A.I.D. RESEARCH & DEVELOPMENT ABSTRACTS

UNITED STATES AGENCY
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FROM THE EDITOR

Evaluation Publications

This issue of ARDA announces a program of A.I.D. publications devoted to the evaluation of development projects and programs. Begun in 1979, the A.I.D. Evaluation Publications program is managed by the Office of Evaluation in the Bureau for Program and Policy Coordination. It reflects increased Agency concern with assessing the effectiveness and impact of its activities in attaining broad program goals, and, equally importantly, with communicating information about these assessments to those involved in designing, carrying out, and evaluating development activities. Historically, it is unusual for development donors to publish and disseminate evaluative information; it is even more unusual for donors to publish information which either confirms or critically challenges established assumptions and procedures in development programming. Through the Evaluation Publications program, A.I.D. hopes to share more widely the evaluations' findings in order to contribute to greater understanding of the development process. Announcement of these evaluation reports thus represents a new effort by the Agency and a major addition to ARDA's coverage of Agency work.

Thirty-three reports are included in this issue, under their respective subject fields. The Evaluation Publications program includes five types of reports. The first, *Program Evaluation Discussion Papers*, are commissioned to explore issues, critically examine assumptions and practices, and summarize documented experience. The second, *Project Impact Evaluation Reports*, assess the intended or unintended impacts of completed projects or related projects. Impact evaluations focus on priority areas selected by Agency executives and are prepared by teams composed entirely or predominantly of Agency staff members unassociated with the particular project(s) or with the country Mission. The third, *Program Evaluation Reports*, consolidate and synthesize evaluative information in the context of an overall program, sector, or type of development activity. The fourth, *Evaluation Special Studies*, include occasional papers that record unique or valuable instances of the Agency's development experience or that address design and evaluation issues in new types of projects. The fifth, *Program Design and Evaluation Methods*, present the results of Agency work in developing methodologies, research designs, and data collection and analysis strategies that support the design and evaluation of development programs.

Abstracts of new publications will continue to be included in future issues of ARDA.

Descriptions of individual evaluations are located under the following item numbers:

Environment and Natural Resources

In recent years, our environment has increasingly become the subject of both scientific study and passionate, public debate. The overwhelmingly, carefully documented fact is that our environment is everywhere degraded. Language is strained to describe this degradation and its long-term consequences for human life.

It is impossible to fully grasp the depth of the biosphere's restorative resiliency when protected from environmental insult, and difficult to simply accept how truly little we know of both the destructive and restorative processes. We blithely ascribe cause and effect concerning the destruction, but fail to reduce its pace. As a sobering example of modern man's ability to change the natural environment at unprecedented rates, consider that: more than a billion years ago, significant amounts of oxygen began to appear in the earth's atmosphere; no more than 4 million years ago, the first humans appeared; yet during only the last 100 years, atmospheric carbon dioxide increased 15% worldwide and may double before the middle of the next century — largely as the result of man's burning of fossil fuels. Since oxygen is the *sine qua non* of life as we know it, such increases in concentrations of carbon dioxide are ominous.

Nature, when left to itself, maintains a proper balance between oxygen and carbon dioxide through photosynthesis in marine and land vegetation. For centuries, however, human beings have used the oceans — which generate one-half of the world's oxygen — as a giant sewer, dumping refuse as though it ceased to be a problem when it disappeared from view. Only now are we beginning to understand how this pollution of the oceans threatens the delicate web of life. The widespread degradation of the world's forests in this century intensifies this threat to truly alarming proportions. For example, tropical forests, which constitute the earth's richest ecosystem, are being destroyed at the rate of 49 million acres a year. Such destruction is roughly equivalent to annually denuding the nations of Nicaragua and Costa Rica or the combined area of the states of Maryland, Virginia, and West Virginia in the United States.

A grim picture of the current state of the environment emerges from a close examination of the documents in this issue's section on Environment and Natural Resources. Announced in this section are 26 draft reports on the state of the environment in individual countries throughout the world. Produced by the United States Man and the Biosphere Program (MAB) and funded by A.I.D., this collection of environmental reports describes each country's natural resources base, its environmental problems, and the measures being taken to manage those problems. Subsequent issues of ARDA will include future reports as they become available. Besides these reports, which offer a rich source of comparative information to help solve practical problems, the U.S. MAB program provides research and training to study human interactions with the natural environment, and extends its experience and integrative approach in resolving specific resource management problems.

Also announced in this section are 17 additional studies on critical issues in forestry, fuelwood, other renewable energies, and related topics. Included are descriptions of conferences on deforestation

(continued on back inside cover

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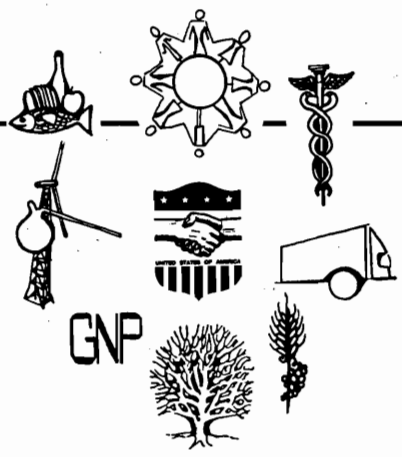

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SUBJECTS AND DOCUMENTS OF SPECIAL CURRENT A.I.D. INTEREST

DOCUMENTS OF SPECIAL INTEREST IN THIS ISSUE OF ARDA: **ITEM NO.**

SERIES INCLUDED IN THIS ISSUE:

DOCUMENTS AVAILABLE IN FOREIGN LANGUAGES

QUESTIONS AND ANSWERS ABOUT ARDA

What is ARDA?

ARDA, "A.I.D. Research and Development Abstracts", is a quarterly abstract journal issued by the Division of Documentation and Information, Office of Development Information and Utilization, Bureau for Science and Technology.

What is the goal of ARDA?

The goal of ARDA is to transfer development and technical information to active practitioners in development assistance.

For whom is ARDA published?

ARDA's target audience is A.I.D. staff worldwide and selected key institutions in developing countries. Such institutions are government agencies, universities, libraries, research organizations, and other public and private sector organizations.

What materials are abstracted in ARDA?

ARDA presents abstracts of A.I.D.-funded current and less recent research studies, state-of-the-art reports, sector analyses, special evaluations, and other documents which, taken together, describe a broad spectrum of international development experience.

Who receives ARDA?

All major A.I.D. offices in AID/W and in the field receive ARDA regularly and automatically, along with other information outputs.

Developing country recipients who have completed the "ARDA Questionnaire" signifying their interest in the receipt of ARDA and other information outputs receive ARDA regularly. (USAID Missions are encouraged to ask counterpart institutions to write to the Editor of ARDA for the questionnaire or to send the names and addresses of such institutions to the Editor of ARDA. Peace Corps Volunteers may also ask the counterpart institutions in which they work to write for the questionnaire.)

Other institutions and individuals active in development assistance may also request the "ARDA Questionnaire."

How are ARDA publications ordered?

Send the completed order forms to:

A.I.D. R&D Report Distribution Center
P.O. Box 353
Norfolk, VA 23501
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How can full texts of titles abstracted in ARDA be obtained?

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- The address label of each issue of ARDA carries the recipient code number for the institutional recipient. The recipient code number now has 16 digits. The full code number must always be used on the order forms.
- Immediately above each ARDA document title is a bar containing a 3-digit item number and an 8-character publication number (example: PN-AAH-497). The full PN number must also be included with each order.

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AID/W staff and USAID Missions may order an unlimited number of materials at no cost in either paper or microfiche. Only A.I.D. staff may order paper copies of documents more than 300 pages long.

Developing country institutions on the authorized ARDA mailing list may order up to five paper copies at no cost or they may order an unlimited amount of titles on microfiche. No developing country institution can order the paper copy of documents more than 300 pages long. The first group of eight digits in the recipient code number ends in "001" for developing country institutions which may order materials at no cost.

What formats are available for full texts?

Most titles included in ARDA may be acquired in paper copy. All titles are available, however, on negative diazo microfiche.

All USAID missions and developing country institutions with access to microfiche readers with 24x magnification should order documents on microfiche.

USAID missions can build up complete microfiche libraries of A.I.D. publications by either subject classification or by geographic region. Missions desiring more information on documents available to them on microfiche or on microfiche equipment should write to the Editor of ARDA.

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Please direct all correspondence and requests for further information to:

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Bureau for Science and Technology
Agency for International Development
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QUESTIONS ET REPONSES RELATIVE À ARDA

Qu'est-ce qu'ARDA?

ARDA, "A.I.D. Research and Development Abstracts" (Résumés sur la recherche et la développement de l'Agence pour le Développement International), est une revue trimestrielle composée de résumés publiée par la Division de la Documentation et des Informations, Bureau des Informations sur le Développement et leur Utilisation, Bureau pour Science et Technologie.

Quel est l'objectif d'ARDA?

ARDA cherche à transmettre les informations techniques et axées sur le développement aux techniciens participant à l'assistance au développement.

A qui s'adresse ARDA?

ARDA s'adresse au personnel d'A.I.D. dans le monde entier et aux institutions clés choisies, situées dans les pays en développement. Des institutions de ce genre sont des organismes publics, des universités, des bibliothèques, des organisations de recherche, et autres organisations des secteurs public et privé.

Que contiennent les résumés d'ARDA?

ARDA présente des résumés d'études actuelles et moins recentes relatives à la recherche et financés par A.I.D., des rapports faisant le point des connaisances actuelles, des analyses sectorielles, des évaluations particulieres, et d'autres documents qui, ensemble, décrivent un large évantail de réalisation dans le domaine du développement international.

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Tous les principaux bureaux d'A.I.D. dans le monde entier reçoivent ARDA, régulièrement et d'office, en même temps que d'autres rapports d'information.

Les destinataires qui résident dans les pays en développement et qui ont rempli le "Questionnaire d'ARDA" prouvant ainsi leur désir de recevoir ARDA et d'autres rapports d'information les reçoivent régulièrement. (On incite les missions de l'USAID à demander aux institutions homologues d'écrire au rédacteur d'ARDA pour se faire envoyer le questionnaire ou de faire parvenir les noms et adresses des institutions en question au rédacteur d'ARDA. Les voluntaires de Peace Corps peuvent également demander aux institutions homologues où ils travaillent d'écrire pour demander le questionnaire.)

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PREGUNTAS Y REPUESTAS SOBRE ARDA

¿Qué es ARDA?

ARDA, "A.I.D. Research and Development Abstracts" (Sumarios de Investigación y Desarrollo de A.I.D.), es un periódico trimestral publicado por la División de Documentación y Información, la Oficina de Dsarrollo Informacíon, el Despacho de Ciencia y Tecnologia.

¿Cuál es el objectivo de ARDA?

El objectivo de ARDA es el de transmitir información técnica y de desarrollo a trabajadores activos en asistencia de desarrollo.

¿Para quién se publia ARDA?

La audiencia blanco de ARDA consta de los funcionarios de A.I.D. en el mundo entero y de los instituciones claves seleccionadas en los países en desarrollo. Tales instituciones son agencias de gobierno, universidades, bibliotecas, organizaciones de investigación y otras organizaciones del sector público y privado.

¿Qué materiales son condensados en ARDA?

ARDA presenta extractes de estudios de investigación corrientes y menos recientes consolidados por A.I.D., informes del estado del arte, análisises del sector, evaluaciones especiales, y otros documentos que, juntos, describan un espectro ántlio de experiencia de desarrollo internacional.

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SAMPLE DOCUMENT CITATION AND ABSTRACT

Item number
Numéro de l'article
Número de articulo

133

Publication number
Numéro de la publication
Número de publicación

PN-AAH-900

A REFERENCE COMPILATION OF SCIENCE AND TECHNOLOGY OFFICIAL DEVELOPMENT ASSISTANCE FURNISHED BY A.I.D. FOR THE LESS DEVELOPED COUNTRIES (LDCs)

Title
Titre
Titulo

Author(s)
Auteur(s)
Autor(es)

Reynolds, A.; Gaithwright, T.

Issuing Organization(s)
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Logical Technical Services Corporation.

1980, 88 p.

Prepared for the United Nations Conference on Science and Technology for Development .

Supplementary note
Nota supplémentaire
Nota suplementaria

Document date and page numbers
Date et nombre de pages du document
Fecha y número de páginas del documento

Abstract
Résumé
Sumario

This research report, summarizing official development assistance provided by A.I.D. to LDCs, was produced to meet the needs of participants in the United Nations Conference on Science and Technology for Development. It represents a synthesis of A.I.D.'s economic assistance philosophy, which is characterized by a two-fold thrust: (1) a "basic human needs" approach to bilateral development assistance, which combines the furthering of U.S. interests abroad with U.S. humanitarian interest in that quarter of the world's population condemned to live at a substandard level; and (2) a refocussing of A.I.D.'s assistance to LDCs from sophisticated technology to light capital, labor-intensive applications of scientific and technological developments. The report concentrates on development assistance in the fields of health, nutrition, and population; energy and natural resources; employment, trade and industrialization, and access to technology; food, climate, soil, and water; and urbanization, transportation, and communication. In each case, the relevant technologies and means of technology transfer are discussed in conjunction with a statement of the development problem addressed by these technologies and with illustrative examples of A.I.D. programs. The report concludes that comparatively little U.S. technology can be transferred to LDCs without significant adaptation. The LDCs have become aware of the need for technologies tailored to fit their resource endowments and absorptive capacities, and stress is being placed on the development of more appropriate technologies as well as on devising policies and institutions permitting LDCs to make better technological choices. An extensive subject index is included in this report.

Project number
Numéro du projet
Número de proyecto

Contract/grant number or symbol
Numéro ou symbole du contract/de la subvention
o simbolo de contracto o subvención

AID/DSAN-C-0021

931023200

Foreign language availability
Disponible en langues étrangères
Disponible en idiomas extranjeros

Also available in French: PN-AAG-000, 88 p.

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N'oubliez pas de mentionner le numéro de la publication lorsque vous remplirez les bulletins de commande au dos de la présente publication.
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001 PN-AAH-351

PROFILES OF BASOTHO FARMERS

Wilken, G.C.; Fowler, M.H.
Colorado State University, Department of Economics.
1979, 57 p.

LASA Discussion Paper No. 8

Understanding the complex characteristics of Basotho farmers — who are resilient but who also resist introduction of new crops, tools, or techniques — is necessary if development planning for Lesotho's agricultural sector is to be effective. This report characterizes Basotho farmers through three essays entitled "Images of Basotho Farmers", "Are the Basotho Subsistence Farmers?", and "Progressive Farmers in Lesotho". All three studies elucidate the relationship between previous assumptions and present policy. The first essay notes that a confused image arises from literary characterizations as early as the 1830's. Evaluations of Basotho farmers vary from one period to another, revealing a strong cultural bias toward farmers' motivations and abilities. Some authors, for example, believe that Lesotho is an agrarian society composed of nonfarmers and indifferent pastoralists who produced great surpluses in the past but who are now incapable of self-subsistence; others claim they are not agriculturalists by tradition and make poor use of their natural resources. The second study concludes that despite the similarity of Basotho farmers to subsistence farmers elsewhere, typical subsistence farmer behavior models would not work well, if at all, in Lesotho — principally because of the pervasive opportunity for off-farm employment and its resulting income that characterize the Basotho farm and home economy. Recommendations are made for further preliminary studies of the environmental and social factors affecting production. The third essay cautions against employing progressive and initially attractive farming schemes to solve Lesotho's agricultural production problems. Such schemes distribute already scarce resources to the select few able to afford the new technology. In any case, it is uncertain that these programs can effectively disseminate new methods or produce widespread benefits in the agricultural sector. Indeed, they may create social disparity and thus impede agricultural development. Reliance on the inherent hardiness of the Basotho farmer and his highly developed local institutions represents a sounder basis for future sector development. An 81-item reference list (1861–1979) is appended.

AID/ta-BMA-6; AID/ta-CA-1 632006400

002 PN-AAH-492

THE "ELEUSINES": A REVIEW OF THE WORLD LITERATURE

Rachie, K.O.; Peters, L.V.
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1977, 187 p.

The Eleusines are practically unknown outside southern Asia and eastern Africa. Yet, *Eleusine coracana*, or finger millet, is a food source for millions of people in this region, indicating the important role it plays not only in nutrition, but also in the farming systems in the semiarid tropics. To increase the awareness of agriculturalists worldwide of the value of finger millet or ragi, this report reviews world literature on the characteristics, cultivation, and nutritional value of this crop. After an analysis of the morphology, cytology, and genetics of ragi, breeding techniques for ragi are examined, along with breeding incentives and constraints such as mating and stand establishment difficulties. A study of ragi cultivation by country shows that although it is adaptable to many soil types and high elevations, it is seldom grown on a large scale due to high labor requirements and the lack of nitrogen, one of the soil nutrients needed for cultivation. Ragi, normally grown by peasants, is usually fertilized not with expensive chemical agents, but with farmyard manure. Other aspects of ragi cultivation examined include land preparation, mineral content, and the effects of soil salinity. The authors recommend investigating the environmental conditions predisposing the development of the most important diseases affecting ragi — blasts and blights — and breeding varietal resistance to the pathogens causing these diseases. Ragi's resistance to storage pathogens and pests and its ability to maintain its viability when stored in hot, humid areas make it an excellent storage grain. Moreover, under intensive cultivation, ragi produces high yields, has high nutritive value, and enjoys relative freedom from pests and diseases. An evaluation of the protein, mineral, and vitamin content in ragi and its uses when processed into flour and malt is included. In conclusion, there is great potential for meeting future nutritional needs through the improved and increased production of ragi, but this will require intensified research and improved management programs. A total of 12 brief technical appendices and a 405-item bibliography (1886–1975) of English, French, Italian, German, and Russian references is appended.

AID/ta-G-1421 931097200

003 PN-AAH-529

CATALOG OF HOLDINGS AND OTHER REFERENCES IN THE LESOTHO MOA/LASA LIBRARY

Wilken, G.C.; Leballo, M.J.; Eckert, B.J.; Motleleng, M.; Bolls, K.J.
Colorado State University, Department of Economics.
1979, 377 p.

LASA Research Report No. 5

In 1978 the Lesotho Agricultural Sector Analysis (LASA) project team compiled a bibliography listing reference materials on agricultural planning and development in Lesotho which were held in collections in the United States, Europe, and Africa. Since that time, the acquisition efforts of the LASA project team have focused on obtaining materials from Lesotho, such as national and ministerial documents and technical and statistical reports, as well as project papers, data analyses, and related consultant reports reflecting indigenous research and development activities. This second bibliography represents the collection of the LASA library, which has recently merged with that of Lesotho's Ministry of Agriculture. This combined collection contains the most complete and accessible agricultural and development planning materials and

project documents in Lesotho. The bibliography contains nearly 3,000 entries (1841–1979) of English, Italian, Sesuto, German, French, and Spanish publications, and is organized into the following subject categories: geography and natural resources; agriculture; agricultural marketing; industry and commerce; population, employment, and migration; education, training, and extension; health and nutrition; society, culture, and the political process; Lesotho planning and development assistance; and theory and methodology. A final category lists other bibliographies, catalogues, government guides, surveys, and reports. Each entry carries conventional author, title, and publication information, as well as the library at which the document is held. The final section of the bibliography contains an alphabetical index of authors which refers the reader to the subject category entry for complete information.

