or Agricultural Mass Education program, as splendidly explained by the Minister of Agriculture. The program envisages a higher yield per hectare by improved farming techniques, a better organized irrigation system, the use of selected high yielding rice seeds, the application of insecticides, and most important of all the application of fertilizers. With respect to this last item Indonesia has to import large quantities of manufactured fertilizers to supplement domestic production. A plan to expand our fertilizer plant in Palembang is now under way, and a number of internationally well-known foreign companies are applying for a license of foreign investment in new fertilizer plants. In this respect we are highly appreciative of the survey now being conducted by the International Finance Corporation on the possibilities of fertilizer production in Indonesia.

To improve the effectiveness of food distribution to all parts of the country a high priority is conferred to the rehabilitation of the economic infrastructure, especially in the transportation sector. An agreeable degree of success has been achieved, but to give you some idea of the enormous burden this task has put on the national budget I want to quote from the President's report to Parliament on July 10 last year:

> "For the past seven to ten years rehabilitation of the economic infrastructure was practically ignored so that it suffered a very great shortage. From the 80,000 kilometers of roads in Indonesia less than 20% are in good condition. The rest need repair. The cost of repair, however, amounts to approximately 1.5 million rupiahs per kilometer, so that it is easy to figure out how many billions the government would need to have the entire network of roads rehabilitated. Similarly, there is a backlog in the dredging of harbours, rivers, etc. For seven to ten years mud has been accumulating, thus preventing the normal use of our harbours. The cost of dredging also comes to billions of rupiahs."

To attain the third objective, to secure a fair share of the production increase for the farmers, one of the ways employed by the government is the reorganization of the rural credit system through farmers' or rural credit banks. In a period of capital scarcity and of interest rates as high as 20% per month in the private rural capital market, it is considered most urgent to help farmers with relatively soft credits.

Mr. Chairman,

These then, are in brief some of the principal economic factors related to Indonesia's food and especially rice problem. I have given a very sharp focus on rice, but this does not mean at all that other food commodities are being ignored. To reduce the pressure of rice on the national budget, serious thoughts and actions have been directed to the quantitative and qualitative increase of other food products, either as a supplement or a substitute to rice. Maize, cassava, sago, fish, seaweed, and the imported bulgur wheat and wheat flour are, with other food products, considered nutritious and more economical than rice to be included in the popular diet. But the great sensitivity of our people to their established diet and eating habits warns us to proceed only with considerable care to introduce changes in that field.

Mr. Chairman,

In conclusion allow me to mention the following contradiction. Our soil is fertile, our climate is most favorable for agriculture, and especially for food production, we have millions of hectares of arable land and many more millions of virgin lands, irrigation water sources are waiting for exploitation, our petanis or farmers are hard working people and have accumulated a wealth of experience in many centuries, and yet our people are poor, and food is available for many of us only in scant supply. Why is this so? What are the reasons?

This is, I think, the challenging problem this workshop is confronted with. I am confident, Mr. Chairman, that under your wise leadership and with the highly respected expertise of the participants, both foreign and Indonesian, this workshop will be successful in showing us the way to conquer the threat of hunger for the millions of our beloved country.

Thank you.

ADDRESS
by
General Soeharto
President of the Republic of Indonesia

Honorable Ministers
Your Excellencies, Ambassadors
Honorable Chairman of the Indonesian Institute of Sciences
Honorable President of the U.S. National Academy of Sciences
Honorable Scientists
Ladies and Gentlemen:

First of all, it is a great pleasure indeed to have this opportunity to express my appreciation, on behalf of the Government of Indonesia and myself personally, on the occasion of the holding of the "Workshop on Food," which is organized jointly by the Indonesian Institute of Sciences and the U.S. National Academy of Sciences.

I would like to welcome to Indonesia the foreign scientists who are participating in this workshop, and I hope that you will obtain a clearer picture of our country, the problems which we face, our present and future efforts to realize a sound economic development of our country.

I am following this workshop with great interest because of the practical reasons which are being faced by Indonesia itself, for wider reasons effecting the international cooperation in general and scientific cooperation in particular, especially for the benefits to be obtained.

On this occasion, I shall speak more to the participants from abroad as I assume the Indonesian participants are fully conversant with the problems which we face.

Ladies and Gentlemen, I think that the holding of this "Workshop on Food" is a timely event as I see it from the problems which we now face. As you know, this year of 1968 is the final year for the execution of the economic stabilization program for Indonesia, the results of which, we have intended to use as a strong basis for the establishing of the five-year national development plan, which is scheduled to commence during 1969.

A review of the economic situation of Indonesia shows that our national economic structure is mainly agrarian and oriented towards exports. The agricultural sector produces 52% of our

National income and 72% of the labor force is gainfully employed in this sector with the result that our foreign exchange resources come from the agricultural sector. For those reasons we have selected the agricultural section to form the pivotal point of our economic development.

In this respect, the agricultural field requires our great attention and the importance of production of food must be emphasized because the peoples' need for food has not yet been fulfilled by domestic production. Although our food production--especially rice--shows an increase, this increase in production lags behind the increase in Indonesia's population.

Facing this fact, we have to import rice from abroad in order to meet our total food requirements. This is indeed a situation which does not benefit the Nation whether we adopt a short- or long-term view.

To point out only a few salient facts, it is sufficient for us to realize this critical problem, that in Asia alone, at this time, according to estimates made by the FAO, there are 300 million people suffering from shortage of essential basic food. Another estimate also shows that, with the present indication the developing countries, especially in Asia, will experience a shortage of food amounting to 275 million tons of grain in the year 1985.

This is why, from the long-term as well as from the short-term point of view, we have the task to increase the production of food to the maximum by intensification as well as by expansion. Moreover, for this short-term program we are doing our utmost to increase the supply of other foods, such as wheat-flour and bulgar which have become accepted by the people, especially since the National production of rice is insufficient.

Indonesia, indeed, has the potential vast enough to multiply the production of rice, in particular, and agricultural products, in general. We have a very extensive area of land which is still untouched by human hands and which is very excellent for agriculture and we have an abundant supply of water. The greatest problem which we face is the limited supply of capital which can be utilized for this purpose of developing the land, together with the problem of shortage of the proper means, for expanding production, irrigation and transport, and the total application of the modern findings of science and technology.

In order that you may obtain a better picture of the situation, let us consider the following data: Indonesia has approximately 30 million hectares out of which ½ of that area comprises natural forest which can be cleared and the land used for rice cultivation.

This would mean that an additional 30 million hectares of land would become available for rice production in addition to the 7 million hectares presently under rice cultivation.

If we could clear and place into rice cultivation one million hectares of new land every year, this would mean that within a period of 30 years Indonesia could make intensive use of the land and with B.I.M.A.S. which is now in operation, could obtain a production of rice which would yield 100 million tons. Considering the average increase of the population at present, within that period of 30 years, Indonesia will have a population of 200 million; and with a consumption of 180 kg. per capita every year, it would mean that "only" 36 million tons are needed.

From the picture I have just outlined it is quite clear that Indonesia still hopes and is firmly convinced that, within the future, it will be able to produce sufficient rice for home consumption and for other people of the world.

Taking into consideration our present ability, the figures I previously mentioned may appear to be ambitious or exaggerated, but it is our earnest conviction that we shall reach our goal.

Mr. Chairman, ladies and gentlemen; participants of the workshop, I realize that not all aspects relating to food like the ones I have mentioned, are going to be discussed by the workshop. However, since the workshop is supposed to study the problems scientifically, the final results should certainly benefit us greatly.

From our experience during our 23 years of independence, we are aware of the importance of the application of science for our economic development.

Indeed, we have not had full opportunity to develop our economy seriously; there are many factors and problems which we face and have to solve, asking a great deal of our time and energy during the course of our independence.

The Indonesian people and my Government are doing their utmost to carry out the rehabilitation and economic stabilization

program and we are reaching the period of the implementation of our 5-year development program.

We realize our short-comings in application of science and technology for our economic development. I have to explain that the short-comings are not only caused by the shortage of experts available at present, but are mainly the result of the limited facilities available and other weaknesses associated with the application of science and technology to our development program. Accurate and reliable data are still required.

But, we are convinced, however, that with all our short-comings we must proceed to work with all our power. That is the reason why I am particularly interested in this workshop. I fully hope the workshop will come out with contributions to solve our food problem, and produce valuable findings for use in the application of our coming 5-year program.

My expectations are well-founded because of this gathering of learned scientists from many countries possessing expertise and long experience in the field of food production.

In closing, I would like to express my expectations for wider relations on a broader scope.

This gathering of scientists from many countries certainly brightens the future of our world. Here, cooperation between nations has materialized, not only been expressed. I am pleased because the cooperation among nations, in this case, has been aimed to solve socio-economic problems presently being encountered by one state--Indonesia.

This realistic cooperation will certainly assist in the realization of world peace and prosperity, also, if it is applied to other kinds of development which involves the needs of people of other developing nations.

To the participants coming from various countries, in particular to the members of the U.S. National Academy of Sciences, I once more would like to express my full appreciation for the assistance in sponsoring the workshop.

To all participants of the workshop I once more would like to wish all success and I hope that the workshop will be fruitful and the results will be of great benefit to Indonesia.

This is also the hope of the Indonesian Government.

Thank you.

KEYNOTE ADDRESSES

Pages 61 - 96

POPULATION GROWTH AND ITS CONTROL, FOOD REQUIREMENTS AND FOOD PRODUCTION

by
Dr. Kartono Gunawan, Director,
Institute of Demography

We are now living in the last third of the twentieth century, a period to be one of the most difficult man has yet experienced. If the most recent population projections materialize, the history of this period may be influenced more by the explosion in the number of people than by any other single factor.

The existing imbalance in the rates of growth of population and food production in Indonesia which we are facing now, coupled with an awareness of the prospective rates of growth of the population in the future have raised the question whether we can provide food for its increasing numbers. We are losing the battle to provide adequate food and the general outlook is indeed alarming if we do not take serious steps in population stabilization and accelerating the rate of increase of food production.

It is often asked whether the imbalance of population growth foreshadows a situation in which hunger will offset the gains that have been made both through the control of malaria or any other infectious disease and improved health services, and whether the long and rapid declines in death rates which have not, as yet, been followed by a comparable decline in birth rates, will give away to an increase in death rates because of irregular and insufficient nutrition. Thus the problem we are facing is a symptom of a much more basic problem, the uncontrolled rates of human increase washing away the benefits of man's effort in food production increase.

In response to this deluge of people, we are forced to shift our thinking, our planning, and our resource allocation from the earlier but ultimate objective of improving diets and general consumption to that of avoiding famine. Reductions in high birth rates, it is argued, are necessary if rates of population growth are to be reduced to a level at which growth in food production can again keep pace with them. It is clear, that an acceptable balance between food and population cannot be achieved by focussing our attention on either of those alone since a close relationship between changes in the numbers of people and their food requirements has often been observed. Population stabilization and the acceleration of the rate of

increase of food production in Indonesia or in any other developing country are like two blades of a pair of scissors. Neither can be effective without the other (11).

Though it is generally recognized that neither is to be viewed as an isolated goal, nor is either sufficient alone, it is apparent that there is no one pattern of development of these relationships which is applicable to all countries. What was the past and what will be the future pattern of development in Indonesia? Our past experience has been that population growth in Java and Madura has led to intensification of cultivation, and the improvement of cultivation has, in turn, made possible population increase.

The rapid population growth, coupled with a division of the land, however, leads to fragmentation of holdings and to underemployment of the people on the land. Migration to the Outer Islands, mainly to Sumatra, to search for new lands and urban centres has long been one of the means of alleviating this situation. Looking at the process of urban growth, which is presently taking place in Indonesia, it can generally be inferred that the rapid growth of urban centres cannot be considered as a consequence nor as a cause of rapid process of industrial development. The process of urbanization, which primarily consists of a rapid expansion of the number of inhabitants of major, and in particular capital, cities of the regions is only to a limited extent related to the industrialization process and for a substantial part caused by a too high degree of centralization of the public administration.