AID/ta-BMA-6; AID/ta-CA-1

004 PN-AAH-723

KITALE MAIZE: THE LIMITS OF SUCCESS

Johnson, C.W.; Byergo, K.M.; Fleuret, P.; Simmons, E.; Wasserman, G.

U.S. Agency for International Development.
1979, 62 p.

A.I.D. Project Impact Evaluation Report No. 2

Ninety percent of Kenya's people depend on maize as their staple food. This report examines the impact of A.I.D.'s support to maize breeding projects in Kenya, which aimed to make regular improvements in hybrid maize through development of a breeding methodology and to create an institutional capacity in East Africa for maize research. The evaluation is particularly concerned with the spread of improved hybrid technology and its impact on economic growth, equity, and government policy. Most of the breeding program for high potential areas was a success — yields improved by 25% under research station conditions and, by 1972, the new maize seed had increased yields by one million tons. The private sector was crucial in the rapid diffusion of hybrid maize specifically adapted to the different regional climates. The new seed was of greatest value to those farmers with sufficient land, labor, and capital to fully utilize the innovation, but it also allowed numerous smallholders to improve their food security. The projects' successes, however, were limited by their concurrent failures. The majority of the poor did not participate in achieving the high yields made possible by the improved technology. Research to improve maize protein quality and to develop varieties in low rainfall areas was not successful; neither were efforts to create a regional maize research capacity. The Government of Kenya failed to adjust pricing and marketing systems to problems of abundance and did not insure availability of critical inputs, e.g., fertilizer and credit. Even more importantly, the planned development of an indigenous, ongoing maize research capacity, including training aspects, did not occur. It was learned that the simplicity and viability of the hybrid seed contributed most to its success; equity cannot be expected to arise from technological improvements; and the long-term continuity of foreign experts, which ensured the breeding program's success, did not allow institutionalization of the research capability. An 118-item bibliography (1963–79) is appended.

698017600; 618065200; 618065700; 615018000

005 PN-AAH-858

METHODS OF REDUCING POSTHARVEST LOSSES OF ROOTS, TUBERS, FRUITS, AND VEGETABLES IN DEVELOPING COUNTRY ECONOMIES

Morris, R.F.
1978, 17 p.

The goal of appropriate food technology is to preserve, process, and store food cost-effectively and with minimal loss of produce due to needless and preventable spoilage. This report focuses on various storage and processing interventions designed to improve the postharvest production of fruits, roots, tubers, and vegetables. Of crucial importance to the shelf life and quality of produce are the temperature, relative humidity, gas concentrations, ventilation, and absence of light in the storage environment. Although refrigeration reduces spoilage of perishable produce, the dual need for equipment maintenance and a continuous power supply frequently limits its applicability in developing countries. Less expensive cooling systems and mechanical devices need to be developed such as those using freon, ammonia, or water. Evaporative cooling regulates humidity to prevent shriveling, a substantial problem in arid areas. Atmospheric gas alteration (AGA), also known as controlled atmosphere storage, places produce in an environment with air of different proportions of nitrogen, oxygen, and carbon dioxide. While AGA increases off-season fruit availability, fruit thus stored must be of higher quality than that stored in air to be cost-effective. An example of AGA preservation is the wrapping of bananas in semipermeable plastic film to trap carbon dioxide. Effective produce preservation also requires proper physical spacing and ventilation while in storage to combat fungal disease incidence. The pit storage method covers cured roots and tubers with dirt to maintain sufficient humidity and to shield the produce from the sun. Processing methods most applicable to LDCs' needs and of the greatest potential impact are easily implemented and are either low in cost or labor intensive. Examples include fermentation, drying, dehydration, heat processing or canning, and chemical treatment. The report proposes further study of canning and fermentation processes. Attention should also be given to such vital factors as transportation, packaging (perhaps the cheapest method of minimizing produce losses), postharvest system analyses, and personnel training to ensure problem awareness. Four reference items (1970–78) are included.

AID/ta-C-147-614 931115500

006 PN-AAH-859

FRUIT, VEGETABLES, ROOTS AND TUBERS IN THE DEVELOPING ECONOMIES: AN ESTIMATION OF LOSSES

Morris, R.F.
1978, 15 p.

Because they spoil easily, fruits, vegetables, roots, and tubers, which number over 1,000 species throughout the world, are called "perishables." In this report, damages occurring to perishables and the problems of estimating the associated losses are discussed. Damage to perishables results in weight loss causing decreased flavor, nutritional value, appearance and, since perishables are commonly sold by weight, in lower market value. This damage may be physiological, pathological, or physical. Physiologically, since plants continue respiring after harvest, the speed with which the metabolic process of respiration converts starches to carbon dioxide and water vapor determines how fast perishables lose weight during storage. For example, roots and tubers respire slowly after harvest and lose only 2–5% of their weight per month while snap beans may lose 83% of their weight in only 5 days. The temperature and oxygen supply in storage facilities also determine how long perishables will remain edible. Pathological elements (i.e., fungi and bacteria), the most serious cause of post-harvest damage, usually harm plants after previous physiological or physical damage has taken place. Initial infection by a specific pathogen followed by massive attack by weak pathogens is the normal pattern. Losses from physical damage are due to the high water content which predisposes produce to bruising when bumped or dropped. This type of damage is common in LDC's where food handling techniques are poor. Damage from insects and rodents is significant, but not as harmful as the above factors. The reliability of data on damage losses is often questionable for several reasons. Data are frequently valid only for one commodity under one set of conditions. The extent of produce loss within a short time after harvest also varies widely. Finally, loss estimates are frequently misinterpreted when the parameters used for measurement are not clearly defined and the numerical data obtained is too detailed to be reliable. Even at a conservative estimate, however, some 25% of perishables produced are lost annually, indicating a need for effective international action. A 16-item bibliography (1960–78) is attached.

AID/ta-C-147-614 931115500

007 PN-AAH-922

QUANTITATIVE ANALYSES OF LESOTHO'S OFFICIAL YIELD DATA FOR MAIZE AND SORGHUM

Eckert, J.
Colorado State University, Department of Economics.
1980, 35 p.

LASA Research Report No. 8

Crop yield estimates computed by Lesotho's Bureau of Statistics have undergone considerable scrutiny recently. The Bureau's data seem unreliable, showing a long-term decline in yields, a high degree of variability both within each year and between districts, and, in 1976/77, a jump of more than 50% over earlier averages. Climate fluctuation, however, heavily influences cropping patterns in Lesotho and may account for these anomalies. This paper analyzes, at the macro-data level, the relationships between crop yields and rainfall in Lesotho and develops mathematical equations to estimate maize and sorghum crop yields. Equally importantly, it tests the validity of Lesotho's official crop yield statistics. Multiple linear regression, run on 39 of 59 selected recorded yield averages, was applied to determine the relationship between yield levels and monthly rainfall totals. Illustrating his conclusions with charts and mathematical equations, the author quantifies yield relationships for maize and sorghum; analyzes the accuracy of his equations and the variability in official statistics; discusses yield discontinuities, such as that for 1949/50 and 1976; and determines the applicability of the equations in predicting crop yields. The results suggest that Lesotho's maize and sorghum yield figures are highly reliable and that their variation reflects actual agronomic and environmental determinants; proceeding with other analyses based on these data now appears warranted. Because the equations accurately model existing data, estimates are calculated for the early 1970's when no official statistics were collected. With the help of the equations presented, government officials can make pre-harvest predictions of crop yields and can formulate better policy decisions on such issues as food imports, food aid negotiations, inter-district food movements, and strategic food reserves. A 14-item reference list (1952–80), as well as two appendices explaining the use of "dummy variables" in the equations and discussing the methodology used in estimating 1976 crop yields, are appended.

AID/ta-BMA-6; AID/ta-C-1 632006400

008 PN-AAH-977

CENTRAL AMERICA: SMALL-FARMER CROPPING SYSTEMS

Hobgood, H.H.; Bazan, R.; Ehrick, R.; Escobar, F.; Johnson, T.; Lindenberg, M.
U.S. Agency for International Development.
1980, 111 p.

A.I.D. Project Impact Evaluation Report No. 14

Rural development strategies have increasingly focused on extending modern production technology to improve the low yields of small farmers who produce most of the world's food crops. This report evaluates a research project to increase small-farmer production in Central America by developing improved cropping practices. The Small Farmer Cropping Systems Project (SFCS) supported research by the Center for Tropical Agricultural Research and Training (CATIE) in Costa Rica on the traditional multicropping systems used by over 4 million small farmers in Costa Rica, Nicaragua, Honduras, El Salvador, and Guatemala. Although progress was slow in El Salvador and Guatemala, the project succeeded in implementing on-farm research and developing area-specific recommendations. The major shortcoming of the 5-year project was that it concentrated on the research process itself rather than on verifying and disseminating results.

Farmer impact was thus limited to the 75 small farmers on whose farms research was conducted. Farmers in Nicaragua and Guatemala were active participants, whereas those in Costa Rica and Honduras remained largely ignorant of the project and disinterested in adopting alternative systems. Test farm yields increased in every country but Guatemala. CATIE's staff, training, and support capabilities were greatly improved and most national agricultural institutions involved were positively impacted. The team concluded that SFCS is a replicable model capable of significantly improving the lot of the small farmer. Recommendations for future projects are: (1) include dissemination of research results; (2) stress an interdisciplinary approach; (3) seek the active participation of farmers; (4) improve SFCS methodology by upgrading farm selection criteria, clarifying the relationship between on-farm and central station experiments, and increasing attention to the non-agronomic aspects of small farm systems; (5) promote maximum interagency collaboration; and (6) shorten the time lag between research, verification, and dissemination. Appendices on evaluation methodology, project impact on CATIE, and CATIE's production data are included, as are reports on Nicaragua, Guatemala, Honduras, and Costa Rica.

596006400

009 **PN-AAJ-140**

INTERCROPPING WITH CASSAVA: PROCEEDINGS OF AN INTERNATIONAL WORKSHOP HELD AT TRIVANDRUM, INDIA, 1978

International Development Research Centre (IDRC); Central Tuber Crops Research Institute.
1979, 142 p.

IDRC-142e

Although as much as 50% of all cassava is produced in small farm, multiple cropping systems, most cassava research has been monocrop oriented. This report presents the proceedings of a workshop, jointly sponsored by the International Development Research Centre and the Indian Central Tuber Crops Research Institute (CTCRI), on the problems and benefits of intercropping with cassava. Researchers and policymakers from four international and six national research centers were invited to participate. After 2 days of field visits to CTCRI's central and farm research sites and to a cassava processing plant, 14 papers were presented on research efforts in Brazil, India, Indonesia, Malaysia, Central America, Africa, and Thailand. Topics covered included the implications of cassava intercropping for soil fertility, agroclimatic and biological interactions, agronomics, agroeconomics, and crop protection. Finally, participants reviewed research methodologies and established guidelines for future research on intercropping with cassava. The authors conclude that further research is needed on the effects of regional drought stress on productivity; the type and timing of bean planting with cassava; intercrop disease dynamics; analytical techniques for using variability and cropping pattern data; multiple cropping effects on stability; and the economic impact of intercropping with cassava. Increased attention should be given to the following issues: (1) the effect of greater production in lowering the market price for cassava producers; (2) the tendency of intercropped cassava to develop large roots which lessen its marketability; (3) the need to compensate for cassava's high potassium demand by intercropping with low potassium demand plants or altering the fertilizer regime; (4) the potential for intercropping at a later stage in cassava's growth and simultaneously harvesting both crops; (5) the need to involve farmers in the design and evaluation of on-farm research; (6) the need to orient cassava research toward the poorest third of the farmers; and (7) the need to improve evaluative methodologies. A 179-item bibliography (1935–79) and a list of workshop participants are appended.

AID/ta-G-1406 931078600

010 **PN-AAG-691**

POLICY DIRECTIONS FOR RURAL WATER SUPPLY IN DEVELOPING COUNTRIES

Burton, I.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 54 p.

A.I.D. Program Evaluation Discussion Paper No. 4

In order to provide an adequate potable water supply for every individual in developing countries by 1990, greatly increased efforts have been slated by donor agencies during the International Drinking Water Decade (1980–90). To be effective, however, these increased efforts must improve on previous water projects, which have had a high failure rate. This paper examines problems associated with rural water supply programs and recommends changes in policy directions. The author briefly reviews the history of water assistance projects and the priority accorded them by donors and host countries and lists recent evaluations conducted by international and bilateral donors. The many maintenance-related problems which are most commonly responsible for failures in water supply projects are discussed. In general, the lack of spare parts and other supplies, coupled with insufficient national program support (often reinforced by donor emphasis on construction, rather than maintenance), leads to equipment breakdown or misuse, and not the technology itself. Lack of coordination among the myriad of donors and consultants leads to further confusion and inefficiency. Lastly, villagers are often unaware or misinformed about the benefits of potable water — they tend to value taste or convenience over safety. Project planners often ignore the social/religious value placed on water by the community, which can lead to a lack of local motivation to maintain and use the new systems. To ensure the effectiveness of future programs, the author recommends that A.I.D.: (1) choose appropriate technology which is cost-effective and easily maintained; (2) increase donor collaboration; (3) improve the manpower, administration, and commitment of host governments to national water programs; and (4) increase community participation and education related to local water projects. The author especially recommends a shift in emphasis from the planning of individual projects to a national or sector approach in which institutional building activities as well as

hardware are funded. A list of practical steps to achieving these policy shifts is presented. A 14-item bibliography (1975–78) and an appendix on problem dimensions are attached.

930008500

011 PN-AAG-841

PROPOSED WATER MANAGEMENT PROGRAM FOR MAJOR IRRIGATION SCHEMES IN SRI LANKA

Lance, E.; Willsie, R.; Moore, M.; Hagood, M.; Kemper, D.
CH2M Hill, Inc.
1979, 285 p.

Because of poor irrigation management, much of Sri Lanka's agricultural lands can be farmed only occasionally or only during the Maha season — despite the fact that sufficient rainfall exists for one or more crops per year. The purpose of this study is to determine the institutional, organizational, and physical components of a proposed A.I.D. irrigation program in Sri Lanka. The country's water management problems are primarily due to poor maintenance and a lack of control over water use. Insufficient attention is given to operational requirements, and budgeting for maintenance is inadequate. Scarce government resources are often used for new construction rather than for maintenance. Water is taken at will by area farmers, and relationships between farmers and government agencies are not good. Furthermore, water management personnel are poorly trained and are not given the authority and support they need to enforce water rationing. A.I.D. has proposed a program which includes upgrading of the Walawe and Gal Oya irrigation schemes, improved water management training and extension programs, increased cooperation from the Irrigation Department, and funding of a social research program. The Irrigation Department's Water Management Division would be strengthened — its staff enlarged and trained, and the Division placed under the authority of a deputy director who would have no other responsibilities. Other steps would include: (1) revision of criteria used to select technical assistance recruits, i.e., placing less weight on academics and more weight on numeracy tests and human relations; (2) greater coordination of programs and plans by the Department of Agrarian Services, Agriculture, and Irrigation; and (3) a willingness to prosecute for damages in order to restore discipline to irrigation projects. Finally, the proposed A.I.D. project is evaluated for technical, social, economic, financial, administrative, and environmental soundness. Appendices include descriptions of the Irrigation Department's organizational structure and work program, local level governments, farmer organizations, and the Uda Walawe and Gal Oya projects, and a cost breakdown of the proposed A.I.D. program.

AID/otr-C-1618 498024900

012 PN-AAH-575

POTABLE WATER SUPPLY IN RURAL MOROCCO

Dajani, J.S.
1979, 23 p.

The shortage of potable water supplies in Morocco has been the target of an extensive project to rehabilitate 400 rural wells in eight provinces. After assessing the project's technical feasibility, the author of this report concludes that such a vast project, besides being difficult to manage, would be too diffuse to show any tangible improvements. He proposes instead that extensive efforts to rehabilitate wells be undertaken in one, or at most two, provinces; and he provides a model for such a scaled-down effort. The selection of Ouerzazate, the province to serve as the model's site, was based on its poor water supply statistics (87.8% of the households have no water source), the poor condition of existing wells, adverse climatic conditions, and the fact that the Peace Corps has already laid the groundwork for rehabilitating wells in this area. A preliminary site survey established the existence of 100 public wells and 40 other types of public water sources and found that the province's residents often bypassed these wells, which contain chlorinated water, in order to obtain better tasting, but obviously dirtier water, from poor quality wells. The following work plan for the proposed project revision is suggested: (1) setting priorities for selecting target communities; (2) assessing the target communities' water supplies; (3) defining specific water source improvements, as well as identifying skilled laborers; (4) determining if existing sanitation conditions need improvement; (5) educating the community about hygiene and water source maintenance; and (6) conducting follow-up visits to each community. Emphasis is placed on the need to combine water source improvements with upgrading waste disposal practices and to keep the project's administrative structure as simple as possible. The inputs required by the Peace Corps and the host government are detailed, as are budgetary and administrative needs. Finally, it is suggested that a team of U.S. volunteers and Moroccan officials initiate planning and surveying activities in the province of Marrakech in view of a possible adoption and adaptation of the proposed model in that province. Detailed figures and tables are located throughout the report.

AID/ne-C-1575 298003500

013 PN-AAH-668

IRRIGATED AGRICULTURE IN AFGHANISTAN

Experience, Inc.
1978, 134 p.

Agriculture in Afghanistan, particularly small-farmer agriculture, is hampered by inadequate irrigation systems and inappropriate use of water and land resources. This study identifies three main problem areas inhibiting development of irrigated agriculture in Afghanistan and proposes possible solutions. Failure to effectively inventory and exploit resources and lack of adequate conveyance systems limit available irrigation supplies, the use of which is further constrained by the reluctance or inability of farmers to

adopt irrigation practices. Several solutions proposed for this resource problem are to: (1) establish a National Water Resources Committee (NWRC) responsible for the review of all proposed projects; (2) develop groundwater resources by drilling wells and by artificially introducing water; (3) undertake a comprehensive soil inventory and description; (4) conduct a soil/water conservation program for irrigated catchment areas; and (5) construct surface water storage reservoirs. The problem of conveyance system inadequacies can be lessened by construction of new river diversions and consolidation of existing ones; introduction of supply pumps; and reductions in the amount of water needlessly lost — over 65% of the total supply — through seepage, inadequate system design, evapotranspiration, and insufficient flood protection. The lack of appropriate farm infrastructure and farmer acceptance constitutes the final problem area. Suggested solutions are: (1) increasing farmer knowledge of modern farming methods and enforcing application of efficient water-use practices; (2) improving on-farm water distribution and drainage systems; (3) increasing soil reclamation activities and introducing farming practices more conducive to efficient soil and water use (intercropping, proper seeding, etc.); and (4) maximizing the use of rainfall and other runoff irrigation by the use of impoundments. A series of technical packages to deliver necessary inputs and implement some of the proposed solutions is presented. Included are five appendices on the use of groundwater and recharge, the potential impact of technology, the role of soils, the NWRC, the report's study methodology, and survey discussion notes.

AID/afr-C-1130 GTS 298035300

014 **PN-AAH-724**

KENYA RURAL WATER SUPPLY: PROGRAMS, PROGRESS, PROSPECTS

Dworkin, D.