Improper planning and the inability to creat part-time farming, i.e., the combination of work in agriculture and in industry, that can be viewed as a transitional stage permitting the use of rural labors in industry without immediately incurring the expenditures for housing and social services required, as a result of migration from rural to urban areas, had an adverse effect and worsened further the imbalance. Rural-Urban migration and the consequent increase in the urban population leads to an increase in the demand for food which, in turn, leads to increased pressure to produce agricultural commodities for the market (6).

Incentives that can be effective in getting farmers to increase their production are primarily economic, such as remunerative price relationships, a reasonable share of the harvest and the availability of their necessities have been absent. The evidence in Indonesia where prices of farm products had been held down, shows that after controls were abandoned in 1964 and prices allowed to seek their own level, farm

of traders, will create a sufficient incentive to the farmers. At the same time if we succeed in increasing the income of the urban people, there would be a change in the consumption pattern away from staple food, and hence consumption other than staple food might become relatively more important. This might well exert a dampening effect on food demand in Indonesia in the future. How such an effect would apply and what course it follows to all food groups should be an area of furthur research.

The problem of increasing production is not a lack of basic materials or knowledge, since these can be duplicated from outside experiences, but the problem is rather to develop and apply the necessary technology where the components (determinant variables) essential to production can be combined effectively. Capital, education, social and economic organization, motivation and governmental policies all need to be taken into account along with the basic science and technologies of food production.

As to the factors which bring about the production increase, it has been pointed out that phenomena has been discussed unrelated to the problem of population control. Knowledge concerning the determinants of accelerating food production which will sustain the population food requirements is very limited, and the process itself is far more complex to be explained in term of simple relations among a limited number of variables. Nevertheless, it seems appropriate to relate the food production with the increasing growth of the population and the limited resources in particular opportunities for capital formation.

In exploring the policy implications of this large scale and continuous process of both the population growth and the requirements on food production, the proper course seems to be to start with spelling out a number of points of departure which are still uncertain to us at present. We will first discuss at length by looking at some of the factors which have bearing on the solution of the problem of imbalance of population and food.

Subsequently, we will discuss the objective of a policy to deliberately shape the future growth of purposeful pattern of population and its requirements for food which is desirable and tolerable for accelerating a rapid rate of social and economic development for the country as a whole. This implies an attitude of breaking away from established patterns if necessary and the courage to enter new and untried avenues all of which reflects the spirit of The New Order.

of traders, will create a sufficient incentive to the farmers. At the same time if we succeed in increasing the income of the urban people, there would be a change in the consumption pattern away from staple food, and hence consumption other than staple food might become relatively more important. This might well exert a dampening effect on food demand in Indonesia in the future. How such an effect would apply and what course it follows to all food groups should be an area of furthur research.

The problem of increasing production is not a lack of basic materials or knowledge, since these can be duplicated from outside experiences, but the problem is rather to develop and apply the necessary technology where the components (determinant variables) essential to production can be combined effectively. Capital, education, social and economic organization, motivation and governmental policies all need to be taken into account along with the basic science and technologies of food production.

As to the factors which bring about the production increase, it has been pointed out that phenomena has been discussed unrelated to the problem of population control. Knowledge concerning the determinants of accelerating food production which will sustain the population food requirements is very limited, and the process itself is far more complex to be explained in term of simple relations among a limited number of variables. Nevertheless, it seems appropriate to relate the food production with the increasing growth of the population and the limited resources in particular opportunities for capital formation.

In exploring the policy implications of this large scale and continuous process of both the population growth and the requirements on food production, the proper course seems to be to start with spelling out a number of points of departure which are still uncertain to us at present. We will first discuss at length by looking at some of the factors which have bearing on the solution of the problem of imbalance of population and food.

Subsequently, we will discuss the objective of a policy to deliberately shape the future growth of purposeful pattern of population and its requirements for food which is desirable and tolerable for accelerating a rapid rate of social and economic development for the country as a whole. This implies an attitude of breaking away from established patterns if necessary and the courage to enter new and untried avenues all of which reflects the spirit of The New Order.

Given that the desired objective is to shape both the population growth and the food production pattern which will contribute in an optimal way to an accelerated rate of development in not too long a time, it is implied that comparisons have to be made among a number of alternative patterns of future population growth.

These alternative patterns of future population growth are drawn on the basis of a factual knowledge concerning the prospects of expansion of existing population as well as an assessment of prospective course of growth of the components. With respect to food production one should focus and elaborate further the constraints of different types of limited resources with competitive uses, which have to be assessed in terms of other opportunities.

In addition, constraints of a different type have to be taken into account, such as the willingness to adopt new technology, the availability of irrigated fields, and suitability of arable lands.

It should be clear to everybody that the consequences of alternative courses of action implies a choice among sets of intended and unintended consequences, and that in particular special attention should be given to the unwanted consequences. Since not all consequences are reducible into a common denominator, a comparison has to be made between essentially non-comparable effects of actions.

Once a choice has been made as to the optimal pattern of population growth and food production which seems feasible, the means to achieve such a desirable pattern of growth of both has to be spelled out. The choice of means depends partly on the knowledge concerning the principal factors which determine the population growth and their relative effectiveness.

At present, however, knowledge concerning these relationships is still limited. Nevertheless, since urgent and fast deliberate steps have to be taken in order to influence the future population growth and since the requirements of food cannot wait until all the necessary data are assembled, decisions must be made on the basis of the limited available knowledge concerning some of the factors which have some bearing on them.

What is our present knowledge of the growth of the Indonesian population and what progress has been attained by the

agricultural sector to fulfill the requirements of the population for its food? Besides the limited knowledge, there seems to exist uncertainties of population estimates as well as food production. Before we proceed to the discussion of Population Growth and its Control, Food Requirements and Food Production, it seems appropriate to start with reassessing the available but limited and uncertain data, since this has a great significance to a study of the future relationship of population and food supply.

Uncertainty in Present Rates of Population Growth and its Components

Estimates of present growth rates for the whole country and by regions are of doubtful reliability. The growth between the intercensal period of 1931-1961 is uncertain, but if the most probable value of about 2.4% per year is accepted, the estimate of the present population is understated by 1.8%. Greatly divergent values may be obtained by the technique used in estimation.

If one accepts the rate implied by the 1961 census, the rate of population growth for the whole of Indonesia is 2.3%. The subsequent annual demographic surveys, however, show different results. The Central Bureau of Statistics has estimated a growth rate of 2.16% in 1962 and 2.8% in 1963. If we accept the results of the two successive population estimates obtained from the National Sample Surveys in 1963 and 1964, then the growth rate between the two periods did not exceed 2.8%.

The uncertain rates of population growth in Indonesia are mainly affected by the uncertain estimates in the course of fertility and mortality patterns reflected in the birth and death rates. The Central Bureau of Statistics has estimated from the 1961 Population Census data a crude birth rate of 44.5% and a crude death rate of 21.5%, leaving then a natural rate of increase of 23.0%. The same institute has estimated from the demographic survey data a crude birth rate of 43.0% in 1962 and 47.0% in 1963 and a crude death rate of 21.4 and 19.0%, respectively. The Institute of Demography has recently estimated a crude birth rate of 46.2% for Indonesia and 43.8% for Java and Madura. In addition, by taking the quinquennial period of 1958-1963 the estimated stable birth rate in Java and Madura is 42.5% and a death rate of not less than 19.0 per thousand.

The vital rates of Indonesia are much affected by the age distribution and the social-economic condition. So far, the latter is difficult to predict except for a certain period in which the 1962/1963 drought had a bad impact on the population of Central Java. The general health condition has improved since the malaria eradication campaign has been initiated in Java and Madura, and consequently it is legitimate to assume that the death rate has decreased in the first half of this decade.

It has been suggested in various publications that there could be some error in the enumeration of the 1961 Census. The U.N. has concluded that the 1961 age distribution is seriously distorted by large-scale misreporting (10). A possible explanation is that the age entered on the interview schedule was often an estimate made by the interviewer, rather than the transcription of a number supplied by the respondent. To determine where there is net overestimation of age and where net underestimation, it is necessary to find a method by which all the variables or components of growth would be consistent with each other.

By using the stable west model life table computed by the Office of Population Research, Princeton University, the U.N. further concludes that Indonesian age distribution follows the so-called African-Southern Asian pattern in which there is (a) a tendency to overestimate the age of young children, contributing to the typical excess proportion at ages 5-9, and the relative understatement at 0-4; (b) a tendency to overestimate the age of girls 10-14 who have not reached puberty, causing a net transfer downwards across age ten, and contributing to the peak at ages 5-9; and (c) a tendency toward overestimation like that affecting some of the 10-14 years olds, for females 15-19, 20-24, and 25-29, causing net upward transfers across ages 15, 20, 25, and 30, and causing deficits at 10-14 and 15-19, and excessive proportions at 25-29 and 30-34.

There arises some doubt as to whether the conclusions that emerge from the application of stable population are correct, even though the general approach remains useful in detecting age misreporting. Among the contemporary populations for which the method does not appear useful are those strongly affected by migration and those that have suffered a sequence of wars or other major disturbances. The Indonesian age distribution revealed by the 1961 census may belong to this category.

Recent studies by the Demographic Institute show that, by comparing the three independent population estimates, i.e., the 1961 census, the Labor Force Survey (LFS) in 1958 in Java and Madura, and the First Round of the National Sample Survey (NSS) in 1963, births and deaths during the fifties differed from the forties, partly due to a relatively better health and prosperous condition, but for a substantial part caused by delayed marriages and separation of married couples during the Japanese occupation and struggle for independence, and to harsh conditions, in many instances, resulting in the newborn not surviving.

This conclusion is confirmed if we compare the ratios of proportion of males and females 5-9 to 10-14 years old, i.e., c(5-9)/c(10-14), of which the census figure is higher than either of the two dates. The figures for males and females are as follows:

	1958 LFS	1961 Census	1963 Demo. Survey	National Sample Sur. 1963	1964
Males	1.5	1.8	1.5	1.8	1.5
Females	1.9	2.0	1.8	1.9	1.7

This is what one would expect if the break between the low reproduction of the war and revolution on one side and the peaceful period of the Republic occurred exactly in the period 1950-1951. For this would make the 5-9 group in 1959 somewhat short because it contains about two years of the low forties; it would make the 10-14 of 1963 somewhat high because it contains two or three years of the high 1950's. Hence the study of the three sets of data not only broadly confirms the census for younger age groups, but permits us to locate somewhat more precisely the moment of change.

However, if we compare the age-sex distribution, both for males and females, the distorted census distribution is confirmed by the Asian pattern for ages 20-29, especially the pronounced heaping in the 25-29 years group of females.

Another variable which might be important in generating the uncertain vital rates is the uncertainty in the size of migratory flow between rural-urban and inter-islands.

The 1958 Labor Force Survey gave the migration characteristics with a reference period of one year prior to the data of the survey and hence, infants below one year of age are excluded. It also shows that almost 99% of the rural and 97% of the urban population did not change their residence.

The second NSS assembled migration data by residence, with a reference period of five years. From Table 1 it is clear that 78% of the outmigrants from Java and Madura to the Outer Islands lived in the rural areas, and hence revealed the flow of farmers, against 22% in the urban. Given a contrary movement of about 50% of the total of outmigrants from the Outer Islands to urban areas in Java and Madura (excluding Djakarta) one would infer that those consist of traders and workers, and those who seek for higher education.

These figures are relatively small if we compare them with the total flow of migrants. Of a total of 3,383 thousands migrants in Java and Madura, only 6% originated from the Outer Islands, as against 25% of the total of 1,634 thousands migrants in those islands from Java and Madura.

The second NSS did not specify the outmigrants' origins by rural-urban residence and neither includes Djakarta nor the special households. Consequently the exclusion of these implies that the inflow of migrants from the Outer Islands to Java and Madura is underestimated. Given the net migration of 90 thousand per year to Djakarta, of which 20 thousand came from the Outer Islands, then one would estimate that during the early sixties Java and Madura lost only about 100 thousand migrants.