U.S. Agency for International Development.
1980, 45 p.

A.I.D. Project Impact Evaluation Report No. 5

Despite high levels of investment, Kenya's 10-year old water supply program has been unable to build successful water supply systems in rural areas; even as new systems are built, the number of inoperative systems increases. This paper evaluates the impact of the national program and the reasons behind its failure and makes policy recommendations for future A.I.D. water supply projects. The two types of activities supported by Kenya's Ministry of Water Development (MWD) — systems built and operated by MWD and self-help (Harambee) water projects — are discussed. Of special interest is a Harambee program financed by A.I.D. and the Cooperative for American Relief Everywhere (CARE) which succeeded in building only 1/3 of its scheduled projects, with increases in per capita costs of over 100%. Complexity of design, lack of supervision and government support, widely scattered site locations, and the large number of scheduled users were among the problems responsible for these and other MWD project failures. The MWD program's impact is analyzed in terms of reliability, service to users, and socioeconomic, health, and other benefits of rural water supply. The author's main conclusion is that delivering piped water to individual metered connections is inappropriate for rural Kenya due to the lack of engineers, high capital costs, inadequate operational/maintenance funding, and ineffective administration. Specific recommendations are: (1) that groundwater resources be developed and that use of improved shallow wells and handpumps be encouraged; (2) that new projects demand only as much institutional support as is available, while upgrading support capabilities; (3) that additional funding sources for the program be located; (4) that increased system reliability become a primary A.I.D. focus; (5) that health and sanitation measures be included only if existing community practices are deemed inadequate; and (6) that A.I.D. finance self-help projects on a regional or national, rather than a piecemeal, basis. Appendices are included on major donors to the Kenyan program, reasons for diesel system unreliability, water development expenditures, evaluation itinerary, and data collected on selected systems.

015 **PN-AAH-749**

PHILIPPINE SMALL SCALE IRRIGATION

Steinberg, D.I.; Caton, D.; Holloran, S.; Hobgood, T.
U.S. Agency for International Development.
1980, 75 p.

A.I.D. Project Impact Evaluation Report No. 4

Since 1976, the Philippine Government (GOP), with A.I.D. support, has built or rehabilitated over 1,000 village irrigation systems. This document evaluates the two successive A.I.D. projects which have contributed to this effort. The evaluation begins with a brief description of the projects, in which small, subsistence farmers are encouraged to form cooperative organizations called Irrigators Service Associations (ISA's) in order to gain access to loans and electricity and to construct, operate, and maintain village irrigation systems. The GOP provides loan monies and extension services and arranges for electricity to be brought to the area. The next section analyzes the economic, social, and political impact of these projects. Although irrigation provides the opportunity to grow two crops each year and this double cropping has led to increased on-farm employment, these effects have not necessarily guaranteed real income benefits for the farmers, particularly since they must curtail off-farm employment. Increasing costs of production, debt burdens from capital investments, and persistent technological and water management problems have dampened the rise in farm incomes. The small farmers also do not receive the higher price paid by the GOP exporting company because they cannot afford to adequately treat their rice after harvest. The improvement in family income that does occur is often spent on education rather than improved nutrition. A concluding section contains major findings and policy implications. Overall, the village irrigation systems have had immediate and visible benefits. Nevertheless, more extensive use of total farm resources (raising livestock), complementary off-farm enterprises, post-harvest grain treatment, and timely and adequate credit provision will be

necessary to increase farmer income to a level enabling them to carry their debt. The authors recommend, therefore, that any future A.I.D. support concentrate on technical assistance to improve the productive capacity of farms in existing irrigation systems rather than continuing to expand the ISA network. Six appendices concerning related topics, including a 20-item bibliography (1975–79), are included.

492027400; 492030100; 492033400

016 PN-AAH-936

REVIEW OF AQUACULTURE DEVELOPMENT ACTIVITIES IN CENTRAL AND WEST AFRICA

Grover, J.H.; Street, D.R.; Starr, P.D.
Auburn University, International Center for Aquaculture.
1979, 98 p.

Fish farming is not widely practiced in Central and West Africa despite promotion efforts dating back to the 1940's, the acceptance of fish as a food by the vast majority of people, and the availability of suitable lands. The purpose of this study is to assess the reasons why these efforts have not had more impact and to suggest improvements. The following responses to fish culture development efforts are noted. (1) The AID-assisted Peace Corps project in Zaire has been impressive: farmer demonstrations have had good yields; Peace Corps volunteers are extremely dedicated; and small fish are readily accepted by the rural population. Although government participation has been meager, conditions seem favorable for the expansion of aquaculture. (2) Although Peace Corps volunteers working on fish culture development in Cameroon were as dedicated as those in Zaire, Cameroon simply lacks the grass roots interest noted in Zaire. (3) While there is a semblance of fish culture extension and fingerling distribution in Nigeria's Oyo State, the impact of these programs has not been great. On the other hand, a large land clearing and fish farm development scheme in the Bendel State (managed by the U.S.-based Tiffany Farms) has generated considerable interest among other Nigerian states and investors. (4) Little, if any, fish culture in Liberia is taking place at the village level; nor are there sufficient hatcheries or local biologists to sustain a development effort. Nevertheless, the authors view the current USAID proposal to strengthen the Central Agricultural Experiment station at Suakoko as worthwhile. Aquaculture, it is concluded, has the potential to provide both food and income for rural village dwellers. Future development efforts should begin with a careful country-by-country inventory of land, water, climate, and other resources to assess each area's suitability for fish culture. In addition, future efforts should be integrated with health education programs emphasizing fish as a source of protein and the need to control schistosomiasis. The report includes a sociocultural overview, individual country analyses, and a bibliography (33 entries, 1961–79).

AID/DSAN-C-0053 931131400

017 PN-AAH-968

WATER RESOURCE DEVELOPMENT IN INDIA: ISSUES, PROBLEMS, AND PROSPECTS

Posz, G.S.; Peterson, D.F.
USAID/India.
1980, 35 p.

The future of India will be determined to a significant degree by its success or failure in developing its water resources. The failure of the 1979 monsoon — which resulted in one of the worst droughts of recent record and caused an 8-10% drop in agricultural production and near stagnation in the national economy — highlights India's desperate need for more abundant water. This report provides a current account of water resources development in India, with particular emphasis on irrigation and agricultural production. Although India's average rainfall is approximately 120 cm (slightly more than the global mean of 99 cm), it is seasonal and often erratic in timing and geographical distribution. Groundwater is unevenly distributed as well. Although irrigation development is a priority of the Government of India (GOI), the nation's existing irrigation systems are inefficiently managed. The remedy is increased construction and improved operation of distribution channels. It is estimated that a reduction in water transit losses, provision of regulatory structures, and crop planning could increase the total amount of irrigated land by as much as 25%. In addition, effective use of groundwater resources will require that the GOI assign a high priority to rural electrification because electricity provides a more economical and efficient means of lifting groundwater for irrigation purposes than diesel-powered pumps and devices driven by draft animals. Water rates charged to farmers are too low. However, it is unlikely that the central government will try to force either higher rates or other reforms through the state assemblies, where there would be sharp resistance from landholders. Inter-basin transfers to water-scarce states via a national water grid seems equally unlikely. Most probably, a national grid will be developed incrementally, with a series of projects gradually extending the system throughout the country. Overall, scarcity of capital, rising construction costs and other economic constraints will probably slow the rate of water resources development in India — particularly with regard to the expansion of irrigated lands.

018 PN-AAH-974

RURAL WATER PROJECTS IN TANZANIA: TECHNICAL, SOCIAL AND ADMINISTRATIVE ISSUES

Dworkin, D.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 31 p.

A.I.D. Evaluation Special Study No. 3

For this evaluation of A.I.D.'s rural water projects in Tanzania, a survey was conducted of 20 Tanzanian villages whose completed water systems used the four major technologies available for dry, wet, and mixed regions. Villages visited represented regions with

different natural water resources. Three major results from this survey are presented in this report. On the technological level, it was found that of the types of water systems surveyed — those driven by diesel engines, gravity, windmill/diesel, and shallow well handpumps — handpumps represented the most appropriate technology due to their greater reliability and lower capital and operating costs. Shallow wells were also labor-intensive and the use of local construction and maintenance materials increased employment. A lesson learned was that a number of diesel and windmill/diesel systems did not function due to a lack of funds for fuel and parts. It was also found that most users were willing to pay operational costs if the systems were perceived as equitable and useful. Finally, on the administrative level, it was found that some donors set up separate parallel organizations with offices isolated from the office of the Regional Water Engineer who will eventually be responsible for the project. Without close coordination, successful continuation of the project is uncertain. Three recommendations corresponding to these results were made: (1) A.I.D. should specify the use of shallow wells with handpumps for village water projects in Tanzania. (2) Users should pay for the system's operating and maintenance costs and be involved in the water supply decision. In addition, rural water projects should incorporate a method to assess users and to collect funds to cover operating and maintenance costs. (3) Project planners should ensure that the activities of the Regional Water Engineer are integrated with donor initiatives. This can be accomplished by training counterpart personnel; conducting periodic reviews to prevent duplication; and adopting or adapting the methods of donor projects into the regional program. Appendices on field studies, bilateral assistance, and technical requirements for A.I.D. potable water projects are included.

019 PN-AAH-975

KOREAN IRRIGATION

Steinberg, D.I.; Morrow, R.B.; Palmer, I.; Dong-il, K.
U.S. Agency for International Development.
1980, 89 p.

A.I.D. Project Impact Evaluation Report No. 12

The irrigation project evaluated in this report was designed to help South Korea become self-sufficient in rice and barley and to raise farm incomes. Fifty-five irrigation works including pumping systems, drainage, reservoir construction, and land reclamation were completed. All were small (and in many instances nearly complete) elements of a larger system. Rice self-sufficiency was achieved by 1975, soon after the project began. Barley production declined due to a high rice support price and a growing demand for wheat in urban areas. Farm incomes increased. However, because farm incomes are directly related to farm size, the project affected beneficiaries unequally. The project's success is attributable to the high degree of engineering and administrative competence demonstrated by the Government of Korea, the effective delivery of extension services and agricultural inputs, and the high support price for rice. Lessons learned include the following: (1) More attention to overall economic trends and collection of baseline data is needed in the project design stage. (2) Small and medium irrigation schemes can be economical when added to an already effective farming system. (3) Because neither the bureaucratic nor social structure of Korea permits farmers and their wives to participate in project decisionmaking, community development outputs should not be expected from such special projects. (4) The assumption that a strong correlation exists between higher income and improved nutritional standards is false in non-subsistence economies. Korean farm families directed their extra income to the education of their children rather than to dietary improvements. (5) Unless the effects on women are considered in the project design, women's working conditions may deteriorate. (The labor-saving technology introduced in this project benefited men; women have undertaken a larger share of the field work as children have left home for school or urban employment.) Aging of the farm population as the result of increased education and migration to urban areas will be an important factor in future farm development. Appendices include related socioeconomic studies and a brief bibliography (11 entries, 1974–80).

489070600

020 PN-AAJ-208

THE IMPACT OF IRRIGATION ON DEVELOPMENT: ISSUES FOR A COMPREHENSIVE EVALUATION STUDY

Berry, L.; Ford, R.; Hosier, R.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 82 p.

A.I.D. Program Evaluation Discussion Paper No. 9

Although irrigation can greatly improve the world's capacity to feed itself by increasing agricultural production, most irrigation projects fall short of this goal. These failures are due sometimes to defective design, but more often to the expense involved, poor management and leadership, and improper use of resources. A sound system of evaluation can improve the effectiveness of these projects. This report examines A.I.D.'s current evaluation process and recommends revisions to improve project design. After reviewing the current status of irrigation in the developing world, the authors discuss A.I.D.'s evaluations, which typically concentrate on a project's conformity to its original purpose or on the performance of the implementing agency. The study found no evaluations which look comprehensively at a project's three stages — preparatory, construction, and operational — or examine and compare basic themes of irrigation project designs. Recommendations are: (1) that in order to improve project management and design, far greater use be made of evaluation data; (2) that evaluations focus on donor, host country government, and user needs; (3) that a grid of analytical questions/criteria be used consistently in evaluating each project; (4) that use of local public and private institutions in evaluating projects be increased; and (5) that evaluations stress management and environmental issues and farmer risk responses. Finally, evaluation guidelines designed around five major components are presented for routine use at

each of a project's three stages. The five areas are economic viability; use of land, water, capital, and labor resources; performance and management of the water system; environmental effects (including health impacts); and social soundness, including effects on production and income distribution. At least one project from each of A.I.D.'s four regional bureaus should be selected for more detailed examination, and an overview of the irrigation in each region where A.I.D. has or will have irrigation projects should be developed. A 107-item reference list (1967–80) and annexes on related U.N. projects, environmental considerations, and criteria for project site selection are appended.

930008500

021 PN-AAG-922

THE SOCIOLOGY OF PASTORALISM AND AFRICAN LIVESTOCK PROJECTS

Horowitz, M.M.

A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 115 p.

A.I.D. Program Evaluation Discussion Paper No. 6

To be successful, development projects not only must be technically sound but also must take account of developing countries' values and indigenous strategies. This paper analyzes the sociological and ecological assumptions which underlie A.I.D. interventions in the West African livestock sector. Against a background portrait of the African herdsman, A.I.D. sector interventions in the region (infrastructure improvements, replication of western commercial production systems, and organizational innovations) are identified and critically reviewed in terms of the problems of desertification and mixed farming, range tenure, pastoral offtake, mobility, herd management, and the role of women. The author faults A.I.D. projects for ignoring the social and ecological realities governing African pastoral life. He stresses the fact that pastoralist behavior is a logical outgrowth of past involvement with the Sahel environment. Development efforts which impinge on mobility or threaten the herd's ability to support a large number of persons will be resisted. "Top-down" approaches that ignore the highly individualistic nature of West African herdsmen are likely to meet with failure. In line with the work of other anthropologists and social scientists, the author notes the following functional relationships between herdsmen and herding conditions which should be safeguarded in livestock interventions: (1) Due to the variability of semiarid grazing conditions, mobility is often necessary for survival. (2) Pastoralists recognize claims existing on land and water use and their movement is constrained by those claims. (3) Pastoralists seek to increase and maintain the size of their herds because of the many and different benefits deriving therefrom. (4) Despite the desire to increase herd size, there are managerial constraints on the number of animals maintainable under the direct control of a single herding unit. Expansion beyond that point leads to diminishing returns, reflected in an increase in disease, predation, theft, runaways, and watering costs. A 108-item list of French and English references cited (1939–78) is appended.

022 PN-AAH-238

REPORT OF THE WORKSHOP ON PASTORALISM AND AFRICAN LIVESTOCK DEVELOPMENT, HARPERS FERRY, WEST VIRGINIA, 1979

Institute for Development Anthropology; A.I.D., Bureau for Africa and Bureau for Program and Policy Coordination.
1979, 86 p.

A.I.D. Program Evaluation Report No. 4

At a recent workshop on pastoralism and African livestock development, it was agreed that livestock sector programs must be reoriented to make them more compatible with the social, economic, and environmental realities of arid and semiarid pastoral regions of Africa. This report summarizes the discussions of that workshop. Workshop topics included range degradation and productivity, program and project objectives, institution building, marketing, and case studies examining the SODESP Senegalese Project, the Maasai Livestock Project in Tanzania, livestock development in Kenya, and the evolution of livestock projects in Botswana. Consensus on the following points was achieved. (1) Quantitative data relating to pastoral systems are unreliable for two reasons. First, arid and semiarid regions experience considerable climatic instability. Data gathered at a specific time or location may not be relevant under future conditions. Second, data gathering techniques are insufficiently standardized to encourage comparability. (2) Management units for development interventions in livestock should be both small scale and based on existing cultural ecological systems. In large projects, decisionmaking is centralized and remote from individual herd managers who are locally in charge of herd movements and offtake. (3) Herd mobility can be due to crisis-survival mechanisms or effective strategies for long-term range exploitation. Planners must understand these processes and find ways of delivering quality-of-life services to mobile populations without constraining mechanisms of pastoral life. (4) Semiarid rangelands can undergo biological and climatic stress without long-term secular degradation, the very identification of which is difficult. Incorrect range analysis and treatment can exacerbate the semiarid ecosystem. (5) Livestock program emphasis should be placed on supporting the subsistence base of the pastoral herder rather than stressing commercial activities benefitting consumers. (6) Program monitoring and evaluation should be made components of programs in the livestock sector. Areas of further research are specified. Appendices include a list of workshop participants and agenda, and questionnaires.

AID/otr-G-1741 930004700

023 PN-AAH-721

CASSAVA DISEASES IN AFRICA REVIEWED

Terry, E.R.; Oyekan, J.O.
International Institute of Tropical Agriculture (IITA).
1976, 3 p.

Cassava (*Manihot esculenta*), a hardy, tropical lowlands plant, annually yields more than 50 million tons of edible roots in Africa alone, where cassava is a diet staple in 40 nations. Cassava,

however, is susceptible to a wide variety of diseases, some of them of unknown origin. This report by the International Institute of Tropical Agriculture (IITA) reviews cassava's six major disease types. (1) Cassava mosaic disease (CMD) is caused by a virus or virus-like agent and results in chlorosis of the leaves' discrete areas. Spread by whiteflies and by planting cuttings of infected plants, it causes a yield loss of 20–90% and is active in all of East, West, and Central Africa. (2) The virus-caused cassava brown streak (CBS) renders tubers inedible by causing extensive root necrosis. Active along Africa's east coast, CBS' main symptoms are leaf chlorosis and brown streaks on plant stems. Control of CBS requires use of disease-free planting material. (3) Cassava bacterial blight (CBB), one of the most devastating of bacterial diseases, affects the yield and planting material. CBB reduces yield by 36.6–58.2%; is characterized by water-soaked leak spots on plant leaves; and is spread by rain splash and the use of infected plant material. Use of disease-resistant cassava varieties can control CBB. (4) Cassava anthracnose (CA) is a fungus that has dramatically affected cassava in Nigeria, Zaire, Ivory Coast, Liberia, and Ghana. In 1975, an estimated 90% of Zaire's plants were severely affected by CA. (5) Grey leaf blotch, brown leaf spot, and white leaf spot are cassava's major leaf spot diseases (*Cercospora*). They are caused by fungi spread by the infection of new plantings by the conidia of old, infected cassava. (6) *Phytophthora* and white thread disease are the two main root rot diseases affecting cassava. They appear where drainage and excessive rainfall are problems. Their control requires good drainage, use of light soils, avoidance of waterlogged areas, sensible crop rotation, and an early harvest. The report notes IITA development of disease-resistant cassava strains and includes a 21-item bibliography (1938–75) of English and French sources.

AID/ta-G-1251 931030900

024 PN-AAH-722

CONTROL OF IMPORTANT FUNGAL DISEASES OF POTATOES: REPORT OF THE PLANNING CONFERENCE, LIMA, PERU, 1978

International Potato Center.
1979, 184 p.