Table 1. Migration by Place of Residence
(in thousands)

Residence prior to the NSS (Outsending Area)	Present Place of Residence (Receiving Ar.)					
	Java - Madura			Outer Islands		
	Rural	Urban	Total	Rural	Urban	Total
Java-Madura	2419	777	3196	325	94	419
Outer Islands	94	93	187	1194	440	1634
TOTAL	2513	870	3383	1519	534	2053

Source: Central Bureau of Statistics, Second NSS, 1965.

Reassessment of the Demographic Characteristics and Population Projection for 1961-1991

In order to eliminate any underestimation of the rate of increase of the population for planning purposes in the future, it is necessary to reassess continuously the demographic characteristics of the population concerned based on more recent data. Some reassessment of the demographic characteristics will be outlined in brief.

The age structure revealed by the 1961 Census has been smoothed by taking into consideration both the probable under- and overestimation of the various age groups and the age distribution of the subsequent survey data. The result of this smoothing is given in Table 2A and is used as a base population for the estimation of future population up to 1991 with an interval of five years. The level of fertility has been reassessed by utilizing the result of the second NSS on age specific birth rates and assuming that the pattern of fertility will continue to persist in the future. The most probable and reliable index of fertility expressed in terms of total fertility is 6.2 which means that with the implied growth rate during the period before the 1961 population census of 2.3% will give a birth rate figure of 46.0 per thousand. The mortality level, however, is difficult to predict and based on world-wide experience it is assumed to decrease in the future by an increase in the expectancy of life at birth of one-half per year from the estimated level of 45 years for females and 42.5 years for males in the period before the 1961 population census.

International migration from and to Indonesia is considered to be negligible and assumed that the population is a closed one. However, if we are interested in the flow between Java and Madura on one hand and the Outer Islands on the other, then one should analyze further the impact of such migratory flow and the characteristics of the migrants. The Second NSS revealed that, though the flow is negligible, the characteristics of migrants of the in- and out-flow from Java and Madura to the Outer Islands are different and hence may have a certain impact on the growth of the population. The impact of such growth pattern of the population and its food requirements should be an area of future research activities.

Finally, some considerations must be given to the marriage pattern in the future since from the history of France it is obvious that a decline in birth can occur by postponement of marriages. The series of surveys done in the past show that there is a tendency to delay marriage which not necessarily affects the average family size, but would affect the birth rate in a particular period of projection. As has been stated earlier, reducing the average completed family size will take time depending upon the speed the population is motivated. The effect of a reduction in the completed family size will be reflected in a decrease of the total fertility, and hence any family planning program should have as target population ever-married women in the child bearing age.

Table 2A. Population Projections of Indonesia by Age and Sex, 1961-1991 (in millions)

Five years Age group	MALES 1961	1966	1971	1976	1981	1986	1991
0-4	8.9	9.5	10.7	13.1	15.8	18.8	22.5
5-9	7.7	8.2	8.9	10.0	12.4	15.1	18.1
10-14	4.3	7.5	8.0	8.7	9.8	12.2	14.9
15-19	3.9	4.2	7.0	7.9	8.5	9.7	12.0
20-24	3.4	3.8	4.1	7.1	7.7	8.3	9.5
25-29	3.8	3.3	3.6	3.9	6.9	7.5	8.1
30-34	3.6	3.6	3.2	3.5	3.8	6.7	7.3
35-39	3.2	3.4	3.4	3.0	3.4	3.7	6.5
40-44	2.5	3.0	3.2	3.3	2.9	3.2	3.6
45-49	2.0	2.3	2.8	3.0	3.1	2.8	3.1
50-54	1.5	1.8	2.1	2.6	2.8	2.9	2.6
55-59	1.1	1.4	1.6	1.9	2.4	2.6	2.7
60-64	.8	1.0	1.2	1.4	1.7	2.1	2.3
65-69	.5	.6	.8	.9	1.1	1.4	1.7
70-74	.3	.4	.4	.6	.7	.9	1.0
75-+	.4	.2	.2	.3	.5	.6	.7
Total	48.0	54.2	61.6	71.3	83.5	98.3	116.5
	FEMALES 1961	1966	1971	1976	1981	1986	1991
0-4	8.7	9.5	10.6	13.0	15.7	18.5	22.2
5-9	7.7	8.1	8.9	10.0	12.4	15.0	17.9
10-14	4.4	7.4	7.9	8.7	9.9	12.4	14.9
15-19	3.9	4.3	7.3	7.8	8.6	9.7	12.1
20-24	3.5	3.7	4.2	7.1	7.6	8.4	9.6
25-29	4.0	3.4	3.6	4.1	6.9	7.4	8.7
30-34	3.8	3.9	3.3	3.5	3.9	6.7	7.3
35-39	3.4	3.6	3.7	3.1	3.4	3.8	6.6
40-44	3.0	3.2	3.5	3.6	3.0	3.3	3.7
45-49	2.3	2.8	3.1	3.3	3.4	2.9	3.2
50-54	1.7	2.1	2.7	2.9	3.2	3.3	2.8
55-59	1.2	1.5	1.9	2.4	2.7	3.0	3.1
60-64	.8	1.0	1.4	1.7	2.2	2.5	2.7
65-69	.5	.6	.9	1.1	1.5	1.9	2.1
70-74	.3	.4	.5	.7	.9	1.2	1.5
75-+	.4	.3	.4	.4	.5	.8	.9
Total	49.4	56.0	63.7	73.6	85.9	100.8	119.0

Source: Institute of Demography, Faculty of Economics, University of Indonesia.

These reassessments enable us to prepare the population projection as shown in Table 2B, that might be useful for this workshop in calculating the food requirements in the future. This projection is of a "medium" one and some refinements are still being made in the Institute of Demography. The table shows an accelerated growth from 2.47% during 1961-1966 to 3.36% in 1986-1991 and a doubling time of twenty-five years, if the present fertility continues in the future. If such projection materializes, then we are facing one of the most difficult tasks we have yet experienced.

Table 2B. Population Projections of Indonesia by Age and Sex, 1961-1991 *
(in millions)

	MALES						
Age Group	1961	1966	1971	1976	1981	1986	1991
0-4	8.9	8.9	9.9	12.2	14.5	16.8	21.0
5-9	7.7	8.2	8.2	9.3	11.5	13.8	16.1
10-14	4.3	7.5	8.0	8.1	9.1	11.3	13.6
15-19	3.9	4.2	7.3	7.9	7.9	9.0	11.2
20-24	3.5	3.8	4.1	7.1	7.7	7.7	8.8
25-29	3.8	3.3	3.6	3.9	6.9	7.5	7.6
30-34	3.6	3.6	3.2	3.5	3.8	6.7	7.3
35-39	3.2	3.4	3.4	3.0	3.4	3.7	6.5
40-44	2.5	3.0	3.2	3.3	2.9	3.2	3.6
45-49	2.0	2.3	2.8	3.0	3.1	2.8	3.1
50-54	1.5	1.8	2.1	2.6	2.8	2.9	2.6
55-59	1.1	1.4	1.6	1.9	2.4	2.6	2.7
60-64	.8	1.0	1.2	1.4	1.7	2.1	2.3
65-69	.5	.6	.8	.9	1.1	1.4	1.7
70-74	.3	.4	.4	.6	.7	.8	1.0
75-+	.4	.2	.2	.3	.5	.6	.7
Total	48.0	53.5	60.2	69.1	80.0	92.9	109.9

* Based on the assumption that we can reduce the present birth rate of 4.6% to 4.3% by 1976, a declining death rate expressed in terms of increasing the life expectancy by one-half year per year.
This can be considered as a low projection.

Table 2B. Continued

Age Group	FEMALES 1961	1966	1971	1976	1981	1986	1991
0-4	8.7	8.8	9.8	12.3	14.4	16.6	20.8
5-9	7.6	8.1	8.3	9.3	11.7	13.8	16.1
10-14	4.4	7.4	7.9	8.1	9.2	11.6	13.7
15-19	3.9	4.3	7.3	7.8	8.0	9.0	11.4
20-24	3.5	3.7	4.2	7.1	7.6	7.8	8.9
25-29	4.0	3.4	3.6	4.1	6.9	7.4	7.7
30-34	3.8	3.9	3.2	3.5	3.9	6.7	7.3
35-39	3.4	3.6	3.7	3.1	3.4	3.8	6.6
40-44	3.0	3.2	3.5	3.6	3.0	3.3	3.8
45-49	2.3	2.8	3.1	3.3	3.4	2.9	3.2
50-54	1.7	2.1	2.6	2.9	3.2	3.3	2.8
55-59	1.2	1.5	1.9	2.4	2.7	3.0	3.1
60-64	.8	1.0	1.4	1.7	2.2	2.5	2.7
65-69	.5	.6	.9	1.2	1.5	1.9	2.2
70-74	.3	.4	.5	.7	.9	1.2	1.5
75-+	.4	.3	.4	.4	.5	.8	.9
Total	49.4	55.3	62.3	71.5	82.6	95.7	112.6

Source: Institute of Demography, Faculty of Economics, University of Indonesia.

Population Control and Food Requirements

Most demographers and students conducting contemporary efforts to modernize societies that are still in many ways pre-modern, believe that continued high fertility is an impediment if not a total barrier to economic and social development of any developing nation. The technological revolution that they adopted from development countries has had one critically important effect in those countries, i.e., a marked reduction in death rates, but has not, as yet, affected the birth rate. There are good reasons to believe that human fertility in Indonesia will decrease during the next few decades, but when and by how much cannot be predicted. Surveys of the attitudes of husbands and wives in East Java, Bali, West Java (Bekasi) show clearly the recognition of a desire to limit the family size. Many couples want no more children than they already have, and would like to know better ways of preventing further births.

However, this favorable attitude toward family planning is much more common among couples who already have their desired

numbers of children, averaging four to five children. Such a kind of attitude may neutralize any provision of family planning services to couples until the desired number of living children is secured. Given the situation we are facing now in Indonesia, what are the necessary preconditions and what speculations about whether the deliberate limitation of the number of children born will soon appear in Indonesia in which the majority of the people have not yet practiced? What impact does the adoption of controlled fertility have on reducing the birth rate, and does it consequently create a favorable condition for the social and economic development in the coming decades, will be the focus of our discussions.

From the history of developed countries we have seen that the control of fertility, after it became habitual among a small segment of married couples, spread through the whole population to an extent that affected the national birth rate.

Recently, the institution of controlled fertility has caused an evident decline in the birth rate in some countries in Asia, such as in Singapore, Hong Kong, Taiwan and South Korea. However, a closer look at history shows no self-evident single feature of modernization--defined in terms of urbanization, communication, education and patterns of employment--that can be identified as closely related to controlled fertility. From the experience of populations in which controlled fertility is now common, what inferences could be made about the future of such an adoption in Indonesia?

The first significant inference is that the principal change responsible for the development of controlled fertility has been a change in attitude or motivation rather than the invention of new techniques. Another aspect of changing climate appears in surveys taken in various places showing a majority preference for smaller families than the average actually reached, and an expressed desire to know feasible and safe methods of misconception. However, any method may become irrelevant if the preferable family size is still higher than in the developed countries when they started their development. In such a case, low infant and child mortality, and public awareness that mortality is low seems to be one of the necessary preconditions for an effective social policy in reducing the number of births needed to achieve a given family size, since high infant and child mortality are the underlying causes of reproductive rates (11). The momentum of the traditional social structure may cause large numbers of births to occur long after child mortality has actually fallen.

The final feature which indicated a probable rapid spread of controlled fertility is the recognition of the importance of reduced fertility on the part not only of demographers, but by many segments of world opinion, by the governments of developing countries, and within international agencies and others specializing in technical assistance. Consequently, a majority of countries have designed and begun to implement programs to introduce controlled fertility in populations where it is absent; some are officially endorsed by the government, and others are organized programs of the community itself. Organized programs should be designed with the knowledge that attitudes and motivations are important, and are taking advantage not only of new contraceptive technologies, but also of modern techniques of public education and persuasion. In a climate of this world approval, the Indonesian Government has also endorsed family planning for its densely populated regions, but insists that the program be organized by the community itself, since decisions and actions must be taken by individual couples acting in accordance with their preconceived interests. Though the role of the government will be limited to giving support and protection, its task is large and difficult, helping and directing the community to set up a high degree of a nation-wide organization, providing adequate financial and logistic support, great flexibility in meeting changing conditions, and continuing objective evaluation of results.