Since potatoes constitute the staple food of much of the world's population, many studies have been conducted on methods of controlling potato diseases. This report of the Fifteenth Planning Conference sponsored by the International Potato Center presents an overview of the latest research on fungal potato pathogens. Numerous research papers discuss the control of such potato diseases as early and late blight, wilt, stem rot, white mold, potato black wart, and rhizoctonia. Attention is also directed to pathogens commonly afflicting stored potatoes awaiting marketing. Each paper examines the incidence and impact of the disease as well as measures for its control. One paper, studying the development of potato types resistant to late blight pathogens, suggests such control strategies as the development of potato cultivars resistant to pathogen penetration and to mycelial development in the infected tissues and development of laboratory methods to screen resistant levels in potentially valuable potato selections. The chemical and biological properties of chemicals used to control fungal diseases in potatoes, including those with systemic and soil-disinfecting effects, are listed in an extensive table. Disease-specific recommendations of this conference include: using three potato types with high, medium, and low disease resistance at all late-blight testing sites to provide standards with which to compare new potato clones; conducting studies on the physiology of late blight parasites to increase the ease and rapidity of identifying stable resistance in potatoes; determining if usable levels of resistance to early blight exist in potato germ plasm; and conducting a survey to determine the geographic distribution and importance of *Verticillium* (a soil-borne fungal pathogen). General recommendations include: preventing the spread of viruses, bacteria, and fungal pathogens to various regions of the world; and adopting tests for detecting the presence of pathogens other than fungi. A total of 265 references (1879–1978) in English, French, Dutch, and German conclude several of the papers.

AID/DSAN-G-0079 931097300

025 PN-AAH-743

LETHAL YELLOWING DISEASE OF COCONUT IN JAMAICA

Eskafi, F.M.
University of Florida; University of West Indies, Jamaica.
1979, 50 p.

The coconut palm produces food, drink, fuel, and shelter in the form of 90 different products used in the domestic economies of many tropical nations. In Jamaica, coconut plantings cover approximately 62,000 acres. In 1977, however, earnings from copra production dropped by $8.37 million. Nearly 60% of this loss was attributable to lethal yellowing disease (LYD). It is estimated that the susceptible varieties of "Jamaica Tall" coconut trees have been dying at the rate of 1,000 per day over the past 7 years. In the coconut palm, LYD causes yellowing of the fronds, premature fruit drop, and death of the tree in 3–18 months. The purpose of the present research study was to identify species of occasional palm-feeding insects present on coconuts in Jamaica for comparison with results obtained in Florida and to test the vector status of selected species. Past studies of vascular tissues, translocation, and xylem pressure of LYD coconut palms have suggested that wilting in the coconut palm is caused by xylem blockage at a point below the growing point. In the present study, researchers used radioisotope P^{32} to study the phenomena in more detail. Radioisotope P^{32} was injected into 45 Jamaica Tall variety coconut palms in two LYD locations, Caenwood and Plantain Gardens, during the dry and rainy seasons, respectively. Again, these data suggest that xylem flow is severely limited in palms with LYD — even in early stages of visible symptom development. In addition, approximately 10,000 homopterans were trapped on and around these trees and checked for ingestion of radioactivity using X-ray film and gas flow counting techniques. Among the insects which fed on palms and were caught in traps, 22 species and 7 genera

were tentatively identified. Five specimens are unknown. Some species collected during the course of this study have not been tested at all, or have never been adequately tested. These include *Dawnaria sordidulum* (Muir), *Idioderma varia* (Van Duzee), *Typhlocybella minima* (Baker), *T. maculate* n.sp., *Cedusa wolcotti* (Muir), *Cedusa* sp., *Agalliopsis tropicallis* (?) [sic], and several species of the genus *Empoasca*. The authors suggest that phloem feeders of the above insects be extensively tested.

AID/ta-C-1368 931115700

026 PN-AAJ-094

PROCEEDINGS OF THE CONSULTANTS' GROUP MEETINGS ON DOWNY MILDEW AND ERGOT OF PEARL MILLET

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1975, 145 p.

In the harsh environment of the semiarid tropics, the hardiest major crop is pearl millet. Recent breakthroughs in pearl millet hybrids promise much greater grain yields and a more favorable ratio of grain to fodder. These new hybrids are characterized by their shorter stature, good tillering ability, and increased production of fuller, compact grain heads. Using these hybrids, India's pearl millet production increased by 36% within 3 years. When grown on a large scale, however, the plants are very susceptible to the diseases of downy mildew and ergot (DM&E), a condition which may end all hopes raised by the new genotypes. The popular hybrids HB-1, HB-3, and HB-4 succumbed to DM&E, resulting in a net result of reduced stand, depressed yields, and losses to farmers, who show increasing doubts about the hybrids. The incidence of diseased plants is between 5–50% and is particularly prevalent in India. This report reviews the current knowledge on DM&E and seeks to establish a priority of activities likely to result in their control. Individual research reports included in this review were contributed by 14 scientists from India, Israel, Senegal, Thailand, and the United States. A comprehensive review of DM&E and its effects upon pearl millet and a bibliography (1884–1975) are included in this report. The review's topics include DM&E's geographical distribution; reproduction; host range; and biological and chemical control. Eight informal papers on DM&E's characteristics and research aspects are contained in this report, as well as the summaries of four discussion sessions held at the Consultants' Group Meeting on DM&E, sponsored by ICRISAT. The topics discussed consist of DM&E's hosts and pathogens, the identification of research priorities, and smut infections. The Group Meeting participants' technical recommendations focused on specific research methods and areas concerning DM&E's pathogens, hosts, and control measures. The participants also proposed that an International Millets Working Group be formed to exchange information through a newsletter and that ICRISAT consider disseminating research papers to pathologists researching millet diseases.

AID/ta-G-1073

027 PN-AAH-602

RISK AND ALLOCATIVE ERRORS DUE TO IMPERFECT INFORMATION: THE IMPACT OF WHEAT TECHNOLOGY IN TUNISIA

Nygaard, D.F.
1979, 145 p.

Thesis (Ph.D.)–University of Minnesota

In the 12 years since high-yield varieties (HYV) of wheat were introduced in Tunisia, only 15% of all farmers have adopted them. This Ph.D. thesis explains the low adoption rate by analyzing the factors affecting a producer's input decisions (including seed choice), the judgemental errors made in output projections, and the effect of such misjudgements on wheat productivity. Using findings from numerous studies on producer decisionmaking, the author develops a theoretical model to describe this decisionmaking process under uncertain physical conditions and in a dynamic economic setting. This model incorporates risk and uncertainty variables and notes the difference, or "allocative error," between the producer's output expectations — based on input decisions — and the actual outputs. By introducing a risk variable, the author was able to develop a mathematical formula testing the conventional hypotheses that: (1) HYV's have a higher risk attached to their production than do ordinary varieties; (2) small farmers tend to be more risk-averse than large farmers; and (3) the allocative errors caused by imperfect information, knowledge, and managerial ability are greater for new production techniques, thus increasing farmer reluctance to adopt them. The model is then applied to Tunisia using data collected from 125 wheat producers. It was mathematically proven that risk perceptions do indeed affect decisions by Tunisian producers and that producers' errors of perception are responsible for reduced profits and misallocation of resources. It follows that introducing greater certainty into small farmer calculations will increase adoption of HYV's and so increase productivity and profits. Various policy options, such as plant breeders, price schemes, and insurance programs, are suggested as means to reduce perceived risks. The beneficial role of extension programs in reducing allocative errors due to misperceptions is emphasized. A 78-item bibliography (1956–77) and appendices on supplementary regression, sample questionnaires, risk parameters, and allocative errors are attached.

AID/ta-BMA-5 931023600

028 PN-AAH-640

AN INTEGRATED APPROACH TO GUAYULE RESEARCH

McGinnies, W.G.; Taylor, J.G.
University of Arizona, Office of Arid Lands Studies.
1979, 27 p.

Development of guayule, *Parthenium argentatum*, as a dependable source of domestic rubber is complicated by the plant's anatomical, physiological, and genetic complexity, especially when cultivated under conditions not native to it. Domestication of

the guayule plant involves several problems, among them genetic manipulation and breeding, the expense of guayule stand establishment, and the effects of irrigation on its rubber-producing capacity. In addition, economically feasible rubber production depends on the assessment of economic, environmental, institutional, and socioeconomic factors. Because of the intricate nature of the research needed to solve these problems, the authors of this paper call for an interdisciplinary, integrated approach to the study of all aspects of guayule rubber production and provide a structure for this approach. Designed to culminate in the successful development and cultivation of the rubber-producing guayule plant, a flow diagram is presented. The diagram is based on a "structured programming" method, where the broadest concept is defined first, and then divided into second-order components until the required degree of detail is attained. Research priorities are not defined by this flow chart. First-level topics include the plant itself, its growing conditions, production, products, economics, and impacts. Second-order topics include, in order: (1) anatomy, physiology, and genetics; (2) climate, soils, water, and biological constraints; (3) propagation, growing, harvesting, and processing; (4) rubber and by-products; (5) production costs, demand, and competition; and (6) environmental, economic, social, institutional, and political impacts. Underlying the entire structure is the collection, exchange, and dissemination of information gained from each area of research. The authors stress that these research efforts must be cooperative to avoid unnecessary duplication and that information dissemination must be comprehensive if research points to economically feasible rubber production from guayule.

AID/ta-G-1111 931015900

029 PN-AAH-822

ASSOCIATION OF "AZOSPIRILLUM" WITH GRASS ROOTS

Umali-Garcia, M.; Hubbell, D.H.; Gaskins, M.H.; Dazzo, F.B.
University of Florida, Institute of Food and Agriculture Sciences.
1980, 9 p.

Azospirillum brasilense is a nitrogen-fixing bacteria which has been isolated from the rhizospheres of a variety of tropical and subtropical nonleguminous plants. In contrast to *Rhizobium*-legume symbiosis, *Azospirillum*-grass interaction does not produce visible structures on roots. This paper describes both the adsorption and the colonization of *A. brasilense* on the roots of pearl millet and guinea grass and provides a possible explanation for the limited colonization of intercellular spaces of the outer root cortex. Grass seeds were surface sterilized, germinated into humid air, and incubated for up to 1 month (14-h photoperiods at 35–36°C). In addition, seeds were germinated in sterile 32 oz Mason jars containing 50 ml of Fahraeus medium. Other sterile seedlings were grown for 2 days in Fahraeus assemblies without agar. Adsorption to grass root hairs was measured by direct microscopic assay, using standardized inocula. Roots themselves were examined with an ISI Super III scanning electron microscope at 15 kV. In addition, *A. brasilense* were grown at 37°C for 7 days in pectin medium and harvested by centrifugation. Test results showed that young inoculated roots of pearl millet and guinea grass produced more mucilaginous sheath, root hairs, and lateral roots than did uninoculated controls. The bacteria were found in the mucigel that accumulated on the root cap and along the root axes. Significantly more azospirilla than *Rhizobium, Pseudomonas, Azotobacter, Klebsiella,* or *Escherichia* cells were adsorbed. Furthermore, it was shown that the pearl millet roots released protease-sensitive, nondialyzable substances which bound to azospirilla and promoted their adsorption to the root hairs. Thus, the grass root hairs displayed selectivity in their binding of bacteria. However, these bacteria did not attach to root hairs when the host was grown in the presence of a readily available nitrogen source — in this instance 5 mM KNO_3. In addition, pectolytic activities were detected in pure cultures of *A. brasilense* when grown in a pectin medium. A listing of literature cited (31 entries, 1938–78) is attached to this report.

AID/ta-C-1376 RES 931100400

030 PN-AAH-825

SURVIVAL OF "RHIZOBIUM" IN SOILS UNDERGOING DRYING

Pena-Cabriales, J.J.; Alexander, M.
Cornell University, Department of Agronomy.
1979, 6 p.

The Soil Science Society of America Journal, Vol. 43, No. 5, p. 962-966

The viability (nodule induction) of *Rhizobium*, a nitrogen-fixing soil bacteria, depends on abiotic as well as biological factors. Among the abiotic factors is susceptibility of *Rhizobium* to drought, or more simply, lack of moisture in the soil. This report presents the results of several experiments to assess the capacity of various strains of rhizobia to withstand different degrees of soil drying while retaining the ability to induce nodulation. After first verifying the nodulating capacity of seven streptomycin-resistant strains of rhizobia, cultures were grown, placed in suspension, and transferred to Lima silt loam soil to reproduce. After 3 weeks, the soil was dried and plate counts of the living bacteria were made. Variations of this experiment included testing for changes in viability of *Rhizobium* when polysaccharides are added to the culture medium, determining rhizobia's ability to survive when the soil is rapidly dried, and investigating the effects upon rhizobial growth if there is a constant percentage of moisture in the soil and if they are inoculated into soil without first being grown in culture medium. Accelerating the rate of soil drying increased the rate of rhizobia population decrease; a subsequent slower rate of decline in viability occurred as the soil lost little water. Additionally, exposure of rhizobia to consecutive cycles of wetting and drying further reduced population size with each cycle. However, those surviving the longest did not demonstrate increased resistance to drying in soil. Fast- and slow-growing rhizobia showed no real difference in their susceptibility to dessication. Addition of rhizobia-generated polysaccharide to inoculants enhanced *Rhizobium* viability more than adding polysaccharide directly to the soil. Also, bacteria inoculated directly into the soil, in comparison to those grown first

in the culture medium and later inoculated into the soil, were more resistant to dessication since the cells' formation of microcolonies in the soil acted as a protection system. In tests made with four soils of varying pH, more *Rhizobium* remained viable at the higher pH's of the Arkport and Lima soils. A 10-item list of literature cited (1962–78) is attached.

AID/csd-2834 211(d) 931012700

031 PN-AAH-826

SURVIVAL OF "RHIZOBIUM PHASEOLI" IN COAL-BASED LEGUME INOCULANTS

Paczkowski, M.W.; Berryhill, D.L.
U.S. Department of Agriculture, Science and Education Administration.
1979, 5 p.

Applied and Environmental Microbiology, Vol. 38, No. 4, p. 612-615

Inoculants of nitrogen-fixing legumes consist of rhizobia bacteria cultures mixed with carrier materials. Although dried, milled peat is the most widely used carrier, coal powder may offer greater advantages in this respect. In this research, long-term growth and survival of *Rhizobium phaseoli* strains 127K17, 127K26, and 127K35 were tested using as carriers eight different coals of various grades. The coals used were Pennsylvania anthracite; bituminous coals from Illinois, Pennsylvania, and Utah; lignite from North Dakota and Texas; and subbituminous coals from New Mexico and Wyoming. To prepare the inoculant, rhizobia cultures were maintained on a mannitol-yeast extract and then mixed with samples of coal powder. After an incubation period, the number of viable rhizobia colonies in this coal-based mixture were counted and isolates from the colonies were used to inoculate pinto beans. After 3 weeks, the roots of the bean plants were examined for the presence of nodules caused by rhizobia. Although the coals ranged in pH from 4.7 to 7.5 and varied considerably in both moisture content and moisture-holding capacity, all the coals except Illinois bituminous coal and Texas lignite (both having lower pH's) supported the growth and survival of the rhizobia strains for at least 6 months. There also were no significant differences in survival between the strains of rhizobia used. Although the use of nutrients such as lucerne meal and sucrose has been found to be beneficial in increasing the survival of rhizobia in some types of coal, its use is not recommended since the chance of contaminating the inoculant and stimulating growth of competitive microorganisms is great. In conclusion, it appears that most coals, regardless of grade or source, may be acceptable carriers for *R. phaseoli* inoculants. A 13-item bibliography (1960–76) is appended.

PA/AG/TAB-610-9-76 931061000

032 PN-AAH-870

TANZANIA SEED INDUSTRY SURVEY: REPORT OF EVALUATIONS AND RECOMMENDATIONS

Hagan, A.R.; Bevins, R.J.; Cavanah, L.E.; Poehlman, J.M.
University of Missouri.
1979, 185 p.

The production of high quality seeds of improved and adapted crop varieties is essential for economic improvement of Tanzania's agricultural sector. This report presents the findings of a survey of the components of Tanzania's modern seed industry: breeder seed research development; expansion of pure lines of improved varieties by foundation seed farms (FSF); certified seed production, processing, and primary distribution by Tanzania Seed Certification Agency (TANSEED); quality control by seed laboratories (SL) and the Tanzania Official Seed Certification Agency; and final distribution. Primary attention is directed towards future development of three of these components — FSF's, TANSEED, and SL's. After a brief description of the current status of each of these components, the major constraints hindering their development are identified and specific recommendations are made for overcoming these constraints. Three recommendations of immediate concern are emphasized. First, the development of FSF's should be limited to three seed farms at the Arusha, Dabaga, and Msimba sites. Emphasis should be placed on rapid development of these sites, especially of the newest farm, Dabaga, which still requires additional staffing, planning for the farmstead layout, service building construction, and erosion control improvements. Second, TANSEED operations should be fully and immediately developed so it can handle all phases of seed certification. Finally, efforts should be made to make the SL's fully operational as soon as possible. To this end, considerable investments in facilities and expatriate consultation will be required. Associated with these recommendations are the continuing needs for manpower training and technical and professional assistance in the fields of research, extension, and marketing. A list of supporting organizations and programs essential for successful growth and performance of Tanzania's modern seed industry is included. Appended are recommendations for research and development for crop production, improvement of educational extension programs, and for seed marketing and distribution; the Tanzania Seeds Act; and a 31-item supporting bibliography (1973–79).

AID/afr-C-1139 621009200

033 PN-AAH-931

RAPID CROP IMPROVEMENT USING TISSUE CULTURE TECHNIQUE

Nabors, M.W.; Hardcastle, T.
Colorado State University, Department of Botany and Plant Pathology.
1980, 34 p.

Technical Series Bulletin No. 24

Cell tissue culture techniques used primarily in basic scientific research can now be used to greatly improve plant breeding by rapidly cloning rare, useful plants and by adding new, beneficial alleles to existing crop varieties. Cell tissue breeding will enable new crop varieties to resist specific environmental pressures, surpass the yield of unadapted varieties, and consume less energy. This report discusses the potential of cell tissue culture techniques and details the application of specific methods used to select salt-tolerant plants. Cell culture techniques arrange the mutation and natural selection process into a format that is simpler, better controlled, and more economical than the traditional, lengthy and random, evolutionary breeding mechanisms. Mutant plant production by this technique consists of four steps: (1) Plant cell groups are placed in a medium with nutrients and special hormones to produce an undifferentiated cell mass or primary callus. Callus portions are placed in a liquid gyrotory shaker to separate single cells from cell clumps, a process known as cell suspension. Single cell suspensions are subcultured when cell density reaches maximum value. (2) Specific spontaneous cell mutations are selected through suspension exposure to conditions that favor mutant growth. Thus, an entire culture of salt-tolerant cells was produced in several months. (3) Mutant cells are induced to grow roots and shoots for eventual regeneration into whole plants (a 4–6 week process). (4) After complete plantlets have been formed, they are transferred to a controlled greenhouse environment for testing of phenotype persistance and mutation inheritability. Most regenerated plants arise from one cell and are thus likely to carry the desired phenotype, if selection occurred in the suspension culture. To avoid deleterious mutations, however, spontaneous mutant searches should be conducted before mutation induction. Although tissue culture methodology is incomplete for some major crops, such as soybeans, techniques are complete for immediate incorporation into existing breeding programs for wheat, oats, corn, tomatoes, and barley. Appended is a nine-item bibliography (1965–80).

931000100

034 PN-AAH-937

HANDBOOK FOR THE COLLECTION, PRESERVATION, AND CHARACTERIZATION OF TROPICAL FORAGE GERM PLASM RESOURCES

Mott, G.O.; Jimenez, A.C.
Centro Internacional de Agricultura Tropical (CIAT); University of Florida.
1979, 102 p.

It is vital for scientists to collect for experimentation a greater range of tropical legumes and grasses before the latter are eliminated through clearing, cropping, and land exploitation. Without a set of standardized procedures, an unmanageable mass of sample germ plasm could easily be accumulated. To avoid this situation, this handbook establishes such procedures for the collection, preservation, and characterization of tropical germ plasm resources. The following steps are outlined in individual chapters: preparation for the collection trip; germ plasm collection in the field; description of the collection site; soil sample collection and procedures; collection of *Rhizobium* strains; collection and preservation of insects and pathogenic organisms; characterization and preliminary evaluation; transfer of forage germ plasm; preservation of the germ plasm; and data management. General and technical equipment needed for a collection trip is discussed, as are basic considerations concerning where and when to look for germ plasms. It is suggested that changes in vegetation, topography, altitude, and land use serve as guides in determining whether a stop is advisable. In addition, collection sites should be described as accurately as possible. The system proposed for the description of collection sites consists of a list of descriptors, their code numbers, the number of characters (letters or numbers) allowed for that descriptor, and a dictionary of descriptor definitions. The handbook suggests that *Rhizobium* collections be undertaken routinely since legumes often fail to encounter effective native strains in new environments. Appendices include a list and a dictionary of descriptors used in forage germ plasm collection, characterization, and evaluation; procedures for shipping nodule samples to CIAT; a list of laboratories which isolate strains of *Rhizobium*; a sample seed export form (India); a list of countries/authorities issuing phytosanitary certificates; recommendations and conclusions of the International Board for Plant Genetic Resources Working Groups on the design and cost of seed storage facilities; recommended conditions for germination tests; and country-specific information exchange codes.

AID/ta-G-1425 931015500

035 PN-AAH-951

ANNUAL REPORT, 1979

International Potato Center.
1980, 147 p.

New methods and advances in potato and other agricultural technology have been developed far more rapidly than national programs can absorb and communicate them to the growers. This annual report documents the efforts and successes of the International Potato Center (CIP) in 1979 and urges a marked increase in funding and development of research and extension programs in the 1980's. Problems and progress in each of the nine major thrusts of CIP research are examined in detail. The nine areas are: (1) collection and classification of tuber-bearing *solanums*; (2) maintenance and utilization of germ plasm; (3) control of fungal diseases; (4) control of bacterial diseases; (5) control of viral diseases; (6) control of nematode and insect pests; (7) physiological and agronomic management and stress physiology; (8)

post-harvest technology; and (9) seed production research. A chapter on regional research and training examines activities, conducted in each of CIP's seven regions, which concentrate on production by offering seminars and short courses on technological advances to local scientists. The next chapter focuses on CIP's Training Department, which administers training at CIP's Lima, Peru headquarters as well as in the regions. Training conducted in Lima concentrates on scientific specialties; in 1979, 28 program researchers and extensionists participated in courses on storage, agroeconomic research methodologies and procedures, and production of basic seed. The next chapter presents the results of research by CIP's Social Science Department on four constraints to potato production in developing countries: agronomic management, tuber seed, pest control, and post-harvest technology. In 1979, five trials of 16 treatment combinations were conducted to alleviate potato production constraints. The potential for the potato as a foodcrop in the tropics and the processes/consequences of technological change were also researched. Finally, the success of CIP's Communications Department in providing accurate, timely information to the public is discussed. A 49-item list of CIP publications (1978–79), a 30-item list of research and consultant contracts, and annexes on CIP personnel and finances are appended.

AID/ta-G-1181 GTS 931097300

036 PN-AAH-969

WEED CONTROL PROBLEMS IN TANZANIA: A REVIEW TEAM REPORT

Miller, S.F.; Burrill, L.C.
Oregon State University, International Plant Protection Center.
1980, 42 p.

The control of weeds, a major problem of both large- and small-scale farmers in Tanzania, is a complex process that can be approached by an array of biological, manual, and mechanical alternatives. This report assesses Tanzanian weed control practices used by seed farms, the National Agricultural and Food Control (NAFCO) farms, selected research institutes, and small farms. The farms visited produced such crops as maize, millet, wheat, barley, and coffee. A wide range of weed control practices were noted such as the use of chemical herbicides, mulch, close ground cover through multiple cropping, and manually pulling up weeds. The most common weeds affecting crop production are *Rottboellia exaltata*, a grass which grows extremely tall, and *Digitaria scalarum*, a rhizomatous grass which, if uncontrolled, will spread until infested areas become useless for farming. The former is usually treated with herbicides, the latter by manual and mechanical means. Since there is a shortage of trained scientists specializing in weed control, it is recommended that a cadre of Tanzanian government agronomists be given university training to enable them to conduct research and provide technical advice to NAFCO and seed-farm managers. In addition, short-term training in weed control procedures and research techniques should be offered to researchers, NAFCO farm supervisors, and seed-farm managers. Periodic expatriate weed control consultation should be sought and literature on weed control should be made available to the research institutes. In view of the shortage of farm machinery, minimum tillage techniques not requiring much equipment were suggested as an effective and viable means of controlling weeds. For example, stubble planting, a method of planting directly into existing crop residues with no intervening soil disturbance, controls weeds and delays erosion. Most importantly, the role of sound farm management to determine both the proper balance between weed control methods and the correct time and rate of herbicide application is cited as necessary to establish effective weed control. Suggested references (1968–80) are attached.

AID/ta-C-1303 931020600

037 PN-AAJ-141

RICE IMPROVEMENT IN CHINA AND OTHER ASIAN COUNTRIES; PROCEEDINGS OF THE FIRST INTERNATIONAL RICE RESEARCH WORKSHOP, GUANGZHOU, CHINA, 1979

International Rice Research Institute (IRRI); Chinese Academy of Agricultural Sciences.
1980, 315 p.

Because rice is perhaps the world's most important food crop, both the governments and the people of rice-growing countries are continuously challenged to increase rice production and improve its quality. This report is a collection of 21 papers presented at the International Rice Research Institute (IRRI) Workshop concerning Asian rice production, with particular attention directed to the People's Republic of China — the world's largest producer and consumer of rice — and India. Each paper is followed by a brief bibliography (1917–79). Emphasis was placed on breeding rice varieties with genetic resistance to insects and diseases and developing cultural practices to enable farmers to control pests without costly chemical applications. Five areas for future collaborative research and testing programs were specified. (1) As part of an international rice testing program, nurseries will be tested in seven Chinese provinces during the 1980 rice-growing season. (2) Innovative breeding methods will be explored. Collaborative research on hybrid rice will involve China and India at first, with other Asian countries joining later. Work on tissue culture will commence with an emphasis on standardizing the culture media. Fifteen seed combinations will be processed through other culture techniques and seeds of 400–600 fixed lines will be sent to IRRI for evaluation under specific environmental conditions and stresses. Scientists also agreed to exchange early-generation materials of crosses for early maturity. (3) Research will be conducted on viral diseases affecting rice, as well as on bacterial blight and rice blast. (4) Several studies of rice insects will be initiated. As part of a multinational project, Chinese scientists will conduct special screening sets to determine varieties resistant to brown planthopper biotypes. Also, preserved parasite and predator specimens will be exchanged to identify natural enemies native to certain regions. IRRI and China will exchange literature on insecticides.

(5) Cooperation between the Chinese Academy of Agricultural Sciences and IRRI on germ plasm collection and maintenance will be continued. A list of workshop participants is included.

AID/492-1310-T 498019800

038 PN-AAH-909

SPECIFIC SOIL CHEMICAL CHARACTERISTICS FOR RICE PRODUCTION IN ASIA

Ponnamperuma, F.N.
International Rice Research Institute (IRRI).
1976, 18 p.

IRRI Research Paper No. 2

Although more than 80% of the world's rice is grown and consumed in Asia, increased production is required to keep pace with population growth. Since the extent of arable land in this densely populated region is limited, additional rice cultivation must take place in lands that remain uncultivated largely because of soil problems. To evaluate potential rice lands, an understanding of the specific properties of flooded soils and of the physiology of the rice plant is necessary, because the chemical changes induced in flooded soils drastically alter the criteria used to evaluate land for dryland farming. This report examines the nature of these changes. Within hours of soil submergence, microorganisms exhaust most of the oxygen present in the soil and water. This process increases the soil pH and nutrient availability and eliminates aluminum and manganese toxicities. Rice can exploit these chemical benefits of flooding because of its root system. Flooding also causes the pH levels of both acid and alkaline soils to converge between 6 and 7, although the rate of pH change depends upon the soil's properties and temperature. This stabilization of flooded soils increases the soil's electrolyte content (with conductivity highest in the saline soils and lowest in the leached ultisols and oxisols), as well as the availability of nitrogen, phosphorus, silicon, and molybdenum. Flooding also has disadvantages. The availability of zinc and copper (both of which are important for improved rice production) decreases and harmful concentrations of iron, hydrogen sulfide, and organic reduction products may build up due to the sulfate reduction and anaerobic decomposition of organic matter. These chemical changes brought about by flooding and inherent soil properties complicate the evaluation of saline, sodic, and peat soils with nutrient problems. Because of chemical changes induced by flooding, soils considered unsuitable by dryland criteria may shift into the suitable or conditionally suitable class — and vice versa. Much work needs to be done, however, before chemical criteria can be developed to systematically evaluate land for wetland rice. A 15-item bibliography (1955–75) is appended.

AID/ta-G-1074 GTS

039 PN-AAH-933

BIBLIOGRAPHY OF THE SOILS OF THE TROPICS, VOL. 4: TROPICS IN GENERAL AND ISLANDS OF THE PACIFIC AND INDIAN OCEANS

Orvedal, A.C.
1980, 163 p.

A.I.D. Technical Series Bulletin No. 17

In an effort to inform university researchers of recent developments in agricultural technologies for tropical regions, this extensive bibliography of materials dealing with the geography of tropical soils has been compiled. The bibliography is the fourth of several planned volumes, contains over 3,500 citations (1866–1979) concerning tropical soils on the islands situated in the Indian and Pacific Oceans, and includes French, Spanish, German, and other foreign-language publications which were extracted from the collections of the Soil Classification and Mapping Branch Library and National Agricultural Library, both of the U.S. Department of Agriculture. Several citations refer the reader to soils maps. Where soils maps based on field work are lacking, however, materials are cited which assist in the prediction of soil types or at least some of their characteristics. Such material primarily concerns soil environment and land use, namely, geology, geomorphology, landforms, vegetation, and climate. Unless they have some relevance to soil geography, citations about fertilizer technology, microbiology, soil chemistry and physics, and the like are specifically excluded. References to soil geography in the tropics in general are grouped under two headings — citations reprinted from the series' first volume (1975) and citations collected thereafter. A list of abbreviations and "user comment" forms, which solicit readers' remarks and suggestions, are appended.

AID/DSAN-147-696

040 PN-AAG-950

SECTORAL MAPPING: AN EXPERIMENTAL APPROACH FOR EXAMINING PATTERNS OF A.I.D. ACTIVITY BY SECTOR

Hageboeck, M.; Goodhart, B.; Cooley, L.; Boudreau, R.; Berge, N.
Practical Concepts, Inc.
1979, 107 p.

Do outdated "cultural myths" play an important part in the current design and implementation of A.I.D. projects? The purpose of this study was to answer this question using sectoral mapping (a process used to aggregate and analyze automated project data by sector) in conjunction with A.I.D.'s data bases (PBAR, TEXT, BREF, AND ACCT). It was found, however, that A.I.D.'s data bases do not contain the information needed to examine such critical factors as the rationale for projects, strategic choices made about technologies and implementing agents, or patterns of project impact. Also, not all of the data in these files can be easily compared across projects. Nevertheless, sectoral mapping has proven to be a cost-effective method for examining such patterns as the level of investment by bureau for a given sector, the distribution of projects across bureaus, and changes over time within bureaus. The authors recommend that prior to undertaking further sector mapping activities, A.I.D. should clearly define what products can be produced using its data bases (i.e., sectoral maps, summaries of portfolio composition, project information profiles, and trend assessments) and determine the cost and potential market within the Agency for these products. Only those sectoral maps and related products projects that have a high probability of making real improvements in A.I.D. projects should be generated. Also recommended are combining automated and manual searches to retrieve answers to pre-set questions; sampling projects to estimate patterns; excluding searches of pre-1974 projects; using technical codes to develop an overview of A.I.D.'s portfolio by mutually exclusive sectors; linking the data bases with the statistical analysis packages in A.I.D.'s computer system to analyze sectoral mapping data automatically; coordinating efforts by various offices to examine patterns in A.I.D. activity; and using A.I.D. direct hire staff to prepare future sectoral maps. Recommendations to improve the overall quality of the data bases, e.g., by eliminating unused data and by breaking out costs by outputs, are also made. Appendices include a description of the procedures used to generate the experimental sector maps.

AID/otr-C-1377 GTS 930004700

041 PN-AAH-244

APPLIED POLICY ANALYSIS FOR INTEGRATED REGIONAL DEVELOPMENT PLANNING IN THE PHILIPPINES

Rondinelli, D.A.
1979, 29 p.

The Third World Planning Review, Vol. 1, No. 2, p. 150-178

The development in many LDC's of urban industrial centers at the expense of rural areas requires that national development planning be based on a clear articulation of urban–rural (spatial) relationships. This research paper evaluates the methods of integrated spatial analysis used in A.I.D.'s Bicol River Basin Project in the Philippines in order to develop the framework for such development planning. The Bicol project is of interest for three reasons: (1) the spatial analyses used in it are potentially replicable in other countries; (2) the problems in Bicol addressed by these analyses are common in other LDC's; and (3) a study of the project provides insights into urban–rural relationships and the spatial dimensions of rural poverty that are useful in reformulating national investment strategies. The analytical methods and planning procedures used at Bicol were divided into three components. First, on the basis of comparative profiles of social, economic, physical, institutional, and demographic characteristics, Bicol's municipalities were categorized as developing, less developed, or underdeveloped. The profiles revealed that a majority of the Basin population live in areas lacking vital services needed to increase agricultural production, expand employment, and meet human needs; and that they lack access to areas providing such facilities. Second, analyses were conducted of the centrality, functional complexity, and relative importance of the municipalities. The Guttman scale of settlements, weighted centrality indexes, and scalogram analysis were used. The scalogram had advantages over the Guttman scale because it was easy to use and required no sophisticated training or equipment. Third, Marshall's threshold analysis was used to measure population sizes in relation to support services and facilities in Bicol settlements. Spatial linkage analyses regarding transportation, economic, market, social, administrative, political, and service linkages were also undertaken. The positive benefits to the various municipalities yielded by these analyses in the Bicol project are noted in a final concluding section of the paper. A bibliography containing 23 resources (1969–78) is appended.

AID/ta-C-1356 GTS

042 PN-AAH-417

A PRELIMINARY STUDY IN THREE COUNTRIES: INDONESIA REPORT

Milone, P.
International Center for Research on Women.
1978, 304 p.

In Indonesia, a country of over 300 ethnic groups, the enormous diversity of language, religion, education, culture, and custom makes the term "Indonesian woman" inadequate. This paper documents the social, legal, and economic status of Indonesia's 66 million women without neglecting ethnic differences. The first section describes the country's Islamic, Christian, and common-law marriage customs, which impact on every aspect of a woman's existence. The history of Indonesia's women's movement, especially in eliminating child and forced marriages, polygamy, and husband-initiated arbitrary divorce are discussed. This is followed by a portrayal of the difficulties faced by women — particularly the young and/or unmarried — in achieving equal status under the law in regard to child custody, property ownership, control of income, tax liability, access to credit, political

participation, and educational opportunities. The many factors responsible for the high rates of female anemia/malnutrition and maternal mortality are examined, along with the success of family planning programs in alleviating these conditions and in opening new opportunities to women. Women's communications networks and the strength of organized women's groups in the country are also discussed; an annex on membership of the Indonesian Women's Congress gives further details. Also presented are economic and demographic profiles of women, the former including an historical and cultural survey of women's work patterns. The author gives her impressions of the effects of modernization on women, particularly of the negative impact of modern agricultural technology on poor rural women. After a survey of current field investigations (with further information included in an annex), a final chapter critiques the existing data on Indonesian women and offers research recommendations, among them improved coordination of information and institutions, augmented institutional capabilities, modified survey techniques, and an expanded, more accurate information data base. A 317-item bibliography (1911–78) and a survey of current research on women at the University of Indonesia, Faculty of Social Sciences, are appended.

AID/otr-G-1477 906010000

043 PN-AAH-434

MANAGER'S GUIDE TO DATA COLLECTION

Hageboeck, M.
Practical Concepts, Inc.
1979, 100 p.

A.I.D. Program Design and Evaluation Methods Series

Project managers, who rely on data to assist them in decisionmaking, project design, and evaluation, often lack the ability to collect the data themselves and must therefore turn to experts. This report is intended as a guide for managers, enabling them to differentiate between credible and suspect data and to direct all data collection efforts on a timely, cost-effective basis. Four aspects of a manager's role in data collection and analysis are discussed: (1) identifying why, what, and when information is needed; (2) determining the appropriate level of funding and time investments; (3) choosing the most effective information-gathering approach; and (4) managing the data collection and analysis process. For example, a manager faced with a need to fund or replicate a project, or to terminate specific activities, may find he needs baseline information. He must then evaluate the prospective cost of data collection to determine whether the value of the information warrants a lesser, or greater, level of investment. The amount of money or time to be appropriated to the data collection necessarily affects the choice of a collection method, as does the existence of relevant information in Mission or Washington offices or in other resource centers. Where sufficient data does not exist, however, the manager may choose a field data collection method. Finally, although the manager does not himself gather the data, he must be able to formulate guidelines for use by the investigators on the study's purpose, its target population, the time frame required, and other issues. The guide specifies criteria to assist a manager in these choices and considers basic information study design issues to help managers determine what answers are needed and how to control their quality. Approaches to field data collection are surveyed to familiarize managers with available options. Finally, the guide examines the benefits and drawbacks involved in using the sampling process and discusses its applicability to managers' needs. Other data collection techniques, such as direct measurement, observation, and interrogation, are presented. A 96-item bibliography (1951–79) is appended.

AID/otr-C-1377 GTS 930004700

044 PN-AAH-533

TOURISM TRAINING: MEXICAN NEEDS/U.S. RESPONSES; FINAL REPORT

Group Seven Associates, Inc.
1980, 129 p.