Bearing in mind the demographic characteristics of Indonesia outlined above, the operations of the features that make principal changes in the development of controlled fertility will reach the maximum effectiveness after 1991, at which time the crude birth rate will decrease by 25%. After that period the family planning program would expand at the same rate as the population to be served, i.e., the proportion of the population practicing family planning would remain constant. It is then clear that no probable reduction in the rate of population growth would be sufficient during the next 20 to 25 years to overcome food deficits; but, because economic growth and social development are made much more difficult by rapid population growth, it may be equally true that a reduction in the rate of population growth will be necessary to increase food production.

There are many problems involved in increasing the food production as the key to meet the food problems of the expanding population in the next 25 years. The first problem in computing the demand for food requirements (in terms of calories and protein needs) is the distribution of the population by age and sex and the average body size of males and females

at different ages. Also, it is important to know the future pattern of distribution of population by rural-urban areas since remarkable differences are found in the amount of food consumed at given levels of real income, suggesting that there may be a "demonstration effect" encouraging the consumption of food, causing urban families to consume more than the rural at the same level of real income (1,3, and 4). Secondly, is whether there are varieties of food which provide the main source of food energy, and whether or not food resources are equally distributed.

In the first case, where rice provides the main source of food energy in Indonesia, steps should be taken to motivate the people to consume other food grains. In the second case, where Java and Madura, especially Central Java and the urban areas are considered as deficit areas in rice, special attention must be given to mechanisms of food distribution within the country, i.e., between the surplus and the deficit areas.

The third problem in estimating future needs for food, should not only take into account the losses involved in processing but allowance should be made also for losses from the time of harvest through storage, transportation, marketing, home preparation and plate waste.

From the supply or production side, the achievement of a satisfactory balance between food and population will require dramatic increases in farm productivity. The transition from traditional to modern agriculture must be achieved within the next decade and a half, and consequently will require more change in human behavior in a much shorter time than has ever before been achieved. The government must make decisions in generating and accelerating the production, allocating more resources for opening new lands, expanding extension services, organizing the supply of farmers' necessary inputs, and improving irrigations. In addition, food price policies must be producer-oriented rather than consumer-oriented.

Farmers must be assured of a price for their products which will make the best use of fertilizer and modern inputs profitable. In order to provide the agricultural sector with massive injections of capital inputs and new technology to close the gap between consumption and production, the government must create a climate for foreign private investment far better than that which exists today, especially in the export sector, which will improve the export capacity of the country and in turn will increase the capacity to import the necessary inputs for meeting the food requirements.

Experiences in most Asian countries show the difficulties in attracting sufficient capital inflow for accelerating the rate of economic growth, and to a lesser extent the food production, in order to keep pace with the rate of population growth. Given this limitation they are forced to shift their thinking, their planning, and resource allocation for avoiding famine by seriously considering the costs-benefits of a national population control program in comparison with other alternatives. They also recognize from the past experience that less than one dollar invested in population control is worth a twenty dollar investment in economic growth, and that the expenditure of approximately one dollar on a national family planning program out of each one hundred dollar spent on development can double the per capita economic growth gained by the whole expenditure. Another aspect of the changing climate is the recognition that a more rapid reduction in birth rate will produce more rapid benefits per consumer and any delay in reducing this in order to wait for modernization may prevent its ever coming.

I shall end my address by making a prediction that will be verified or contradicted in the near future, in case Indonesians recognize the importance of reduced fertility and hence controlled fertility will be rapidly extended through organized programs and that the requirements for these are for a large part provided by the government. The prediction is that if we start our national family planning program next year, aiming at a more rapid reduction in birth rates through organized programs that will cover all married women within the childbearing age in the urban areas at the end of 1976, then in order to reduce the birth rate from 46 per thousand to 43 per thousand, or equivalent to a reduction of total births by 3.2 million in seven years, or 450 thousand per year, a full IUD program implies a new insertion of 2.3 million IUD per year. Alternatively, if we decide to have a cafeteria-system in choosing the contraceptives, the cost per participant for such a family planning program with a mixed pattern of contraceptives would be about one dollar per year, or fourteen million dollars per year if all urban married women in the childbearing age participate in this program. Any delay of such a program, both due to failure in organization and financial limitation, will increase the burden of the government in providing food and other basic necessities as much as ten times or $140 million by the end of 1976.

Table 3. Effect of a Reduction of Fertility by 10%

Period	P	P	B	b	d	r
	(in millions)			(per thousands)		
A. Total Fertility of 6.2						
1961-1966	110.2	-	23.4	45.22	20.52	24.70
1966-1971	125.3	117.5	25.7	43.74	18.04	25.70
1971-1976	144.9	134.8	31.0	46.05	17.02	29.03
1976-1981	169.3	156.6	36.7	46.90	15.72	31.18
1981-1986	199.1	183.6	42.8	46.63	14.24	32.39
1986-1991	235.5	216.5	50.4	46.60	12.98	33.62
B. Assuming a Total Fertility of 5.7						
1961-1966	108.9	102.9	21.8	42.3	20.3	22.0
1966-1971	122.5	115.6	23.8	41.5	17.5	24.0
1971-1976	140.6	131.4	28.8	43.8	16.3	27.5
1976-1981	162.5	151.2	33.7	44.7	15.6	29.1
1981-1986	190.6	175.1	38.4	43.9	14.1	29.8
1986-1991	222.4	204.8	47.2	46.1	13.2	32.9

Source: Institute of Demography, Faculty of Economics, University of Indonesia

Total fertility is calculated from the Age Specific Birth Rates obtained from the Second National Sample Surveys and the data on Children Ever Born from the Population Census, 1961. Calculation is based on Brass Methods of Estimation, Manuals on Methods of Estimating Population, No. IV, UNO, New York, 1967. The results of this estimation is as follows:

Age Group	Age Specific Birth Rates
15-19	.291
20-24	.316
25-29	.230
30-34	.190
35-39	.126
40-44	.057
45-49	.020

References

1. Brown, Lester R., "The World Food Population Problem" Proceedings, Conference on Alternative for Balancing Future World Food Production and Needs, Iowa State University, Center for Agricultural and Economic Adjustment, Ames, Iowa, 1966.

2. Central Bureau of Statistics (Indonesia), "Population Increase in Indonesia", 1962 and 1963, Djakarta.

3. Central Bureau of Statistics (Indonesia), "Result of the First National Sample Survey", 1964.

4. Clark, Colin, "The First Stages of Economic Growth", Proceedings, U.N. World Population Conference, Vol. IV, Belgrade 1965.

5. Coale, Ansley J., "The Voluntary Control of Human Fertility", Proceedings, Symposium on Population Problems, November 1966.

6. Krasovec, Stane I., "Role of Peasant-Workers In Economic Development Under Conditions of Population Pressure", Proceedings, U.N. World Population Conference, Vol. III, Belgrade, 1965.

7. Mosher, Arthur T. "Getting Agriculture Moving", Frederick A. Praeger, New York, 1966, p. 104.

8. Nitisastro, Widjojo, "National Policies Aimed at Influencing Internal Migration, Urbanization, and Distribution of Rural Population", Proceedings, ECAFE Asian Population Conference, New Delhi, 1963.

9. N. K. Sarkar, "The Influence of Population Trend in the Plans of Developing Countries", Proceedings, U.N. World Population Conference, Vol. III, Belgrade, 1965.

10. U.N.O.: Methods of Estimating Basic Demographic Measures From Incomplete Data, Manual IV, Population Studies No. 42, 1967.

11. U.S.A. Report of the President's Science Advisory Committee, The World Food Problem, Vol. I, U.S. Government Printing Office, Washington, D. C., 1967.

PROBLEMS OF FOOD SUPPLY IN INDONESIA

by
Professor Widjojo Nitisastro
Chairman, BAPPENAS

At present the Indonesian economy is in a state of transition which is of great significance for the period to come. In coping with the economic chaos inherited from the past the present government embarked upon a course to stabilize and rehabilitate the economy. The major cornerstones of the strategy of stabilization and rehabilitation are, among others, as follows: (1) first of all, to put order in our own house through fiscal and monetary measures; (2) to rely more on sound economic principles by providing greater freedom and more incentives; and, (3) to re-establish sound economic relations with the rest of the world. It goes without saying that the actual measures of implementation have been or are still very painful.

During the course of implementing the stabilization and rehabilitation program, it has become obvious that the need for knowledge of the influences of change in the supply and demand for food in the Indonesian economy is indeed very acute. With huge imports of rice, slow progress in the efforts to increase food production, and rising food prices, administrators, policy makers, national planners, politicians, scholars, and members of the general public have taken an increased interest in the food problem of the country. This workshop indeed is one reflection of that interest.

There is general agreement that increased food supply through domestic production is a prerequisite for long-range economic growth. Unless there is a substantial increase in the food supply, there will be a continued drain on foreign exchange to purchase food rather than other more productive imports, and a continued threat of inflation lead by upward pressures from the price of food grains. Indeed, it is accepted that major increases in food availability is to be the top priority in the Five Year Plan which is currently under preparation.

The broad food production strategy as presently envisaged consists of a number of elements: Foremost is the creation of an economic climate which will make it profitable for farmers to use increased quantities of modern inputs. Also, to make sure that these new inputs, such as fertilizers, pesticides, and improved seeds, will be available in the country at the farm level at the right place, right time, and right prices.

Within this longer-run framework, it is of the utmost importance to choose the short-run tactics. And it is our hope that this food workshop will not only concentrate on the long-run grand strategy, but also devote its attention to the short-run tactics to be implemented soon.

Within the short run, emphasis on physical inputs is placed on a number of items: improved seeds, particularly the new rice varieties, chemical fertilizers, pesticides, and irrigation water. The potentialities of the new varieties are so high that they give us more hope to achieve our objective of rapid increase in rice production in a shorter time than otherwise. However, there seem to be some doubts expressed as to how this introduction could be achieved on a widespread basis. How fast can the seed multiplication proceed without endangering their purity? In addition to the difficult process of distributing the new seeds, there are also the problems of assuring the presence of complementary inputs such as fertilizers and insecticides, of providing the extension support required to inform farmers of the necessary fertilizers and cultivation practices, and so on. Given both the uncertainty and the importance of the seed program, which will be the best course of action to ensure success in the multiplication and distribution processes and in the coordination of the various related activities?

Given the uncertainty of the seed program, we do realize that the major short-run impact on food production might well come via increased fertilizer use on older varieties. In other words, we are considering a fertilizer saturation for all portions of the rice economy. To achieve this rapid increase in fertilizer use, several tactical questions come up. First, what active role should be played by the private sector in fertilizer distribution? We would like to see an expansion of the private sector, but what are the means and actions to encourage this sector? What should be the scale of the fertilizer import program, when compared to other import needs, to the effective demand for fertilizer in the countryside, and to the problems of distribution?

With regard to insecticides, the problem seems to be rather different. There are indications that insecticide usage has been falling below BIMAS recommendations for some time. This may be caused by the difficulty for the farmer to see a 10 to 30 per cent increase in production through the use of insecticides than it is for him to recognize the 50 per cent or more increase in production made possible with the use of fertilizers. This problem might be more severe with the newer varieties due to greater foliage and a lack of inbred resistance. In addition, maintenance of sprayers seems to be a big problem.

As a result, sprayers break down faster than the normal life expectancy. Thus, to increase the absorption of production-saving insecticides, some new approaches may be necessary. Probably a shift to aerial spraying or granule type insecticides may be the logical direction for the pest control program. If such a shift is implemented, what then are the possible economic consequences?

We do realize the potential and need for a rehabilitated and expanded irrigation system in many parts of Indonesia, especially in Java. This is especially true when one considers that the new rice varieties appear to be much more demanding in terms of controlled water supplies. We do put a higher priority on rehabilitation than expansion. The only real question at issue is how fast this work can be completed. For this, we need a plan indicating the timing, the areas to be rehabilitated, and the concomitant dredging and erosion control necessary in the catchment areas to prevent immediate re-siltation with the consequent damage to the irrigation system. Another aspect to be studied is whether a system must be designed in which the farmer must pay for the regulated water supply to enable the local authorities to maintain the just-rehabilitated irrigated areas. On top of it, a unitary control of water management is probably a necessary condition for an efficient water supply and development. We do hope that this workshop can give us some specific suggestions with regard to the above problems and to the directions of the water resources development program.