Rapid expansion of the tourism sector in Mexico, combined with tourists' expectations and competition from other countries, has put enormous pressure on Mexico's tourism training institutes. This paper presents the final report of a study conducted to assess training needs, determine the U.S. capacity to assist, and develop a time-phased plan of options to redress the manpower shortages. The study was based on 59 formal interviews with Mexican Government, industry, and school personnel and on responses from 87 U.S. universities which provide training in tourism-related areas. The following Mexican problems were identified: (1) at least 100,000 new employees are needed, 660 of whom should be teachers; (2) too many managers are being trained, while training opportunities for mid- and lower-level staff are very few; (3) hotel management problems are motivational in nature and therefore not subject to improvement by training; and (4) new facilities are needed, especially at basic and middle levels. The next section analyzes U.S. educational resources and provides key information about U.S. programs in the study of hotel and restaurant management, transportation, and travel. A major conclusion is that U.S. resources and experience are more than adequate to meet Mexico's assessed needs. The authors then present a plan to apply U.S. resources to Mexico's tourism training needs. Major aspects of the plan are that the training be local, short-term, and inservice whenever possible; be provided to students preparing for future employment; and be oriented to the acquisition of particular skills. Emphasis is placed on curriculum development, teacher training and exchanges, computerization, and English-language training. The report concludes with a list of ten recommendations in the areas of harnessing U.S. resources to Mexican needs; implementation of the 1978 U.S.–Mexico Tourism Agreement; and implications for tourism training in LDC's. A 7-item list of references (1978–80) and appendices on questionnaires used, descriptions of Mexican training institutes, training needs as perceived by the industry, and two model manpower development projects (Nigeria and University of Guadalajara, Mexico) conclude the report.

AID/SOD/PDC-C-0205 931000300

045 PN-AAH-642

THE INCOME AND PRODUCTION OF GUYANA RURAL FARM HOUSEHOLDS; AN ANALYSIS BASED ON THE 1979 GUYANA RURAL FARM HOUSEHOLD SURVEY

Robert R. Nathan Associates, Inc.
1980, 155 p.

Obtaining a clear picture of the economic well-being of farm households in Guyana is a prerequisite for providing assistance to the country's poorest and neediest farmers. To this end, the results of a survey of the income and production of Guyana's rural farm households for the year 1978 as derived from interviews of individuals from 2,306 representative farm units, 2,284 of which were family farms, are presented in this report. To place survey results in their proper perspective, a preliminary analysis of the relationship between agriculture and Guyana's national economic goals, as well as U.S. goals for foreign assistance, is provided. The main body of the report consists of a comparative analysis of the target (i.e., farmers most in need) and non-target groups with respect to their total income, household characteristics related to income, off-farm and farm sources of income, and the expenditures determining the farm portion of net income. The total capital used in terms of land, livestock, and machinery by both groups is also treated. Finally, the levels and efficiency of production, as well as economic returns between the two groups, are compared and their problems in supply and credit procurement are examined. Major findings of this report include: (1) four-fifths of rural farm households had annual incomes below Guyana's target level for development assistance; (2) two-thirds of rural farm household income came from off-farm sources; (3) one-third of farm households reported difficulty in obtaining needed production and service inputs from indigenous sources and so often had to rely on imported inputs for rice production; (4) irrigation systems and conditions were better on non-target farms than on target farms. Based on these findings, the following basic program and policy directives aimed at raising rural farm income are set forth: (1) increasing government support for rural households; (2) encouraging farmers to increase the amount of land under cultivation; (3) improving on-farm water control, the use of imported agricultural inputs, and farm management; and (4) creating more opportunities for off-farm employment. Attached are specifications of derived variables used in the survey.

AID-504-INST-781

046 PN-AAH-847

RAPID RECONNAISSANCE APPROACHES TO ORGANIZATIONAL ANALYSIS FOR DEVELOPMENT ADMINISTRATION

Honadle, G.
Development Alternatives, Inc.
1979, 62 p.

Administrators are often faced with having to make decisions based on incomplete, inaccurate information. Social scientists stress the need for rigorous data collection and formal analysis to improve poor data bases. However, this response ignores the frequently strong political and organizational pressures for timely information and rapid decisionmaking. This paper suggests ways to improve quick, impressionistic data collection methods. When employing rapid reconnaissance methods, social scientists discard the usual questionnaire and subsequent quantitative analysis. Instead, reconnaissance practitioners use proxies for complex dynamics and perform spot checks of the proxies. This technique was used to measure the success of a campaign against illegal lumbering in an Asian country. Typical indicators (reported encounters, arrest rates, conviction rates, and confiscated lumber) were discarded as unreliable. The researcher chose instead to monitor the price of elephants — the assumption being that since the major use of elephants was in lumbering, their going rate in the local market would reveal the campaign's effectiveness. Advantages of these strategies include timeliness, low cost, and flexibility. Major disadvantages are the difficulty of judging either the accuracy of the data or (due to the lack of standardization) the investigator's performance. Also, simple proxies can be misleading. For example, it would seem that a spit-and-polish department of agriculture packed with highly paid Ph.D's would be a good indicator of an organization's effectiveness. However, this assumption does not consider the typical unwillingness of highly qualified personnel to travel to rural areas and train farmers. Thus, it is important to articulate and test one's assumptions. The author recommends that studies be made to determine the contingencies that tend to invalidate different types of indicators. Also, social scientists should study tradeoffs between reconnaissance approaches and indepth methods and try different combinations. The author emphasizes that reconnaissance methods are not a panacea for budget constraints or deadlines, but sometimes provide a practical alternative to costly orthodox approaches.

AID/DSAN-C-0065 936530000

047 PN-AAH-868

EQUITABLE GROWTH: THE CASE OF COSTA RICA

Rourk, P.W.
Robert R. Nathan Associates, Inc.
1979, 103 p.

A.I.D. Development Studies Program: Case Studies in Development Assistance No. 6

Increased concern with "equity" objectives of development — employment, equality, participation, meeting basic needs — has prompted the search for cases of successful equitable growth. Costa Rica, whose growth is analyzed in this report, represents an example where a rising GNP has been maintained along with an equitable distribution of benefits. The report begins by presenting a brief overview of Costa Rica's growth and of the historical components, i.e., the physical setting, colonial influences, economic developments, and political changes, which have been responsible for its current socioeconomic condition. Public sector programs developed between 1960 and the early 1970's are treated next, including the development of physical infrastructure such as roads, electricity, and housing; human resources, including edu-

cation, health care, family allowances, and nutrition; and land reform and wages policy. Issues and alternatives for equitable growth are treated in a concluding chapter. The rate of Costa Rica's improvement and its current GNP level and standard of living indicate that Costa Rica's performance has been unmatched in Latin America. In order to sustain this development process, four policy areas must be given attention. To address rural–urban imbalances, improvements in the poor's access to land, along with complementary infrastructural developments and increased decentralization of public sector activity, are called for. Employment creation in rural regions should emphasize off-farm vocational activities. The dependency burden of the rural poor should be dealt with through the family allowances program by stressing direct income transfers. This would both reduce administrative costs and increase targeting efficiency. Finally, public financing of education should continue, with priority given to rural education. The text is footnoted and includes a 9-item bibliography (1949–74) in English and Spanish.

AID/otr-C-1380

048 PN-AAH-949

PROCEEDINGS, JOINT RESEARCH COMMITTEE WORKSHOP ON THE COLLABORATIVE RESEARCH SUPPORT PROGRAMS, 1980

A.I.D., Board for International Food and Agricultural Development (BIFAD).
1980, 125 p.

The Collaborative Research Support Program (CRSP) concept was designed in response to the Title XII Amendment to the International Development and Food Assistance Act of 1975 calling for "program support for long-term collaborative university research on food production, distribution, storage, marketing, and consumption." Intensive efforts have been made by A.I.D. and U.S. agricultural universities to develop CRSP as a mechanism for applying their long-term, technology-producing research capabilities to solve such developing country problems as post-harvest losses, water management, and small farming and alternative energy systems. In order to improve and strengthen the processes leading to the execution of future CRSP activities, a Joint Research Committee (JRC) Workshop on CRSP's was organized to review and evaluate CRSP experiences in planning, management, and early implementation. This document contains workshop papers discussing such experiences and expressing the insight gained by the JRC, A.I.D., and participating universities into some of the problems and successes of CRSP's. Issues covered in the plenary session on planning included conducting exploratory studies in order to describe problems, to recommend to the JRC potential research approaches (including CRSP's), and to assist the JRC in establishing priorities; Mission involvement in CRSP's; university selection and contracting procedures; and administration of business arising between regular JRC meetings. Discussion at the plenary session on management focused on CRSP management structure, its role in fiscal responsibility, and such A.I.D. policy issues as international travel and the location of CRSP activity. Discussion of experiences in CRSP implementation centered on the small ruminant and sorghum/millet CRSP's which are to date the only CRSP's to have reached the implementation stage. The major concern here was the need for multiple sources of funding, and recommendations were made to investigate possible allocation of food for peace funds and to increase publicity where developing country governments are supporting CRSP's with their own funds. The workshop discussion schedule and a list of participants precede the individual papers.

049 PN-AAH-725

ASSESSING THE IMPACT OF DEVELOPMENT PROJECTS ON WOMEN

Dixon, R.B.
A.I.D., Bureau for Program and Policy Coordination.
1980, 108 p.

A.I.D. Program Evaluation Discussion Paper No. 8

The current methodology for evaluating development projects — even "women-specific" projects — concentrates on logistical questions of timing and supplies rather than on social impact questions and is therefore inadequate to assess a project's impact on women. In order to develop a new evaluative framework which addresses these inadequacies, this study reviews evaluations of 32 A.I.D. and private voluntary organization women-specific projects. The evaluations only indirectly assess women's concerns but provide sufficient information to analyze the success of projects in meeting three basic goals for women-in-development projects: (1) participation in project decisionmaking; (2) access to immediate project benefits; and (3) improvement in socioeconomic status. Specific factors which contribute to the achievement of these three goals are identified. For example, women's participation in the decisionmaking process is higher when projects are administered by women's associations. Women's access to benefits will be greater when project activities build on the prevailing sexual division of labor and increase women's control over their own earnings. Social impact of projects tends to be greatest when women are organized for group action and are directed in activities carrying clear economic benefits. Indicators of physical, economic, and social well-being are presented for determining a project's direct and distributional social impact. It is noted that this evaluative framework is useful to assess not only the impact on women of any project (whether women-specific or not), but, more generally, the differing impact of any project on various social groups. The author stresses that factors which increase women's participation in development should be an integral part of project design and that women's economic and social roles in household and community should be taken into account. The paper's final section suggests methods of data collection to improve determination of a project's impact on women; interviews and group discussions with beneficiaries and the evaluator's perceptions are stressed over an objective or documents-only approach. A 50-item reference list (1971–79) is appended.

930008500

050 PN-AAH-982

CHILD CARE NEEDS OF LOW INCOME MOTHERS IN LESS DEVELOPED COUNTRIES: A SUMMARY REPORT OF RESEARCH IN SIX COUNTRIES IN ASIA AND LATIN AMERICA

League of Women Voters, Overseas Education Fund.
1979, 88 p.

The need to expand women's roles to include contribution to household finances in addition to caring for a family is impaired by the lack of options for child care available to women. This report summarizes studies conducted on the effect of women's income-generating activities on child care patterns, health, nutrition, and alternative approaches to child care in six developing countries — Korea, Malaysia, Sri Lanka, Brazil, Dominican Republic, and Peru. While all the countries are agriculture-based, Korea and Brazil are industrialized. The majority of the women surveyed were wives and mothers, had an average of two to four children, were poor, and were currently employed or wished to work. The results showed that child care responsibilities, lack of marketable skills and employment opportunities, and cultural role limitations lessen women's participation in the work force, although participation of low-income women was higher in the six countries than the countries' national averages; child care is handled mainly by female family members due to a lack of awareness of the services offered by child care centers and preschools; malnutrition among children less than 6 years old was common to all the countries; many women demonstrated little knowledge of the causes of child diseases, the value of immunization, or proper nutrition; women's earnings had little effect on the overall well-being of their families; and a comprehensive child care policy and program is a viable alternative for the needs of low-income mothers and children. From these findings it was recommended that national and international agencies make child care and women's needs a priority; alternative forms of child care such as half-day preschools and industry-based child care facilities be developed, with a focus on disease prevention, child nutrition and health needs, and breast-feeding which is in general decline; vocational training be offered to women and information on job prospects for women be disseminated through mass media; and legislation governing women's participation in the labor force be modified to better meet their needs. Appended are footnotes, a list of in-country child care programs, and the research methodology used.

AID/ta-G-1413 931002300

051 PN-AAG-671

RURAL ELECTRIFICATION: LINKAGES AND JUSTIFICATIONS

Tendler, J.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 84 p.

A.I.D. Program Evaluation Discussion Paper No. 3

Unlike health, education, or nutrition projects, rural electrification (RE) projects do not directly benefit the poor and have thus been de-emphasized in recent development assistance programs. RE projects can, however, promote integrated rural development significantly by encouraging productive and municipal, as well as traditional household, electricity usages. In this paper, a justification for increased attention to RE projects is made based on these additional usages, and issues are identified for further exploration. The author notes that RE planners generally tend to seek replication of the successful Philippine RE project, which strongly favored household consumption. Various issues are examined for their impact on the rural poor. These include the choice of rate mechanisms (meter or flat); lowered rates for high-volume users; beneficiaries and cost-effectiveness of RE projects; preference of the consumer for wood in cooking; economic drawbacks to the use of electricity; and the superiority of independent over central station generation. The author concludes that an RE project is not justified on the basis of household consumption alone; most often the poorest members of the community cannot take advantage of the benefits offered by household electricity. They can benefit much more significantly from the increase in employment which accompanies RE use by producers and from the increase in public services resulting from RE's municipal use. A.I.D. should investigate means of encouraging employment generation in RE projects, e.g., by providing credit and technical assistance to small industries. A.I.D. should also identify public services which are electricity-dependent, such as clinics and schools, and link provi-

While their mothers receive training at a vocational center in Nispara, Bangladesh, these children benefit from an early education at an adjacent day-care center.

sion of RE projects with extension of these services. The author also recommends the creation of a central A.I.D. office to promote local (rather than international) suppliers for the equipment and labor demands of infrastructure projects and favors an AID-supported central fund to promote local cooperatives and auto-generation projects. A 94-item bibliography (1966–78) is attached.

930008500

052 PN-AAH-976

THE PHILIPPINES: RURAL ELECTRIFICATION

Mandel, D.; Allgeier, D.; Wasserman, G.; Hickey, G.; Salazar, R.; Alviar, J.
U.S. Agency for International Development.
1980, 71 p.

A.I.D. Project Impact Evaluation Report No. 15

A.I.D.'s overall evaluation of its Philippine Rural Electrification (RE) program, consisting of eight successive projects, had limited effect on the rural poor and the economic development process. This program began in 1965 and has since energized 844 (59% of the national total) Philippine municipalities, 9,088 (27%) barrios, 1,159,434 (20%) households, and 101 new cooperatives; resulting in a change of schedule for total national energization from 1990 to 1987. To improve the productive capacity of the poor, cooperatives were organized and lent funds to extend electrical power into their areas. Many of the poor, however, could not afford its installation, continued use, or more than one or two light bulbs a month. Community lighting, such as street-lighting, indirectly helped the poor in various ways, such as by providing greater personal security. Those with sufficient financial resources or skills were able to use the electricity for entrepreneurial activities. RE impact upon development occurred in areas with a concentrated population, available technical skills and capital, and access to large and diverse markets. Active promotion of electricity-dependent investments and projects also increased program impact. Conclusions reached are: (1) Economic growth requires not only electricity, but also the development of power-oriented projects and programs. (2) Electrification must be complemented by development efforts aimed at the poor if it is to directly provide higher productivity levels, employment opportunities, and better public and social services. (3) The service nature of cooperatives requires that a high priority be given to effective management — even at the expense of beneficiary participation or democratization of the development process. (4) Productive power use and slower expansion rates encourage the financial viability of RE systems. (5) Because of the availability of other fuels, RE does not greatly increase energy demand. Appended are the evaluation's methodology, assessments of the financial viability and development potential of RE cooperatives, cooperative statistics, socioeconomic case studies, an energy impact statement, and a 23-item bibliography (1974–80).

492024800; 492031400; 492088800; 492030600
492032100; 492016900; 492009500; 492018900

053 PN-AAH-978

BOLIVIA: RURAL ELECTRIFICATION

Butler, E.; Poe, K.M.; Tendler, J.
U.S. Agency for International Development.
1980, 56 p.

A.I.D. Project Impact Evaluation Report No. 16

Two rural electrification systems initiated in Bolivia in 1973 and 1974 are the subject of this report. By 1979, all distribution networks were completed, except in the La Paz region. Power was supplied to 42,000 consumers and was used primarily for residential lighting. Although demand outpaced supply, consumption per household was lower than projected, and irrigation and industrial use was negligible. The preponderant positive impact of the projects was social. Household lighting improved the physical quality of life for 7% of Bolivia's rural population. Electric light was more convenient, less expensive, safer, and healthier than previous lighting sources such as kerosene and candles. Unfortunately, electrical power did not appear to play a catalytic role in economic development nor was it a precondition for it. Excessive technical design standards increased capital and operating costs of the systems. The premature termination of project financing for the initial hookups resulted in disproportionate exclusion of the poor from project benefits. The urban-rural rate structure, although beneficial, provided insufficient revenues for utilities to expand the rural systems. In addition, the absence of an aggressive promotion program, including a mechanism to mobilize financing by beneficiaries, resulted in a smaller number of residential and productive consumers than might otherwise have been possible. Several lessons were learned: (1) Similar projects should be located where a demand for productive use is evident from the productive use of other forms of energy. Alternatively, if the project purpose and probable impact is purely social, the system should be designed to maximize household connections. (2) Designers should introduce cost constraints into technical standards by allowing choices to be made by host-country technicians and by those who will be concerned with the utility's revenue-earning operations. (3) Electrification projects should be linked to other development activities. (4) A vigorous promotional program to teach rural people how to obtain and make productive use of electric service is recommended.

511004900; 511020500

054 PN-AAG-795

AGRICULTURAL CREDIT POLICY IN BRAZIL: OBJECTIVES AND RESULTS

Araujo, P.F.C. de; Meyer, R.L.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1978, 26 p.

Savings and Development, No. 3, p. 169–192

Over the last decade, Brazil has made agricultural credit the cornerstone of its development strategy. The present study analyzes the objectives and results of this strategy, with emphasis on the behavior of agricultural lending, in order to assess its possible replication in other developing countries. Brazil has used the existing banking system almost exclusively to channel credit into agriculture. While employing credit controls, discount mechanisms, and reserve requirements that have been used by other developing countries, Brazil has experimented with controls on interest rates and bank mergers. Actual interest rates have been set lower than those charged to other users. Specifically, rates for loans to small farmers in poor agricultural areas are lower by 1–2% than the discounted rates that are assessed to larger agricultural loans. Incentives and controls have been established by the government to encourage official and private banks to channel their lending in the direction of agriculture. Results have demonstrated that agricultural credit has sharply increased relative to output. Agricultural investments in machinery have particularly increased. Nevertheless, the spread effect of this credit has been limited, since 90% of all farms in Brazil have not received this credit. Approximately 75–80% of the credit has been used by commercial farmers in a few southern states. Also, it is evident that farmers receiving these large commercial loans have either used the money elsewhere or have used the money to free their own funds for private needs. The authors state that the Brazilian experience cannot be fully judged until it is allowed to operate under more favorable conditions where credit distortions are not as pronounced. Until the rates on agricultural credit are raised so that lenders are not penalized for agricultural loans, there is no way to judge how well lenders will meet farming needs and at what price. A list of 25 references (1971–76) is included.