Irrigation, fertilization, disease control, and the use of improved seed varieties have only a limited effect on the productivity of land if not accompanied by improved methods of cultivation. In the past, the majority of inventions and innovations which led to improvement in methods of cultivation came from the farmers themselves. Even now, self-discovery is still important in contributing to improvements in methods of cultivation. However, given the level of education of the farmers, the scale of operation, their limited resources, and their attitude toward risk, improvement of methods of cultivation will undoubtedly be a slow process. To increase the speed at which new techniques of production are developed, an effective agriculture research program must be conducted. Again, here, a plan for agricultural research is needed indicating the timing and research areas which should be explored, consistent with the national needs.

The emergence of commercial agriculture accompanied by an increasing use of off-farm inputs in general raise the working capital requirements of the farmers. The characteristics of food farming in Indonesia in terms of scale of operation and

marketable surplus, require the farmer to rely heavily on credit for his financial expenditures, as such credit provides the basis for increased production efficiency. To meet this demand, an efficient rural credit system is needed to provide credit timely with a convenient repayment program suited to the money flow from the cropping cycle, and based on a reasonably simple procedure. Within this long-run strategy what are the short-run tactics to meet the growing demand for credit in the rural areas?

Increased agricultural production requires incentives to farmers by decision makers, and a positive response of farmers to those incentives. In this regard, the Indonesian government has adopted the policy that price relationships should be such that the use of fertilizer and other modern inputs will be profitable to farmers. However, the problem we would like to suggest for deliberation is whether the price relationship, as adopted by the government, reflects the appropriate level of the terms of trade for agriculture, and what are the specific policy techniques that should be used to assure the profitability of the new inputs? In other words, there seems to be a conflict of interest in implementing this policy. Increasing the terms of trade for agriculture might stimulate agricultural production. However, such an increase, assuming that it were possible to achieve, would add to the production cost dilemma in the industrial and the estate sectors of the economy.

Another related aspect of farmers incentives is the uncertainty he is facing at the time he has to make the decision. The difference between the expected value of the increased output and the cost of the use of new inputs is crucial in the decision making of the farmer. To a large extent gain determines the farmers' incentive to use the new inputs. Considering the scale of operation of Indonesian food production, the cash expenditure for the purchase of new inputs is relatively large, especially when the farmers have to pay it in advance. It is true that under certain conditions the profit of such an investment will be large. But the great uncertainties which the farmer faces make the use of the new inputs a risky business. At the time he must make the decision he knows for certain only the price of the new inputs. Other factors such as weather, soil response, and price of output, which determine the payoff, are uncertain. Two steps which the government can take to reduce this risk has been suggested and indeed have major attractions. First, guaranteed prices of the output eliminate one major uncertainty with regard to the monetary payoffs. Second, subsidized input prices to reduce the cost of implementing the new inputs. Both raise the question of administrative feasibility. And put in the proper economic context,

both suggestions have wide repercussions on the country's development effort. The second suggestion has certainly less an impact (via cost) on the estate sector and hence on exports. This question is at present one of the important issues. We would appreciate it if the food workshop can give us some clue with regard to the direction of the solution.

The increased use of new inputs and the expected increases in output will require improved marketing facilities and procedures. In fact the more efficient the marketing institutions perform their function, the more feasible will be the program of increasing production through introduction of new inputs. Our food marketing mechanism is far from efficient. This is mainly due to poor conditions of the existing infrastructure, the lack of standardization and grading, poor storage and transportation facilities, and imperfections in the market. Under such conditions the marketing systems could not reflect changes in retail and wholesale prices at the retail level. The adverse consequences of this type of inefficiency is known and need not be elaborated. The question which we have in mind is what is the best marketing policy to be pursued by the government to ensure efficiency in this sector?

So far I have discussed only the supply side of the food problem. It is also of the utmost importance to look at the food problem from the point of view of demand. One of the causes of the problem of the food economy of Indonesia is the differences which exist between the production and consumption patterns. The policy implications of this problem are either to change the consumption pattern to conform to the production pattern, or vice versa.

There seem to be advantages to change the existing consumption pattern. First, it would lessen the overwhelming dependence of the population on rice. Second, it would reduce the consumer's resistance to alternative foods in times of rice shortages. Finally, if the substitutes are available in the world market at prices much lower than rice, it would conserve foreign exchange. An attempt to substitute rice by corn during the previous regime ended up in failure mainly because it did not take into account consumer preferences. Recently, however, there is some evidence which indicates that consumers would indeed accept wheat grains if and when there are sizable price differentials in their favor. Since wheat flour can be obtained at much lower prices than rice, there is a possibility of importing it in sufficient quantities in order to keep their prices low. We would appreciate the views of the participants of the workshop on this subject and also would invite information on this matter as has been experienced elsewhere.

SCIENCE AND NATIONAL INSTITUTIONS

by
Dr. Frederick Seitz, President,
National Academy of Sciences

The topic I have chosen for my address is related to the two working groups of our Workshop on Food with which I am associated, Groups VII and VIII, which are concerned with the role of institutions in solving problems. What I would like to do is to discuss briefly both the importance of institutions in a nation and the need of maintaining the flexibility of institutions. I will then give a brief description of the way in which the National Academy of Sciences has operated over its 105 years of history, not because it would necessarily serve as a model for Indonesia, but because I do know its history which may be of interest to you since the Academy has on the whole maintained its productivity and flexibility over the years.

The first and most important matter to achieve in planning and developing both programs and products for a nation is, of course, a successful and stable government. Many factors contribute to such stability. In part it is tied to tradition, but in the main, it is related to the success of the government in handling the problems of the people. One of the important roles which the government can play is that of institution building. Institutions and people cannot be separated. The success of any nation in handling its problems depends basically upon the capacities, skills and the organization of the people. On the other hand, a good pattern of institutions within which the people can work provides many advantages since it provides organizations through which individuals can channel their talents. Institutions can provide continuity during a transition from one administration to another. They can provide organizations, such as committees, which may be able to work on issues and problems over a long period of time even though the individuals on the committees change for one reason or another. As I said earlier, the pattern of institutions that a nation has is by no means unique. A given pattern may be good for one people, but unsuccessful for another. The institutions may be public or they may be private. A great deal depends on the history of the country and on the problems which it faces.

It is highly important whatever the pattern may be, however, that the institutions remain flexible because the problems which nations face differ from one era to another, from

one generation to another, often varying over a much shorter period. Perhaps five years is the unit of time on which one should measure the scale of change. If, for example, I examine the course of events in my own life, I think I can say there has been a major change in the issues confronting my own country about every five years. I believe that is not unusual for most nations in the world.

Before turning to the detailed history and programs of our Academy, I might say a few words about the overall structure of the society in the United States, since our Academy operates within that framework. Our country, or our society, is composed of an admixture of private and public enterprises. The most important of the public enterprises in a sense are those of the Federal Government, although I do not wish to underestimate the importance of work at the community or at the state level. On the whole, however, I will focus on the federal level in discussing public matters since our Academy is linked with our Federal Government.

Historically, the private institutions, both those which are intended for profit and those which are not; for example, the private philanthropic foundations, play an exceedingly important role. In fact, 50 odd years ago when I was born, the private institutions were on the whole far more important than the public in controlling and governing many facets of our society. It was true then that the attitude used by the United States, except perhaps during periods of war, was that the government governs best which governs least. The great depression, however, made it necessary to change this pattern. The private institutions proved incapable of dealing on their own with the economic problems of the depression. The government began to play a more and more important role, and today it is essentially the center about which most activities revolve.

I wish to emphasize, however, that both private industry for profit and the private not-for-profit organizations, such as The Rockefeller Foundation and The Ford Foundation, still play a very great role and undoubtedly will continue to do so for a long period of time. For one thing, somewhat over one-half of the taxes that are needed for the Federal Government are raised from the private industrial sector. That being the case, one cannot underestimate the importance of private activity for profit.

The Federal Government has three main divisions: the Executive Division under the President, which contains the agencies designed for various purposes, as is the case in most

governments; the legislative side; and finally the judicial side. I will have practically nothing to say about the judicial side, although of course, it is important for society as a whole.

Most of the executive agencies have scientific components. The agencies are, for example, the Department of Agriculture; Department of Defense; Department of Health, Education and Welfare; the Atomic Energy Commission; the National Science Foundation, which is very important for the academic scientists; the Space Agency; Commerce; Interior; Transportation; and recently a new one for Housing and Urban Development. Each has its own scientific officers and scientific program. They vary a great deal; for example, some of the agencies like Transportation are only beginning to develop their scientific structure. With the passage of time, however, the role of science, pure and applied, grows in all the federal agencies. The various agencies have individual advisory structures, consisting of both internal and external advisory groups. That is, they bring in citizens from private life to help in planning their programs. There is little uniformity among the agencies. Much depends upon the history of the agency and the problems that it faces. With the help of advisers, the agencies develop programs for various types of scientific work and evolve the corresponding budgets. The proposed programs and budgets are then transmitted to the President of the United States, who analyzes them with the help of staff. In our present governmental structure, there is an organization on the executive side known as the Bureau of the Budget, which attempts to monitor which programs are acceptable, keeping in mind to some extent past decisions. The Bureau of the Budget is flexible, however, and the decisions of the past do not necessarily govern the future.

The President has a number of advisers to help him analyze the budgets presented to him by the agencies. About ten years ago he added a Science Adviser to this structure, the present Science Adviser being Dr. Donald Hornig. His Deputy, Dr. Ivan L. Bennett, will be in Djakarta toward the end of the week. The Science Adviser to the President has, in turn, an advisory committee, the President's Science Advisory Committee, composed of 18 individuals who serve for three-year terms. In addition, the Science Adviser has a staff which is grouped in an organization designated the Office of Science and Technology. It is not large, being composed of only about 20 people. As the President of the National Academy of Sciences, I serve in an ex officio way on the President's Science Advisory Committee.

The President's various advisers examine the budgets and programs presented to him by the agencies, suggesting modification. The results are then transmitted to the legislative side, that is to the Congress which has two houses; namely, an upper house, or Senate, and a lower house, the House of Representatives. Both houses are organized into committees which examine portions of proposed programs. The committees in turn have many advisers, consisting both of full-time staff and outsiders who may be asked to give testimony. The Congressional committees ultimately decide which of the President's programs they wish to approve. Needless to say the vital question of money enters into decisions. The programs which are approved are passed back to the President for final acceptance or veto.

Let me describe the National Academy of Sciences and try to give you a picture in a general way of the role it plays in this machinery. Until the United States obtained its independence as a colonial nation in 1776 there were essentially no institutions devoted to science that could in any way be called central. There was one regional academy, if you wish to call it that. It was created in 1740 in the city of Philadelphia by Benjamin Franklin, one of our great colonial statesmen. He decided that the Commonwealth of Pennsylvania, which was then essentially a sea coast community, needed an institution to help it in the scientific planning of pure and applied work and he helped to create the American Philosophical Society which still flourishes. All the other institutions were created after 1776. As a matter of fact, there were no federal institutions devoted to pure or applied science for nearly 100 years. The institutions which were created were, in the main, regional. For example, New England, the northeastern region of the country, decided it needed an institution somewhat like Benjamin Franklin's Philosophical Society and in 1790, just a few years after our war of independence, created the American Academy of Sciences in Boston. It is still active and handles some national affairs but in the main is a regional academy dedicated to conducting scholarly work.

Between 1790 and the middle of the next century, essentially no federal institutions related to science were created for complex reasons. In the early part of our history, in which there was great expansion into the virgin lands of the West, there was too much interest in practical affairs to support the view that science could play an immediately important role in national life. We faced the typical problems of a frontier country. As time went on, another obstacle developed, namely, the growth of sectionalism. The United States, as the name suggests, was originally a federation of nearly autono-

mous states. Many of the states felt that the federation should be weaker than the individual states, and as a result, strongly resisted the creation of centralized institutions. If they were proposed, the legislative bodies would veto them. As you know, we ultimately had a very great civil war over the relative importance of State and Federal Governments. Indeed, our Academy came into being in part as a result of that struggle.

There is one very important exception to the statement that we had no federal institutions for science before 1850 which shows how important foreign aid can be in the evolution of the life of a country. In 1826, an excellent English chemist, James Smithson, who was a member of the Royal Society of London, and a close colleague of John Dalton, who proposed the atomic theory of the elements, decided for complex reasons that he would leave a fortune which he had inherited from his mother to the United States to found a federal institution for science that he hoped would be named after him. It was quite a great fortune by the standards of the day, being about half a million dollars and probably the equivalent of, let us say, 25 million dollars today. The money arrived as gold in barrels in 1836, but because of the difficulties encountered in establishing federal institutions, our Congress debated for over ten years whether or not it would use the money to create such an institution. Only in 1846 did it decide to create the institution now known as the Smithsonian. That organization now plays many roles but it is, so to speak, the father and the mother of many other federal scientific institutions which followed. The Congressmen were additionally wise, for they picked one of the most creative American scientists of the last century, Joseph Henry, to head it. He served in office for over 30 years using the resources and the opportunities almost as well as one could hope. Thus our first institution was essentially a gift from abroad, reluctantly received, but finally accepted.

Our second federal institution was the National Academy of Sciences which was created in 1863 in the middle of the great civil war of which I spoke. Three currents flowed together to create our Academy. First were the government officers who felt they needed a body that could advise them from time to time on matters of applied science. This was particuarly important in time of war. Second was the Congress, which recognized it had been slow in creating institutions. In particular, Senator Wilson of Massachusetts took considerable initiative in working with others to frame a charter for the Academy. Finally, there were the scientists working in Washington during the war.

The three groups joined in deciding to create a private organization with a federal charter which would permit it to work in partnership with the government. The charter, which is very simple, states that the Academy should be available whenever called upon to give advice to the government on matters of pure and applied science. The framers placed the additional restriction on the Academy that those who gave their services should not be paid for their work. One could pay incidental expenses, such as travel and staff salaries, but those who serve as advisers under the auspices of the Academy, as is true of the group assembled here today, are not paid for their services, only for their travel and living costs. One might debate whether the restriction was wise, but I believe it has had an important effect over the history of the Academy since it brought to our service those who wish to work in the public interest out of a sense of idealism and not for personal wealth.

Originally the Academy had 50 members, who, it was expected, would be the principal advisers. They were permitted, however, to decide how large the membership should grow in the future. Today, we elect 50 members per year and ten foreign associates. The overall body has grown from 50 to 800. If the number elected per year is maintained at 50, the size will eventually grow to about 1500, depending upon the effectiveness of modern medicine, since members serve for life.

Until World War I, the elected membership, which was about 200 in 1914, served as adviser to the government on many problems. In that 50-year period the world moved somewhat more leisurely than it is now. The problems came in at the rate of perhaps one or two a year so that the pattern was fairly adequate.

In the meantime, however, the United States became a heavily industrialized nation. As a result, the problems which arose became much more sophisticated. Moreover, the body of available scientists, physicians, engineers, and others who could give advice grew. By the time of World War I, a wise group of leaders decided that the old pattern, which depended entirely upon the services of the elected members, was out of date, and that one should broaden the base of advisers. As a result they created in 1915 a new body within the structure of the Academy, a body which grew to be the main advisory structure, namely, the National Research Council. I wish to emphasize that it is part of the Academy, and works under the same guiding rules; however, many individuals who are not Academy members serve in it.

The National Research Council was so effective in handling the problems of World War I that the government asked the Academy to continue it permanently. Today about 6,000 scientists, engineers, physicians, and others serve on some 400 advisory committees which are part of the National Research Council. The group here today is in a very real sense a part of this large body.

About 800 full-time staff members serve the 400 committees; about one-third of the staff are professionals. I would like to emphasize that about 80% of the work is a result of individual requests from the Federal Government. In the course of the year we examine something in the order of 500 individual proposals for study. The Federal Government pays for the studies on a project basis, so that I must sign many contracts.

The other 20% of the requests for study originates either in regional organizations or in private organizations such as The Rockefeller or The Ford Foundation, or in not-for-profit federations or industrial groups.

The studies range over an exceedingly broad field. There are, for example, many in medicine. We may on the one hand make a study of the preservation of blood plasma or as happened recently, may be asked to make a study of the effectiveness of all drugs licensed between 1938 and 1962. In 1962 the pattern of licensing drugs was changed because of the birth defects produced by thalidomide. The government needed a body to study the drugs licensed earlier under the type of shielded circumstances we can provide. I might add that our Academy operates the clinic in Japan that studies the individuals exposed to the radiation of the atomic bombs in 1945. Some 20,000 Japanese citizens are given clinical study each year in that clinic. A great deal of significant medical information on the population is available. Of course, much of the medical information has value beyond issues related to exposure to radiation.

There is a Division of Biology and Agriculture which played a role in the organization of this meeting. Within it, for example, is a Food and Nutrition Board, as well as a group which studies the effects of pesticides. The latter involves both those who are interested in the conservation of nature and those who are interested in increasing agricultural production. Closely related to this is a group that examines the amount of pesticide that is permitted in food.

There is a large Division of Engineering working in many fields. It is, for example, deeply involved in transportation. One of its Boards has worked with the Federal Government since 1919 in planning the federal highway network.

There is a Division of Physical Sciences. One of its committees, the Space Science Board, is the principal outside adviser on the national space program. It has helped the space agency plan the scientific program for over ten years. The Division has also helped analyze the opportunities available in various fields of science, such as that devoted to high energy physics.

There is a Division of Earth Sciences which works on problems of geology and oceanography and a Division of Mathematical Sciences which has helped guide, for example, the development of computers.

We have a Division of Behavioral Sciences that originally worked on very specialized groups of problems including those related to determining the aptitude of individuals for special tasks. It now extends its activities much more broadly, however, social scientists, political scientists, and economists being involved in its programs.

There is an Office of Scientific Personnel which spends some of its efforts analyzing educational programs and the careers of professionally educated persons. It also handles the selection committees for many of the federal educational fellowship programs. Groups of university professors come together annually to analyze the qualification of those who apply for federal fellowships. They place the applicants in sequence of preference to assist the agencies in deciding on the distribution.

And last, but not least, we have an Office of the Foreign Secretary, which develops our foreign programs. The Office has conducted and participated in many workshops.

Let me give you one example of the sense of vitality which we have attempted to maintain, since I wish to stress how important it is that the institutions which work within a nation maintain flexibility. Our government had a long established policy which made it essentially impossible for individuals in the government service to participate officially in programs which involve family planning. The topic was in effect taboo. Members of the Academy felt, however, that this was incorrect because family planning represented an issue

which deserved the official attention of our nation in a period of rapid worldwide population growth. As a result, we created a Committee on Science and Public Policy with the explicit intention that the Committee would not wait for issues to come to it as a result of requests but would initiate on its own, and, in a relatively conservative way, studies and programs. The first program that it undertook related to the issue of world population. In 1963 it issued a report bearing the title, "The Growth of World Population." In it, the Committee recommended that the United States Government recognize the importance of this issue and be prepared to help other nations that might come to our government for assistance in the field of family planning. The report, which was supported entirely by private money, had the effect of changing the attitude of our government so that now it is acceptable for our federal agencies to give attention to family planning. The Committee on Science and Public Policy has continued its work in the intervening years usually handling two or three issues a year in which it acts as an initiator.

In another direction, I discovered when I took office in 1962 that the engineers in our country were not very happy about their relationship with the Academy. Although engineering was an integral part of the work of the Academy from the start, and although we had many engineers among our members, the profession as a whole felt it was not strongly enough represented. As a result of many discussions with the engineering community, we decided at the end of 1964 that we should create under the terms of our original charter of 1863 a second Academy that would be affiliated with us and yet autonomous. Thus, we created at that time a National Academy of Engineering which selects its own members but works with the scientific Academy in the planning of the programs of the National Research Council. At the present time the new Academy has a membership of about 250. It will presumably grow to about 1,000, being tied to us and yet autonomous.

Last year we responded to a feeling that there was need for a body in our country which could advise on the social problems associated with medicine adequately. There are private bodies like the American Medical Association, which speak for the professional physician, but are not designed to help the government on a broad basis in planning the socially important programs, such as medical education, which is expanding very fast, or the rendering of medical service to the poor. In searching for a way of dealing with this, we have created a new structure within the structure of the Academy of Sciences, namely, a Board of Medicine. It has 24 members

and has held about six meetings to date. About one-half are men trained in medicine, whereas the others are specialists in the social sciences and economics who have a profound interest in the social aspects of medicine. They have begun to evolve a pattern of programs which they will present to the government. It may one day become a National Academy of Medicine which will be affiliated with our Academy, much as the Academy of Engineering is.

I might mention that among the requests that come to us for advice are some originating in the Congressional Committees. At several times in our history Congressional Committees have turned to us for assistance; however, we have now evolved a pattern whereby the Congressional Committees can approach us on a more or less continuous basis. The manner in which one provides advice to the legislative branch is very different from that used in advising the executive agencies. Congressmen usually prefer having a freedom of choice. They do not like advice which is too circumscribed and removes their freedom of decision. Since they are the representatives of the people who elect them, they prefer to be left with an alternative choice.

Let me close by saying that our Academy, a private organization, has learned over a century to play out its advisory role in many different ways, working in the public interest through a variety of channels.

CLOSING SESSION

ADDRESSES

Pages 97 - 116

CLOSING ADDRESS

by

Dr. Soedjono D. Pusponegoro
Faculty of Medicine, University of Indonesia

Ladies and Gentlemen:

It is with great pleasure I put forward my general remarks concerning the Workshop on Food.

Firstly, it has been the first time that Indonesian scientists have met their foreign colleagues to discuss in a scientific way the major aspects of food in Indonesia. The discussions, which were held in a friendly atmosphere, resulted in practical recommendations to accomplish breakthroughs; recommendations in the framework of the Indonesian Five-Year Development Plan; recommendations for long-term planning; and research projects which are needed to solve the various problems.

Secondly, the Indonesian scientists, who are mostly young, have had the opportunity to discuss the various problems with their more experienced counterparts. It is, therefore, a fact that this Workshop held in Djakarta has greatly contributed to the creation of a more academic and scientific atmosphere in Indonesia, and the contacts already established through the Workshop have to be maintained, either personally or through LIPI.

Thirdly, the recommendations made by the Workshop on Food will be presented tomorrow morning to President Soeharto in the form of a summary.

But the work is not finished yet. The final report will be drafted and reviewed by a small group of Indonesian and American participants, and this will be finished next week. This draft report will be distributed among all Chairmen and Co-Chairmen for comments and revisions, after which the final report will be published. In the meantime, LIPI will discuss the recommendations made by the Workshop with BAPPENAS.

It is my pleasant duty indeed to thank all participants for their tireless efforts day and night to make this Workshop a success for the benefit of Indonesia. Thank you.

CLOSING ADDRESS

by

Dr. H. F. Robinson, Vice Chancellor,
University System of Georgia

I want to thank all of you for the tremendous efforts you have given to the tasks of the NAS-LIPI Workshop on Food. You have convinced me, and all of us visiting Indonesia, that if certain basic requirements can be provided, you will provide the maximum individual contributions toward a solution of the problem of food supply. Your vigorous and dedicated efforts put forth here will serve as examples to others in work on the solution of these problems so important to Indonesia. We have had a wonderful working relationship with our Indonesian colleagues, and I want to thank you from the bottom of my heart, because whatever has been accomplished is due to your efforts.

It has been heartening to see how all of you have worked together, trying to come to conclusions regarding approaches to the solutions of these problems. It was very evident that if the problems could be solved, you were going to find the solutions. The best minds of the nations represented were working together on the important questions. We have had most open, frank discussions. You have supplied us with the best available information on the subjects we were discussing. There has been no reservation in attacking the problems in their various forms, and I think the limitation of time is the only factor that will limit the quality of the report to be prepared.