AID/ta-G-1331 931000300

055 PN-AAH-103

THE FUTURE OF BASOTHO MIGRATION TO THE REPUBLIC OF SOUTH AFRICA

Eckert, J.; Wykstra, R.
Colorado State University, Department of Economics.
1979, 28 p.

LASA Research Report No. 4

Lesotho's economic dependence on remittances from its migrant laborers employed in the Republic of South Africa makes it acutely vulnerable to changes in migration opportunity. This paper analyzes demographic, economic, social, and political factors affecting the future of Basotho migratory labor, predicts the magnitude of changes that may be expected, and considers the implications of such changes for Lesotho's domestic economy. Migrant opportunities are likely to decline substantially during the next two decades due to chronic domestic unemployment in South Africa and changing trends in gold and coal mining production. Studies indicate that South Africa's indigenous labor force will increase annually in excess of employment rates needed to absorb this growing force. This situation will result in a displacement of 0.5 million foreign laborers, 47% of which are Basotho, leaving Lesotho prey to economic instability. Because of the value each commodity has recently acquired, both the gold and coal industries are rapidly expanding their production by use of capital-intensive techniques. This shift reduces labor requirements, as fewer employees can produce higher tonnages with mechanization. Other mining trends which will contribute to massive decreases in Basotho employment are the depletion of several gold mines at which Basotho migrants work and mining in distant locations beyond the economical reach of the Basotho. Such a displacement, according to this study, is beginning to occur. Because the Government of South Africa and South African mining industries are aware of the consequences that a sharp reduction in the Basotho labor force will have, a gradual reduction with advance notice is predicted. Most of the adjustments will occur during the 1980's, probably resulting in a 50% reduction of currently employed Basotho by the year 2000. This reduction will require Lesotho to increase domestic employment of males sixfold and will lead to widespread income inequalities as well as to sharp declines in Lesotho's gross national product and in government revenue from imports. Thirty-six entries (1976–78) are cited for further reference.

AID/afr-C-1387; AID/ta-CA-1 690003100

056 PN-AAH-330

LESOTHO'S EMPLOYMENT CHALLENGE: ALTERNATIVE SCENARIOS, 1980–2000 A.D.

Eckert, J.; Wykstra, R.
Colorado State University, Department of Economics.
1979, 37 p.

LASA Discussion Paper No. 7

Lesotho's employment situation is highly unusual, with more than 50% of Basotho males of working age employed abroad and five-sixths of the country's real growth in gross national income since independence the result of increases in migrant wages. This situation is likely to change drastically during the next 20 years, requiring a fundamental restructuring of Lesotho's economic base. In anticipation of such a change, this paper presents alternative projections of the probable growth in Lesotho's domestic labor force — due to reduced migrant labor opportunities — in order to estimate the total labor force which the domestic economy must absorb by the year 2000. High and low estimates are made of the size and composition of the Basotho population and labor force and alternative migration scenarios for the years 1980–2000

The extended drought in the Sahelian Zone caused decreased food production and famine in Mauritania, Mali, Senegal, Upper Volta, Niger, and Chad. Because infrastructure investment has not been emphasized in this region, these members of the Peul tribe must travel to a distribution center to receive food.

are presented. By combining estimated labor force sizes with likely migratory patterns, the number of Basotho requiring jobs in the domestic economy is derived. Estimates are also made of the potential labor demand for agricultural and other rural activities which traditionally serve as the residual employer in developing countries. Lesotho's projected employment crisis for the year 2000 is reflected in the following statistics: (1) The *de jure* population will increase by nearly 70% to more than 2.25 million; (2) the active labor force will exceed 1 million; (3) migrant employment in South Africa is likely to decline by 50%, leaving only 100,000 such jobs and demanding the creation of 900,000 jobs in Lesotho; (4) employment increases in Lesotho's modern sector (government, commerce, industry) will be insufficient to absorb all the migrants expected to return; (5) the need for agricultural jobs will appear suddenly, as migrants return faster than the modern sector can absorb them; and (6) between 18–20,000 new jobs are needed in agriculture and traditional activities each year for the balance of this century. A 14-item reference list (1973–80) and tables presenting male and female populations by age groups projected to the year 2000 at both constant and increasing growth rates are appended to the report, as are alternative estimates of the number of jobs which must be created in agriculture.

AID/ta-BMA-6; AID/ta-CA-1

057 **PN-AAH-371**

COMPARATIVE ANALYSIS OF NATIONAL PLANS AND BUDGETS OF THE SAHELIAN COUNTRIES

Horenstein, N.R.
BLK Group, Inc.
1979, 194 p.

The low rate of return (53%) realized by Sahelian nations from their development plans makes imperative a careful analysis of plans and budgetary resources. This report presents such an analysis with the purpose of identifying trends for future planning. A key factor affecting investment realization rates is the heavy reliance by these nations on external financing. Shortfalls in the availability of foreign assistance have had a crucial impact on investment realization. In addition, there is the problem of mobilization of capital — a factor which varies considerably on a sectoral and subsectoral basis according to the particular donor institution. Another factor is the frequent revisions of investment levels. These upward and downward revisions are, in turn, related to such factors as inflationary pressures, availability of financing, changing donor priorities, etc. Until recently, the Sahelian nations have allocated substantial portions of their resources to industrial and urban development to the detriment of agriculture. Recent drought has made a change of emphasis even more critical. Mali, Niger, and Senegal are now devoting 24%, 32%, and 14%, respectively, of their rural sector allocations to herd reconstitution and to reversing

the deteriorating condition of the rangeland. Infrastructure investment is another priority need. For example, transporting food from surplus-producing areas is often difficult, if not impossible. As a whole, Sahelian nations have devoted relatively small amounts of funds to health, education, and other social services. Programs benefiting people directly, such as village-based health care and formal and non-formal education systems, are urgently needed. A review of annual budgets shows that overall expenditures are growing faster than revenues. This, in combination with a paucity of managerial and technical expertise, prevents these nations from assuming the recurrent costs of donor-financed projects. The remainder of the report consists of individual analyses of the plans and budgets of Gambia, Mali, Mauritania, Niger, Senegal, Upper Volta, Cape Verde, and Chad.

AID/afr-C-1199 GTS 625092900

058 **PN-AAH-742**

MANPOWER VS MACHINERY: A CASE STUDY OF CONSERVATION WORKS IN LESOTHO

Wykstra, R.; Eckert, J.
Colorado State University, Department of Economics.
1980, 26 p.

LASA Research Report No. 6

Four factors contribute to the grim employment situation facing Lesotho: the migration of the most productive portion of its labor force to South Africa; the projected growth of the present labor force by nearly 0.5 million by the year 2000, a prospect made worse by the likely return of current migrants; the high rates of underemployment in rural households; and expenditure of domestic income abroad, thwarting growth of domestic employment. A coherent employment strategy is sorely needed to stave off the effects of gross under- and unemployment. This paper propounds the use of labor-intensive over capital-intensive methods in conservation and other public works as a way of providing domestic employment — an argument supported by extensive cost-benefit comparisons and analyses of both methods. Using the results of an earlier analysis as augmented by new data on labor productivity and increased fuel prices, this paper first addresses labor-intensive costs. Data show that in labor-intensive operations substantial amounts of direct employment are created, while site overhead costs average about one-third of direct wage payments. Capital-intensive costs are presented in terms of the costs of heavy equipment, including those of operating machinery for 8 years (at 650 hr/yr, with an alternative analysis of 1,000 hr/yr); cost of replacement or depreciation; repair and maintenance; and other costs. Data compiled from the Thaba Bosiu Project indicate that the average conservation project using capital-intensive methods costs R360 and provides 10 man-days of employment per hectare. About three-fourths of this represents equipment costs, the rest being overhead and employment. Labor-intensive methods cost R68 less and provide 60 man-days of employment per hectare more than capital-intensive methods of construction. The analysis clearly demonstrates that a program of labor-intensive public works is a viable strategy for further developing Lesotho's infrastructure, as well as for contributing significantly to its employment objectives. An 8-page appendix detailing the underlying cost analysis, as well as extensive tables and equations, are provided in support of the authors' conclusions.

AID/ta-BMA-6; AID/ta-CA-1 632006400

059 **PN-AAH-871**

SOUTH AFRICAN MINE WAGES IN THE SEVENTIES AND THEIR EFFECTS ON LESOTHO'S ECONOMY

Eckert, J.; Wykstra, R.
Colorado State University, Department of Economics.
1980, 30 p.

LASA Research Report No. 7

During the period January 1973–June 1976, the mining industry of the Republic of South Africa increased mine wages by an unprecedented 500 percent to attract higher numbers of South Africans to mining jobs, thereby reversing South Africa's dependence on foreign labor. The economic impacts of such a reversal were severe, particularly in Lesotho, South Africa's prime source of migrant labor. This paper quantifies the more important of these impacts in order to identify the causes of major economic developments in Lesotho and to suggest the magnitude of economic difficulties that may occur if migration opportunities continue to diminish. The first section analyzes selected characteristics of Basotho migration for the period 1921–79. Possibly the most significant of these traits is that the male labor force available for agricultural employment in Lesotho is now at record levels, a situation worsened by the return of Basotho from South African mines. A detailed analysis is given of the magnitude of the shift in wages during the 1970's, which peaked in 1976 at levels 3–4 times higher than ever recorded. Selected impacts on Lesotho's national economy are analyzed with major conclusions being that migrant wages have severely distorted Lesotho's balance of trade; have contributed to increases in government revenues through the Customs Union; and have resulted in an almost 1:1 correspondence between increased income and imports. Impacts of these economic trends on livestock and agricultural production, consumption, and trade are discussed and figures are presented showing that mine wage increases caused net imports of nearly 100,000 animals annually and the abandonment of cultivation on some 50–60,000 ha. The final section suggests possible trends during the third Five Year Plan period. These include a significant decline in per capita wages, the need to offset negative growth rates in remittances with higher than normal domestic growth rates, and the possibility that a new incentive situation will gradually develop for household/farm decisionmakers. A 15-item reference list (1963–81) and the titles of other LASA research reports issued to date by the Lesotho Agricultural Sector Analysis Project are appended.

AID/ta-BMA-6; AID/ta-CA-1 632006400

060 PN-AAH-920

THE FUTURE ENVIRONMENT FOR AGRICULTURAL PLANNING 1980–2000 A.D.

Eckert, J.; Mohapi, J.N.
Colorado State University, Department of Economics.
1980, 33 p.

LASA Discussion Paper No. 9

Because the dominant factors affecting Lesotho's overall economic development are also those which affect the agricultural sector, characterization of these factors would provide agricultural planners with the economic environment around which their long-term programs and policies should be based. Providing such a characterization, this analysis predicts major problems confronting economic planners that may occur in the absence of a well-defined and implemented development strategy. The major economic, demographic, and institutional events expected to occur in Lesotho during the period 1980–2000 include the following: (1) an increase in population by 60%, and growth in the labor force and in rural households to nearly 1 million and 337,000, respectively; (2) a 50% decrease in migrant employment opportunities, resulting in requirements for a net addition of over 20,000 new domestic jobs; (3) extreme fluctuation in the amount of rainfall in the 1980's and 1990's which will substantially reduce crop yields; (4) completion of an extensive network of mountain and lowland feeder roads; and (5) the implementation of the Land Act of 1979 which will restrict land allocations to farmers already allocated land, increase the average size of operated farm units, and encourage investment through increased land tenure security. Without interventions to lessen the severity of these trends, the following course of events is predicted. The annual need for jobs will remain constant in the near future, exceeding the capacities of both the agricultural and commerce and industry sectors to provide employment. Unfavorable climatic conditions will depress agricultural production, which will in turn erode per capita agricultural incomes. Close analysis of the rural household situation reveals that economic disparity and a stratified social structure may evolve. The authors offer a broad number of recommendations in the areas of employment and income generation and distribution, and present pro's and con's of an economic dispersion strategy to halt foreseeable rural–urban migrations and urban plight. A 20-item bibliography (1963–80) is appended.

AID/ta-BMA-6; AID/ta-CA-1 632006400

061 PN-AAH-921

A CRITICAL ANALYSIS OF MANPOWER UTILIZATION ISSUES IN LESOTHO

Nchapi, M.F.
Colorado State University, Department of Economics.
1980, 52 p.

LASA Research Report No. 9

According to a recent study conducted by the Lesotho Agricultural Sector Analysis Project team leader, the supply of labor requiring employment within Lesotho's economy will increase to 900,000 persons between the years 1976 and 2000, with 93,000 agricultural jobs needed in the next 5 years and over 100,000 such jobs required in each of the following 5-year periods. Development of an effective manpower utilization strategy is thus crucial in solving Lesotho's employment dilemma. This paper reviews an agriculturally-based, employment-intensive theory of development and applies it to the case of Lesotho, critically examines existing data and analyses on the employment situation, and formulates broad policy implications for the Government of Lesotho. John Mellor, in his book *The New Economics of Growth*, defines an employment-oriented development strategy as one which places heavy emphasis on agriculture as the basis of employment generation. The elements of this strategy include giving priority to agricultural production through technological change suitable to conditions in developing countries; reducing capital requirements per employee in the industrial sector; increasing the growth rate of both exports and imports; and decentralizing administrative institutions. The author of this paper delves into the major dimensions of Lesotho's manpower utilization, thereby placing Mellor's strategy into context. These issues include rural–urban migration; the magnitude of labor surplus or shortage; migration into South Africa and miners' incomes; growth of the labor supply during the years 1980–2000; and labor-intensive technologies and labor absorption. It is demonstrated that while the agricultural sector must be developed as the primary employer of returning migrants, the industrial and public works sectors also have an important role in this regard. Recommendations are made in the areas of agricultural production and marketing, import and export substitution, expansion of industry from urban areas, distribution of improved social services to village people, transfer of technology to small farmers and local personnel, and the quantity and quality of training. A 16-item bibliography (1960–80) is appended.

AID/ta-BMA-6; AID/ta-CA-1 632006400

062 PN-AAH-747

THE SOCIOECONOMIC CONTEXT OF FUELWOOD USE IN SMALL RURAL COMMUNITIES

Wood, D.H.; Brokensha, D.; Castro, A.P.; Gamser, M.S.; Jackson, B.A.; Riley, B.W.; Schraft, D.M.
Devres, Inc.; A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 318 p.

A.I.D. Evaluation Special Study No. 1

All successful community fuelwood programs must take into account the importance of local participation, consider the specific socioeconomic characteristics of the proposed location and its environs, and critically examine alternative plans and approaches. These are some of the major conclusions of this indepth report which examines the socioeconomic and environmental aspects of fuelwood use in developing countries and analyzes critical issues regarding this use. Fuelwood is defined as including firewood and charcoal and conclusions are detailed as to the sources, accessibility, harvest or production, distribution, and consumption of each. A description of community fuelwood programs in general is provided in the body of the text, while an annex is devoted to the discussion of specific fuelwood programs in India, South Korea, Nepal, Thailand, Indonesia, Nigeria, Ethiopia, Tanzania, the People's Republic of China, and Colombia. For those designing and implementing individual community fuelwood programs, guidelines are provided to resolve the following questions confronting such projects: (1) What goals can be achieved through community fuelwood programs? (2) Which types are most suited to a particular community? (3) How can these programs encourage local participation especially of women, who are the main participants in wood collection, distribution, and consumption? (4) What resources are required? (5) What are the management requirements? (6) What are the costs and benefits of such programs? Appendices include footnotes, a bibliography, terms of reference for study, organizations and individuals contacted, and the report's research methods. Additional appendices describe selected fuelwood programs and possible future fuelwood activities. An extensive bibliography (261 entries, 1922–79) includes topics on national or global deforestation, afforestation, fuelwood use, and several dissertations on energy, agricultural economics, and social issues.

AID/SOD/PDC-C-0187

063 PN-AAH-923

RAINFALL OSCILLATIONS IN LESOTHO AND THE POSSIBLE IMPACT OF DROUGHT IN THE 1980's

Eckert, J.
Colorado State University, Department of Economics.
1980, 25 p.

LASA Discussion Paper No. 10

T.G.J. Dyer and P.D. Tyson proved scientifically that rainfall over much of the "summer rainfall region" of southern Africa follows a pattern of regularly spaced wet and dry spells each 9–10 years in duration, a situation known as the "quasi 20-year oscillation" which has existed since 1841. If the pattern holds, southern Africa will enter a period of below-average rainfall in the 1980's, with potentially ominous implications for food production. This report examines closely the findings of Dyer and Tyson, especially as they pertain to Lesotho which is situated entirely within the "summer rainfall region" and which is now coming to the end of a wet spell. Research by the Lesotho Agricultural Sector Analysis Project confirms that the model derived by the two scientists is applicable to Lesotho, whose rainfall patterns have definitely exhibited the 20-year oscillation since 1945. The decrease in rainfall during this predicted dry spell will be most serious in southern Africa's summer months, November–February. Compared to average wet-spell rainfall, average yearly summer rainfall will decrease by 20% and winter rainfall by nearly 14%. Such a dry spell may affect both maize and wheat production severely because initial, moisture-sensitive stages of growth occur during November, which may be the month of least rainfall. Drought-resistant sorghum, however, will be only slightly affected. Watercourse levels will also decline. The Ministry of Agriculture should take the following steps to minimize the effects of the predicted dry spell during the 1980's: conduct research to improve farmer management of soil–plant–water interactions under indigenous farming conditions and test new tree and vine crops whose value per water unit is high; give priority to water conservation programs such as repair and maintenance of conservation structures; utilize the government's seed importation capacity to obtain and spread seeds of drought-resistant varieties; and seek a high level of technical assistance to identify needs and suggest optional forms for national water rights legislation. A 15-item reference list (1971–80), as well as average monthly rainfall observations made at district headquarters stations, are appended.

AID/ta-BMA-6 632006400

064 PN-AAG-972

DRAFT ENVIRONMENTAL REPORT ON THAILAND

Library of Congress, Science and Technology Division.
1979, 94 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Located in the heart of Southeast Asia, Thailand's 46 million people make it one of the world's 20 most populous countries. This draft report profiles Thailand's natural and environmental resources and many of its environmental problems. An overview is provided of natural resource- and environment-related organizations and legislation and of the country's population and economy. Maps, figures, and tables add detail to this information. Although highly variable, Thailand's water resources are generally abundant. Surface waters, however, are being polluted by municipal, industrial, and mining wastes. Clearing of upstream forests is increasing sedimentation in waterways, while critical watersheds, especially in the northern region, are being disturbed by loss of vegetation due to shifting cultivation. Heavy rainfall has leached the soil

throughout Thailand, causing high acidity and low fertility levels. In addition, mining practices (particularly the exploitation of tin and tungsten) and shifting cultivation contribute to erosion and the loss of topsoil. Forests are being depleted rapidly, especially in the northern highlands and in the northeast, due to the practice of shifting cultivation by both the local population and seminomadic hill tribes. Unmanaged development of the coastal zone has led to deterioration of its ecosystem, especially on the Gulf. Mangrove forests are suffering from indiscriminate logging for charcoal, encroachment by fishing and mining industries, water pollution, and increased sedimentation. Illegal use of dynamite by fishermen and siltation from mining activities endanger the coral reefs. Illegal hunting and trapping and habitat destruction through forest clearing are destroying wildlife at a rapid rate. Although fish is the principal source of animal food and the only significant source of protein in the national diet, freshwater and marine fisheries are overexploited. Despite the passage of the Enhancement and Conservation of National Environmental Quality Act in 1975 and the formation of the National Environment Board, there remains a lack of coordination between government agencies responsible for resource management. A 46-item bibliography (1969–79) is included.