There will be many benefits derived from this workshop beyong the written report. The friendships made here will result in further contacts with those of us from the United States, the international agencies, and from Australia, Japan, and the Netherlands. We hope we will be called upon by our Indonesian colleagues for help and advice through correspondence, by invitations to return, by requests to help with student arrangements, etc., and this is as it should be. This is the follow-up that is necessary, and may well be the most important development and contribution that will come from this conference. If it is, good; because after all the National Academy of Sciences is principally interested in the development of science, and here it is the science related to the food problem of this country. My plea is that you do call upon us and let us call on you as neighbors from abroad. This is a very important relationship that we have established. We

hope to come back, but if we do not, our thoughts will be with you.

At this time, I want to especially thank Professor Sarwono for all that he has done as we have worked with him, Professor Soedjono, Dr. Didin, Miss Sjamsiah, and all of their staff. We are especially grateful to Mrs. Sarwono and Mrs. Soedjono for the delicious luncheons they have arranged for us each day.

Let me again say that it was a great experience to work with Dr. Ivan L. Bennett, Jr., a fellow Georgian, on the PSAC Report. Dr. Bennett, Chairman of the famous Department of Pathology at Johns Hopkins University, is widely recognized as an authority in his field of medicine. It was his major contribution to science and his leadership abilities that led to his appointment as Deputy Director of the Office of Science and Technology. I know he is going to tell you how pleased he is with what we have been trying to do here at the Workshop. His presence here demonstrates his great interest in the problem of food supply and in seeing that the PSAC Report becomes more meaningful to you. I am happy to have Dr. Bennett bring his remarks to you. Thank you.

CLOSING ADDRESS

by

Dr. Ivan L. Bennett, Jr., Deputy Director,
Office of Science and Technology of the
Executive Office of The President

Ladies and Gentlemen:

First, I would like to read a Message from the President of the United States to the U.S.-Indonesia Workshop on Food:

> "I am greatly heartened by the assembly of distinguished scientists under the auspices of the Indonesian Institute of Sciences and of the American National Academy of Sciences to participate in a workshop on food production in Indonesia.
>
> "As I stated in the preface to the report which is serving as the basis for your discussions, the world food problem is one of the foremost challenges of mankind today.
>
> "Experience in our country and that in other countries shows that increased agricultural production is within the capacity of modern science. The problem cannot be solved, however, unless each nation reaches a considered judgment on the course that it is to pursue.
>
> "I congratulate and thank all of you for devoting your talents to this vital issue and express my earnest hope for a fruitful outcome of your deliberations."

It is, of course, a particular privilege and pleasure for me to be here today at the summary session of this joint effort to apply to Indonesia's food problems the principles set forth in the report which was prepared at President Johnson's request by his Science Advisory Committee (PSAC), with the help of many of the Americans present in this room. As a member of PSAC, I was given the assignment of chairman of the Panel on the World Food Supply, quite unexpectedly, during a visit to watch the launching of a Gemini Space Flight at Cape Kennedy. Little did I dream that the task would take me from Cape Kennedy to Djakarta in less than two years!

I am sorry to arrive so late, after most of your work has been done but, knowing that Dr. Robinson was here and knowing what a "slave-driver" he is, I was confident that the work would be done.

The values of this workshop conference are many but one, especially, I would emphasize. It brings together scientists and specialists of many types to discuss a complex problem. To be successful in any science today requires specialization in one's discipline and specialization inevitably leads to isolation from others as we become concerned with our own narrow sector of endeavor.

But the important problems in today's world are interdisciplinary. Merely to define the problem of food and population and to put it into perspective requires multidisciplinary efforts. To implement programs to solve it will require the same crossing of traditional boundaries and categories of knowledge. This, I believe, is something that we are only beginning to realize--not only in Indonesia--but in the U.S. and all over the world. The brief summary which I will give of the status of deliberations here reflects this linkage of disciplines as well as the cultures of different nations. The tone and the direction of the summaries indicate clearly that you have opened your hearts and your minds as you have thought about and discussed these problems together. They reflect the attitude described by George Bernard Shaw when he said:

> "Some men look at things as they are and ask, why? I look at things that have never been and ask, why not?"

Briefly, the thinking of the Working Groups is running along the following lines:

Working Group I: Population, Food Needs and Nutrition

The continued imbalance between birth rates and death rates has serious long-range implications for the nation's food programs. The current population of 117 million when projected to 1991, using growth rates of 2.0, 2.2, and 2.5% would give an expected population of 204, 223, and 235 million respectively. These projections clearly indicate the urgency of initiating a nation-wide program of family planning aimed at reducing the growth rate below the present 2.6% level.

The nation now faces a serious food problem. To meet it, the Government should develop a National Food Policy and

a National Food and Nutrition body should be created to stimulate coordination and to facilitate implementation of all food and nutrition programs. Scientific advice could be provided by LIPI, thereby aiding the nation to mobilize its scientific and technical capacity in furthering these programs.

Working Group II: Intensification of Production: Soil, Water, Fertilizer, and Improved Agricultural Tools

Prospects for an immediate step-up in food production are substantially better by intensification on the hectares already under cultivation than by extension into new, untried hectares in islands outside of Java. This is possible if the proper combination of practices is applied, including improved plant varieties, the right fertilizers in adequate amounts, adequate water control, and adequate control of weeds, insects, and diseases.

Inputs, particularly of fertilizers, will have to be increased. Most of this will have to be imported in the near future, although Indonesia has the raw materials for eventually manufacturing its own nitrogen fertilizers.

In time, Indonesia will need to extend farming onto soils not now used for crops. Research, surveys, and pilot trials, therefore, need to be done in the new areas to develop production technology adapted to these soils and other environmental characteristics.

Working Group III: Intensification of Production: Food Crops

On the basis of information now available, it appears possible to double rice yields under favorable conditions. This will require the rapid multiplication and use of the new varieties PB-5 and PB-8, large quantities of fertilizers, and the use of chemicals for pest and disease control.

Maize is grown under conditions not directly competitive with rice either during the dry season or in areas where rice is not grown. Improved composites have been developed which have the potential of increasing yield by at least 100 per cent. An increase of this magnitude will satisfy the maize requirement for the expanding population and offers promise of the development of a significant export market.

Extensive research will be required to develop more suitable varieties of pulses and more efficient management practices for these crops. These problems can be solved but hopes for market improvement during the next five years are rather dim.

Production of cassava and sweet potatoes is adequate for current needs. Production of either crop can be substantially increased by adequate fertilization.

Working Group IV: High Protein Foods, Animal Food

The present direct contribution of poultry and eggs to the nutrition of rural populations is negligible--less than two grams of protein per person per day from poultry and all other meat combined--and not likely to increase appreciably in the near future.

With regard to milk there is no foreseeable improvement in its production which will affect the rural population significantly, although an effort should be made to improve the quality of present milk animals and milk supply.

Substantial capital will be required to increase the marine fish catch appreciably. To achieve increased protein from fish, primary attention and assistance are recommended for fresh water pond fisheries and for combined rice and fish culture. Growing fish in small home ponds is feasible and highly desirable.

The fortification of corn and rice is not feasible for Indonesia, but wheat flour (which is mainly imported) should be fortified before shipment with 0.2% of l-lysine as well as thiamine, riboflavin, niacin, calcium and iron. Corn should be genetically improved in protein quality by the introduction of one of the genes opaque-2 or floury-2 into locally adapted varieties.

Since the land requirements and return to the farmer are approximately the same for soybean and peanuts, priority should be given soybeans because of their higher nutritive value and extensive use in Indonesian diets as "Tempe" and "Tahu."

And, the use of coconut protein for human feeding should be actively explored. There appears to be little prospect that commercially produced protein-rich new beverages can contribute significantly to meeting the protein needs of the rural population of Indonesia within the next five

to ten years because of lack of purchasing power.

There is likewise no prospect within the next decade that single-cell protein from yeast or bacteria will be practical for Indonesia.

Working Group V: Processing Marketing, and Utilization of Food

The primary objectives in the area of preservation and processing of foods are to prevent much of the loss that now occurs, and wherever possible, to provide more palatable foods. It is recognized that processing must be kept at a minimum, consistent with these other objectives, in order to hold down the costs. It is generally accepted that air drying is the cheapest form of preservation and it is therefore recommended that small drying units be established at the village level and that a study be made of the need for, and feasibility of, larger drying units at some of the market centers.

A new efficient method of processing rice, known as the "Riviana" process, has been patented in the United States and could usefully be investigated.

Rice marketing has been the subject of intensive discussion, but this is a very involved and complex area involving the whole economy of the nation and, therefore, further studies will be needed before recommendations are forthcoming.

A new type of corn product, developed at Jogjakarta, will sell for a lower price than rice, and the cooking methods are much the same. The small pilot plant which is presently in operation has a potential capacity of five tons per day.

If soybean production is actually increased, there are several processes available to utilize the soybean in the human diet very effectively--whole-fat flour and soy milk.

With regard to the marketing of fish, the following needs are seen: (1) a need for a more dependable source of shipping; (2) more sources of salt, and in closer proximity to the fishing-processing areas; (3) a faster drying method to reduce spoilage; (4) some source of ice for the fresh fish industry; (5) a definite improvement in the marketing organization to eliminate delays and costs; (6) the possibility of developing the shrimp and tuna fishing areas for export.

Working Group VI: Production Incentives and Use of Technical Inputs

The group recommends that major support must be given to research programs directed specifically to raising the yield potentials of the basic food crops in specific locations.

The rate of adoption of output-increasing technology by farmers is directly dependent on the relationship between product prices and the costs of inputs. Indonesia has adopted a very favorable policy with respect to the price of stalk paddy related to the price of fertilizer. It is absolutely essential that this favorable cost/price ratio not be eroded by inflation. Similar incentives need to be developed for other domestic food and export crops.

Investment in both general education and in specialized technical education in rural areas is necessary to realize the potential returns from new technology.

The effectiveness of production incentives also depends on the local availability of the biological and chemical inputs embodying the new technology and on a marketing system which efficiently relates prices at farm and market levels. It is the impression of the Working Group VI that both input market and product market fail to meet the tests of technical efficiency or pricing efficiency at the present time, although a number of steps have already been taken to improve market performance.

Working Group VII: Biology Basic to Agriculture

By far the most important recommendation to come from this working group is that urgent attention must be given to erosion control.

The next recommendation sounds like the type that comes to my own office in Washington almost every day--"The panel also placed emphasis on lack of coordination and poor communication in all scientific (as well as administrative) endeavors and strongly recommended simplification of organization patterns, including elimination of duplicate or multiple charges for the same affairs."

Specific research areas arranged according to their priorities were determined to be:

1. breeding of soybean and peanut varieties and selected species of fresh water fish

2. plant nutrition (primarily N and P)
3. biology of rat
4. biology of weeds
5. climate understanding and weather forecasting
6. ecology of shrimps
7. human ecology

Working Group VIII: Institutional and Personnel Development

1. It is important to intensify the role of the universities and notably the institutes of higher learning in the agricultural field.

2. The working group recommended holding a number of symposia and courses in the center and in the provinces dealing with development strategy and development administration.

3. It recommended specific focus on "package programs" combining the optimum use of material and human resources.

4. It also recommended that a joint Indonesian-U.S. scientific team of high caliber study the needs for stronger and better coordinated research and report to the Government.

5. The large areas of tidal swamps should be investigated and assessed for the feasibility of future expansion of cultivation, especially of food production.

You all realize, of course, that the final fruits of the efforts that will emanate from this conference will benefit future generations more than this one. In other words, we are helping to construct the future. I have just come from Europe where my trip was delayed by the disruptions caused by the "revolt" of University students and related events.

It is, perhaps, understandable that young people, at this time in history, are discontented and bewildered in every country on earth. In this so-called cybernetic age, more and more of them feel that they are being given out-dated educations and sent forth into a world that seems to understand them no better than they understand the world. They feel, rightly or wrongly, that they are caught between the "computers" and the "bureaucrats"--whether in private management or in government.

During these past few weeks, the rapid turn of events all over the world should make us begin to wonder if we have been mistaken in not listening to what poets have been telling us for many centuries--that there is no such thing as an "adult" world.

As the English journalist, Peter Lennon, wrote recently of the student revolts in Europe:

> "Youth is reckless, generous, and valuable, but the world of wise, mature, and organized adults for which youth is supposedly a preparation does not exist."

Indeed, the accelerating rate of change in the lives of all people, largely the result of modern technological advances, has made change the permanent condition of world society--and we find ourselves, as "adults," lacking the ability to grasp the essentials of what we have wrought. We are only beginning to learn how to plan for the future--the future which demographers and economists are now able to delineate with almost mathematical certainty. That is, they can forecast what needs will be and what will be required to fulfill these needs, but we have not yet learned to grapple with the problem of long-range action to meet these requirements. Politics and politicians (the most realistic of men) until now, have been concerned with the short-term, the quick "pay-off," the expediency of giving the appearance of concern and action rather than the more exacting and demanding task of setting goals and undertaking programs that may actually achieve these goals.

There is a common saying in Washington: "You can't be a statesman unless you are elected."

In "Tancred," the great British statesman, Disraeli, wrote that "a majority is always the best repartee." But a majority, we are finally beginning to realize, is not always an articulation of the best politics. The survival of Barabbas, the thief, and the crucifixion of Christ were determined by a vocal referendum and a majority persecuted Galileo, burned Joan of Arc at the stake, and executed Sir Thomas More.

The history of human progress is, in large measure, the history of thoughtful, dedicated minorities who have been able to gain acceptance of their views by the majority of citizens--mainly by converting statesmen and politicians to their way of thinking and leaving it to them to persuade the majority. While, in the last analysis, politicians depend upon the majority for their power, they are where they are because they have mastered the difficult "art of the possible."

Fortunately, there is no finality in simple politics because the important and basic issues of today cannot be settled by mere head-counting alone. This is why the one area of human enterprise that will never be usurped by computers is politics. There are no "digital absolutes" and few of the

urgent and tormented problems of our times and of the future--including that which concerns us, the imbalance of food and population, can be reduced to elementary formulas that can be responded to unthinkingly or mechanically.

It is one thing for New Zealand to settle the question of racetrack betting by a referendum or for Napoleon III to have himself awarded the title of Emperor by holding a popular vote--these are simple, relatively unimportant problems. But the larger and more complex problems faced by all nations are problems whose simultaneous solution is impossible because the resources to solve them all at once are not available to any nation. This hard and unyielding fact makes it mandatory to plan and to set priorities--to be practical. The issues are increasingly complicated and cannot be decided merely by ballot and the problems are also of a type that makes it almost impossible to explain them meaningfully to an entire electorate--because of the apathy and low horizons of desire that characterize electorates everywhere.

The most dangerous result of the unrest which seems to be sweeping the world, developed and developing, can be a reaction by governments who retreat back to conventional wisdom, to the conservative, comfortable, and largely ineffectual ways of doing things, confusing the stubborn problems that cannot and will not be solved with those equally stubborn problems which can be solved. This means indecision and procrastination; because to choose priorities and to set in motion programs to implement them is to commit oneself publicly. While such a commitment, if crowned with success, brings great credit, if the choice is wrong or if the choice is right and the program fails for other reasons, the blame is also great and is sharply focused on he who made the choice. Because success may take a long time and failure may not require as long, it becomes difficult to make the political decisions so all-important in meeting the growing problems of a world which is, quite literally, being remade by technology every decade or two.

Prime Minister Pompidou of France, in discussing the liabilities to the politician of national policy decisions has said:

> "There are in this life, three excellent ways of losing money--gambling, women, and technology, and of these--gambling is the surest, women the most pleasant, and technology the quickest."

It is, perhaps, the vanity of every age to believe itself to be history's turning point. In fact, there are few, if any

sharp corners in the chronicles that hold the record of mankinds' history.

Each of us can think of some event which might be a candidate for such a sharp corner:

--the splitting of the atom
--the discovery of printing
--the discovery of fire
--the discovery of the wheel
--the impact of Darwin's theory
--the Charter of the United Nations
--for Americans, perhaps, our declaration of independence
--for Indonesians, perhaps, the Pantjasila, which you commemorate tomorrow.

Let us all indulge in the vanity of believing that the results of this conference, this planning together, this examination of all aspects of the problem of feeding Indonesia's people, will represent such a turning point in history--as well it might--if we persist in efforts to obtain the implementation of broad, overall programs--for the key to self-sustaining economic growth is food--and the key to food production is the application of science and technology--in the right environment, with the right incentives; and above all, without becoming embittered or disillusioned if there are delays, if things do not go perfectly, or if we discover along the way that all people are not scientists and, hence, are not as straightforward, gifted, talented, farsighted, and as dedicated to long-term goals as are we.

Henry Mencken, an American humorist once observed: "It is a sin to think evil of others, but it is seldom a mistake."

It is well, I believe, for all of us to remember that science and technology can indeed help - but they must be used with good judgment, common sense, and with a high degree of understanding of the particular problem that one faces in a particular country or region.

To emphasize this, I will conclude with a story from the ancient book of Sanskrit tales, The Panchatantra, entitled, "The Lion-Makers."

It is the tale of four Brahmin youths, lifelong companions. Three of them studied very hard and, as the story goes, "reached the farthest shore of the ocean of science." The fourth had no head for science but he had much common sense

or gumption. The three young scientists decided to set out to make their fortunes at the court of a great king. After some discussion, they decided to allow Gumption, the fourth youth, to come with them.

In the course of their journey, they came across some bones in the forest.

"What have we here?" asked the first young scientist as he added flesh to the bones. Quickly, the second young scientist added blood and hide. As the third bent over to give the creature the breath of life, Gumption pulled him back and cried, "Hold on. That is a lion you are about to bring to life! Stop!"

The other three thrust him back shouting, "How dare you stand in the way of science, ignorant one?"

"Wait, then, please," said Gumption, "while I climb this tree."

The lion, brought to life, killed the three young scientists and, after staring at the frightened young man in the tree, turned away and entered the forest.

After waiting for several hours, Gumption, the young man who had only common sense, climbed down and went home alone.

And the tale ends with the Gold-spinner, teller of the story, giving the moral:

> "Book learning many rightly cherish
> But gumption's best of all to me
> For without gumption ye shall perish
> Like the Lion-makers three."

A beginning has been made at this conference, and personally I am convinced that if we can continue to work together, each of us contributing his special knowledge, tempered by common sense, or gumption, we will be able to complete the task that Bismarck once called "to set the clock of evolution at the right hour."

I thank you.

CLOSING ADDRESS
by
Professor Sarwono Prawirohardjo
Chairman, LIPI

Ladies and Gentlemen:

It is indeed a great honor for us to have heard the message of the President of the United States. It shows the great interest of President Johnson and the American people in the world food problems in general, and the problems which Indonesia is facing in particular.

After five days of hard work the Workshop on Food has come to its official end. I would like to add that this is the official end, because I know that tonight and tomorrow many of you will be working on the report which will be produced as a result of this conference, and which will be useful for our Government and the people of Indonesia in their efforts to meet the food problems of the country.

Dr. Bennett has given in his address a summary of the discussions here in the workshop and the results which have been achieved. If we consider the short time in which the workshop has been conducted, the results are indeed impressive, and are of great significance for our Government in providing it with material to be used in efforts to improve the food situation qualitatively and quantitatively.

That these results have been achieved is due to many factors. First, we all know that the report of the President's Science Advisory Committee (PSAC) on The World Food Problem has been very useful for all of us. The results are due, secondly, to the will to understand, the open-mindedness, and the sense of cooperation, which existed between all participants, whether Indonesian or from abroad, during these discussions.

However, as was mentioned in the Djakarta newspaper article, read at a meeting of our Working Group Chairmen by Dr. Robinson on 29 May, this Workshop on Food will be a failure if all the fine recommendations are just words on paper and do not find their realization. It is of the greatest importance, to all of us who participated in the workshop, that the results help in solving the food problems which the people of Indonesia have to face. I would, therefore, like to make an appeal to all of you to take further part in one or another way in activities which might lead to the les-

sening of the need of the Indonesia people for more and better food, and for Indonesia's development of science and technology for the welfare of its people.

Several proposals have been transmitted to me concerning the priorities for implementation of recommendations made by several of the Working Groups. These proposals should be carefully studied. However, in summary they indicate there is indeed a need for a mechanism to closely follow and help with the developments concerning food production, nutritional status of the Indonesian people, and matters relating to it.

In connection with the above, I foresee the possibility that we will ask the assistance of the National Academy of Sciences, and maybe other agencies, in finding persons who could help us in matters in which we think we need foreign assistance and foreign experts. I hope, and believe, that most of those who participated in this workshop have now gathered a more intimate knowledge of the problems in Indonesia, and will be willing to serve in such a capacity.

Ladies and Gentlemen:

Besides the importance of this workshop as a meeting place for discussions of the food problems in Indonesia, I would like to stress that this workshop has many other aspects which are just as important as those I have mentioned, and I would like to elaborate on this matter.

Science in Indonesia existed for a long time, but before World War II only a few Indonesians took part in this venture. I think it is an achievement of which we can be proud, that during the post-war years Indonesia was able to form a relatively good cadre, qualitatively and quantitatively, to carry on the work in science and research. In the gathering here at this meeting you see only a few old horses, most of the Indonesians here are, I think, post-war generation of scientists. I think with regard to the manpower situation, we can be a little bit optimistic for the future. However, I know these scientists are facing great odds.

I shall not tell you how much our scientists earn, because you might not believe me. What I would like to mention is that they miss the stimulus of having personal contacts and exchange of views with their colleagues abroad. Indonesia is far away from the world centers of science, and regional centers of science have, in the main, not yet been developed. Due to the high traveling costs we can only send a few of our scientists every year to international congresses, so there is a feeling of isolation among our scientists.

This workshop has done much to relieve this feeling of isolation. Personal contacts have been established and lines of communications have been opened. In this respect, I would like to request that both sides, Indonesian and foreign, should make sure that these lines of communications remain open.

Before this workshop we already experienced that without much cost this feeling of isolation, which I believe is being shared by scientists of many developing countries, can be lessened. A few months ago we had here, under the auspices of the International Council of Scientific Unions (ICSU), a land-use survey mission of two scientists (it was originally scheduled to be a mission of three) for three weeks. This mission visited, with their Indonesian counterparts, several regions which have a special interest from the standpoint of land use, and two workshops were held--one in Jogjakarta and one in Djakarta.

When such a mission is carefully selected and its visit to the receiving country properly planned, I think that with the same cost a greater number of the scientists of the country can be exposed to new thoughts, new theories and new discoveries in their field than when we send a few of them abroad to attend scientific congresses. However, I do appreciate the importance of scientific congresses.

Ladies and Gentlemen:

Dr. Soedjono has already expressed his thanks to all the participants for their very important contributions to the discussions of this workshop. I would like to repeat this, and I would like to especially thank our foreign participants who came from so far away. I would also like to thank Dr. Robinson, who has done a magnificent job; he deserves our special thanks. I thank the National Academy of Sciences for all its efforts to make this workshop a success; also Australia, Japan, the Netherlands, FAO, UNICEF, UNESCO, WHO, and the Asian Development Bank for sending participants to the workshop. Special words of thanks I would like to express to the National Academy of Sciences staff under the leadership of Mr. William L. Eilers; they worked closely and harmoniously with their Indonesian counterparts.

On this occasion I would also like to thank the Indonesian Steering Committee and the Organizing Committee with their staff for the fine preparations they made and for their labors during the workshop. Words of thanks I would like to

convey also to our Indonesian participants, under the chairmanship of Dr. Soedjono, for their valuable contribution to the workshop.

Ladies and Gentlemen:

This is the last session, in which the whole workshop will meet. Tomorrow and during the following days most of you will go home and to your daily work. Many of our foreign friends will travel far; I wish all of them Godspeed and Au Revoir.

With many thanks to all of you, I close this NAS-LIPI Workshop on Food.