SA/TOA 1-77 931111300

065 PN-AAG-973

DRAFT ENVIRONMENTAL REPORT ON SRI LANKA

Library of Congress, Division of Science and Technology. 1978, 71 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Opportunities for developing Sri Lanka's water, forest, and soil resources exist, but such development must proceed rationally in order to prevent a recurrence of environmental deterioration. This report surveys the country's renewable resources (water, forest, wildlife, fisheries, and the atmosphere) and nonrenewable resources (minerals, soil, and coastal land) and cites potentialities and problems in the island's two climatic zones, the wet zone to the southwest and the dry zone covering the rest of the island. Key points are illustrated by maps, tables, and figures. Overviews of the economy, demographic trends, concerned governmental and private agencies, and environmental legislation are also provided. The major environmental problems which occur primarily in the wet zone, are deforestation, lack and misuse of water resources, and soil erosion. Deforestation has resulted from clearing land for agricultural enterprises, increased firewood demands, development of the timber industry, and the need for construction materials. The ramifications of the rapid pace of deforestation include endangerment of primary forest land and its natural ecology and loss of habitat for wild animals. A particularly serious form of deforestation has been the loss of forests significant for their water-holding capacity, resulting in flooding and increasing soil erosion, especially in areas of high elevation. In these elevated areas, hot air rising from deforested lands has increased droughts during intermonsoonal periods. Excessive irrigation for certain crops in the wet zone and the lack of a more efficient irrigation system in the dry zone are traditional problems. In addition, severe droughts have occurred in recent years with the failure of the monsoon rains, thus exacerbating the problem of water resources. Although legislation protecting the environment and natural resources exists, problems regarding its administration and enforcement remain. An appendix on animals protected under the Fauna and Flora Protection Ordinance and a 17-item bibliography (1961–77) in English and German are included.

SA/TOA 1-77 931111300

066 PN-AAG-974

DRAFT ENVIRONMENTAL REPORT ON PERU

Library of Congress, Division of Science and Technology. 1979, 137 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Although Peru is committed to the rational development of its natural resources, economic expansion has generated environmental problems. This report analyzes the current status of Peru's air, mineral, water, soil, wildlife, fishery, and coastal resources in conjunction with topographic and climatic data. Agencies responsible for developing environmental legislation are discussed, and extracts from the 1979 draft constitution pertaining to natural resources are presented along with an economic profile and demographic data. Nine environmental problem areas are cited. (1) Population growth has averaged 3%, with population densities highest in the Sierra and Costa regions. Half the population — mostly in rural areas — lives in poverty, under poor health conditions. Urban centers such as Lima are unable to supply adequate services or employment opportunities, exacerbating poverty and disease. (2) Water resources are available, yet population settlements and economic activity are located in areas of limited water supply, thus requiring expensive delivery and irrigation systems. Pollution, due to dumping of municipal and mine wastes, threatens these supplies. (3) Many soil areas are considered suitable only for grazing and forestry, and the limited agricultural soils have been overworked, particularly on the Costa and Sierra slopes. Desertification, soil erosion, and salinity are dominant problems. (4) The Sierra and the Costa have been heavily deforested as a result of timbering and fuelwood needs. Mahogany, tornillo, and Spanish cedar have been eliminated as resources in some areas. (5) Wildlife numbers have declined, and the chinchilla and vicuna are endangered. (6) Peru's coastal waters are subjected to pollution from municipal, industrial, and mining wastes. (7) Heavy fishing and water pollution from mine tailings and municipal wastes have prevented the recovery of the anchovy fishery. (8) Air and water pollution from extraction of Peru's major minerals — copper, iron, silver, lead, and zinc — has increased. (9) Although numerous environmental laws exist, enforcement is inadequate. A 96-item (1960–79) bibliography written in English, German, and Spanish is appended.

SA/TOA 1-77 931111300

067 PN-AAG-975

DRAFT ENVIRONMENTAL REPORT ON NEPAL

Chakroff, M.S.
Library of Congress, Science and Technology Division.
1979, 61 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

By 1988, Nepal may lose its most precious natural resource — its forest lands. According to satellite data, Nepal's forest lands declined from 30% to 22% of its total land area in the last decade. This draft report reviews the natural resources and related legislation and institutions of this small, land-locked country, located between northern India and Tibet, and identifies its major environmental problems. The latter include deforestation and the related problems of reduced agricultural productivity, impure drinking water, and soil erosion. Nepal's forests can yield only 77.9 kg of the 546.3 kg of fuelwood currently consumed per person per year, an annual deficit of 6.5 million tons of wood. Because of the diminished firewood supply, people forego heated meals and consume impure water. Also, by burning manure for fuel, they deprive the land of needed nutrients. Marginal lands cleared for agricultural production are abandoned as productivity falls, leaving topsoil a prey to torrential rains. Each year, 240 million cubic meters of topsoil are lost due to the Himalayas' topography and to poorly planned development activities and construction. The loss of topsoil, reduced agricultural usage of fertilizer, and poor farming practices contribute to the recent 2-year decline in agricultural productivity. Nepal's three major rivers have not been fully utilized as hydro-energy sources, nor has potable water been provided to reduce the people's exposure to contaminated water. Despite its considerable legislation regulating forest usage, the government has done little to reforest the areas used for export purposes. An underlying cause of Nepal's environmental problem is the country's high population growth rate. Nepal's present population is 13.8 million, with an annual growth rate of 2.5%. According to some estimates, Nepal will have a population of 22 million by the year 2000. In 1978, no more than 5% of the couples 15-44 years of age accepted contraceptives and only 35% of married couples continued contraceptive usage after initial acceptance. This continually expanding population makes ever-growing demands upon diminishing resources. A 32-item bibliography (1970–79) is appended.

SA/TOA 1-77 931111300

068 PN-AAG-977

DRAFT ENVIRONMENTAL REPORT ON MAURITANIA

Library of Congress, Science and Technology Division.
1979, 43 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

An extended drought, aggravated by population pressures, threatens the traditional agricultural base and fragile environment of Mauritania with rapid desertification. This report assesses Mauritania's overall environmental situation, focusing on its population, its government's environmental organizations, environmental legislation, natural resources, and the environmental effects of its economy. Mauritania occupies a territory about 80% of the size of Alaska, ranging from the northern, hot, arid Sahara deserts to the fertile, green banks of the Senegal River in the south. The current loss of grazing and subsistence farm lands originated with the Sahelian drought that began in the early 1970's. Contributing to the problem was the extension of agriculture to marginal lands previously used for grazing; clearing the areas of their natural vegetation left them unprotected after the crops failed. The growth of livestock herds, made possible by expanded groundwater consumption, led to the conversion of forest areas into grazing areas and the exhaustion of all vegetation. The drought drove the nomadic herders to strip forests to feed their starving livestock; many of the herds died, leaving Mauritania's largest societal group without a livelihood. They were forced to migrate to urban areas where they live in squalor, posing a major problem for the government. Many forests did not survive these amputations and perished as a result. Deforestation is also due to firewood collection near expanding urban areas and the clearing of forests for agricultural expansion. The problem of rapid desertification is thus quite serious, considering the limited amount of fertile soil (40% of the country is covered with sand). The restoration of the delicate environmental balance that characterized this country's past is essential to its future survival. Despite the government's progress in this area (regulating forest use, proposing projects to begin nurseries and village forests, regenerating forest stands and constructing windbreaks), its future actions are hard to predict due to the political uncertainty lingering from the July, 1978 coup d'etat. Appended is a 12-item French and English bibliography (1965–77).

SA/TOA 1-77 931111300

069 PN-AAG-978

ENVIRONMENTAL PROFILE OF LIBERIA, PHASE I

Hazelwood, P.T.
Library of Congress, Science and Technology Division.
1980, 53 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Liberia has a tropical climate favoring high forest vegetation and is rich in natural resources, notably iron ore, timber, and rubber. Its major topographical and biogeographical regions include a coastal plain, a belt of rolling hills, a belt of low mountain ranges and plateaus, and northern highlands. This report is a preliminary review of information available in the United States on Liberia's environment and natural resources. Topics covered by the report include the nation's physical, demographic, and social and economic characteristics; renewable resources; non-renewable resources; parks, reserves, and other protected areas; and environmental problems. Increasing pressures are being placed on Liberia's renewable resource base. Under shifting cultivation, the

dominant form of agriculture, much if not most of the country's primary forests have been reduced to secondary forests or have been completely cleared. Logging by timber concessions and fuelwood demands constitute the other major causes of forest degradation. Mining is the most important sector of Liberia's economy. Iron ore production, which accounts for 60–70% of total export earnings, has resulted in the pollution of the Mano and St. John rivers from iron ore dust and other residues. In addition, Liberia's coastal waters are becoming increasing polluted — the result of spillage from oil tankers, oil cargo handling and off-shore drilling of petroleum. Poor sanitation, however, is the primary environmental factor affecting public health. Sanitary piped water, waste water and sewage treatment plants, and sanitary disposal of human waste occur rarely. Monrovia is the only city in Liberia with a sewage treatment system. Overall, Liberia's primary environmental problems include: (1) deforestation; (2) pollution resulting from mineral exploitation; (3) unregulated urban expansion; (4) rural water supply and sanitation; and (5) a lack of legislative and institutional mechanisms necessary for environmental management. References (59 entries, 1931–80) and appendices (consisting of demographic, social, and economic data; lists of soils, vegetation, and endangered animal species; and a biogeographical map) are provided.

SA/TOA 1-77 931111300

070 PN-AAG-979

DRAFT ENVIRONMENTAL REPORT ON JORDAN

Bauman, F.
Library of Congress, Division of Science and Technology.
1979, 103 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Jordan is not endowed with abundant natural resources. Only 9% of the land is cultivable and forests cover less than 1% of the country. Wildlife has been decimated by overhunting, and mineral resources are few, although phosphates are growing in economic importance. This draft report profiles Jordan's natural resources including water, forests, soils, wildlife, fisheries, beaches, minerals, and atmosphere. Organizations related to the environment are listed in light of their responsibilities, and legislation relevant to each resource is described. Demographic and economic data are also provided. Jordan has several major environmental problems. (1) Water resources for human consumption and irrigation are few, a situation exacerbated by frequent droughts. Inadequate water supplies and sanitation facilities are major contributors to gastroenteric diseases as well as infectious hepatitis, typhoid, and dysentery. In Amman, most dwellers rely on tank trucks for water delivery. A survey of 747 other communities established that only 1.5% have satisfactory potable water supplies for 80% of their residents. Most of Jordan's municipal water systems are in poor condition and incur water losses of 25–60%. A heavy concentration of industry in the crowded urban area of Amman-Zarqe is causing water pollution problems. (2) Deforestation has been accelerated by agricultural clearing, fuelwood exploitation, and overgrazing which have caused soil erosion, loss of valuable timber resources, and damage to watershed areas. (3) Soil erosion due to deforestation, overgrazing, and irresponsible farming practices (especially in upland areas where wheat, Jordan's main crop, is grown) has led to reduced land productivity and the siltation of reservoirs. In the catchment area for the King Talal Reservoir, 95% of the land is affected by sheet erosion. Excess salinity is also a problem which frequently accompanies irrigation. The southern borders of the Zarqa River are particularly subject to this problem. This poor environmental picture is reflected in the generally low level of health of Jordan's people. A 56-item bibliography (1964 –79) is appended.

SA/TOA 1-77 931111300

071 PN-AAG-980

DRAFT ENVIRONMENTAL REPORT ON HAITI

Library of Congress, Science and Technology Division.
1979, 61 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Haiti's current, almost unparalleled environmental degradation is due to interrelated problems of overpopulation, deforestation, and soil erosion. This draft environmental report assesses Haiti's environmental problems, natural resources, economy, and the Government of Haiti's (GOH) environmental agencies and legislation. The resource demands of Haiti's population of 4.8 million, with an annual 2.2% growth rate, lead to the extended farming of marginal, easily erodible lands, and the stripping of forests for fuel. Haiti is the most densely populated country in the Western Hemisphere, estimated in 1978 to have 178 people per sq km, yet the GOH has not supported the family planning programs initiated by international donor agencies (who themselves need greater coordination and cooperation). Deforestation, the farming of marginal lands, and slash-and-burn agriculture cause Haiti's chief environmental problem: soil erosion. Haiti's strong rains wash nutrient soils off farmed hillsides and down into the dams and irrigation works, where the accumulated silt renders irrigation systems inoperable and reduces dams' hydroelectric potential. In addition, soil erosion causes reduction of fish populations through high alkalinity in lakes, ponds, and rivers, and decreases agricultural output as farmers must till deeper, less fertile soil. GOH studies estimate that although 55% of the country should normally be forested, Haiti's forests have been reduced to 7–9% of the land area. This deforestation is due to the clearing of forests for commercial lumber, firewood and charcoal (90% of the current wood use), and additional farmland, which is then farmed by common slash-and-burn methods. GOH hopes to increase its forests to 18.5% of the total land area and has accordingly passed legislation banning timber exports, requiring that cut trees be replaced with new ones, and directing local governments to plant communal forests in eroded mountain areas. GOH will also seek alternative energy sources to meet growing energy demands and will give special attention to reforesting hydrological basins. Appended are a 29-item French

and English language bibliography and a list of Haitian birds protected in recent legislation.

SA/TOA 1-77 931111300

072 PN-AAG-981

DRAFT ENVIRONMENTAL REPORT ON GUATEMALA

Library of Congress, Science and Technology Division.
1979, 99 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

As a first step in assisting development planners in Guatemala to identify critical areas of environmental concern, this draft report profiles the status of Guatemala's natural resources. Indigenous resources investigated include water sources, forest areas, soils, wildlife, coastlands, beaches, fisheries, and minerals. Government and non-government agencies which deal with environmental issues are discussed in light of their responsibilities; environmental regulations are enumerated in detail. Demographic information is also provided with the aid of maps and charts. A general economic profile highlighting both industrial and agricultural production concludes this report. Five major environmental problem areas are noted. (1) The most serious problem is deforestation which, since 1890, has occurred in over 50% of the nation's forests. Inadequate forest management in conjunction with increasing population pressures in the highland regions have accelerated this process. (2) Since the turn of the century, 40% of the land's productive capacity has been lost due to erosion. Aggravated by the existence of a predominantly steep-sloping geography, in addition to deforestation and poor soil conservation techniques, erosion is a serious problem in the cultivated western highland areas. (3) Water pollution presents a great hazard as a result of the concentration of population in areas with inadequate waste disposal systems and increases in surface runoff because of barren ditches. (4) The use of pesticides such as DDT, Dieldrin, Toxaphene, Methyl and Ethyl parathion, and Endrin in cotton growing areas has dramatically increased. Application procedures, particularly aerial spraying, have been inadequate in providing safety measures and as a result these toxic sprays have been polluting major water sources and are being transmitted in food chains. (5) At the present growth rate of 3.3%, the nation's population will double in 22 years, straining available resources, particularly in urban areas, in addition to encroaching upon the surrounding natural habitats of wildlife. A 50-item (1968–79) bibliography in English, German, and Spanish is appended.

SA/TOA 1-77 931111300

073 PN-AAG-982

DRAFT ENVIRONMENTAL REPORT ON BOLIVIA

Library of Congress, Division of Science and Technology.
1979, 76 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Bolivia is a landlocked nation whose topography is an important factor in considering its environmental problems. With the help of maps and charts, this draft report elaborates upon this relationship while profiling the nation's water, soil, mineral, wildlife, fishery, and forest resources. The responsibilities of relevant organizations and standing legislation concerning the development of natural resources are outlined. Population data and economic information are also provided to demonstrate how their growth patterns have been defined by the environment. The concentration of people living in the unproductive Altiplano region has taxed the area's available services. Soil suitable for agricultural use is limited and poor cultivation methods and overgrazing have accelerated erosion. This process, compounded by desertification in the highland and valley areas, has led to poor water retention, which increases runoff. The result is serious flooding in the lowland areas. In the farming regions of Santa Cruz, slash-and-burn agricultural practices also promote erosion and the abandonment of farm land. Potable water supply is also a problem. Poor water quality caused by urban waste and mining residue, particularly in the Altiplano, has been responsible for the spread of various diseases. Deforestation is another growing concern. Tropical areas of the northern lowlands have been subjected to increased timber exploitation. Deforestation for agricultural purposes is also accelerating, especially in the Santa Cruz district. Generally, Bolivia's wildlife is still varied and plentiful. However, some native species such as the vicuna are on the verge of extinction. The Bolivian Government has initiated efforts to resolve these problems with the establishment of the Division of Natural Resources and Environmental Protection. But limited manpower and funding continue to limit progress in this area. A 40-item bibliography (1964–79) in English and Spanish is appended.

SA/TOA 1-77 931111300

074 PN-AAH-752

DRAFT ENVIRONMENTAL REPORT ON INDIA

Bauman, F.
Library of Congress, Science and Technology Division.
1980, 175 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Many of India's environmental problems arise from attempts to meet the basic needs of its enormous population for food and energy. This draft report profiles India's environment and natural resources in order to specify these problems. After an introductory section on the distribution and characteristics of India's population, basic descriptions are provided of the country's topographical and geological characteristics and of such natural resources as climate, water, soils, forests, wildlife, coastlands and beaches, fisheries, minerals, and air and the atmosphere. Concluding sections deal with the nation's economy, with emphasis on the agricultural, industrial, and energy sectors; the governmental, research, higher education, and private organizations which deal with environmental issues; and current environmental legislation. India is faced with the following environmental problem areas. (1) Water resources are in short supply in regions such as the Deccan Plateau due to dry seasons and the lack of adequate storage

facilities. In addition, poor surface water irrigation has resulted in waterlogging and water loss, while some areas experience annual flooding periods. Domestic waste and runoff containing pesticides and fertilizers have contributed to water pollution. Groundwater problems include overpumping, salinity, and pollution due to seepage from fertilizers and pesticides. (2) Soil damage has occurred in 20% of India's soils through the presence of salinity and alkalinity, acidity, waterlogging, cracking, and erosion. (3) During the past 20 years, 4.0 million ha have been deforested — in a country that had 74.9 million ha of forest area in 1978. Continued recession of India's forests is due to clearing, fuel needs, fires, and grazing. (4) Great loss of wildlife has occurred due to urban and rural encroachment; there exist 25 endangered species. (5) Fisheries have been overexploited. (6) Coastal zones have experienced sea erosion and marine pollution. (7) Air pollution is most pronounced in urban centers, although rural regions have been subjected to similar problems as a result of the burning of wood and dung. A 93-item bibliography (1960–79) is appended.

SA/TOA 1-77 931111300

075 PN-AAH-753

DRAFT ENVIRONMENTAL REPORT ON THE PHILIPPINES

Chakroff, M.S.
Library of Congress, Science and Technology Division.
1980, 77 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The Republic of the Philippines is an archipelago composed of an estimated 7,100 islands located along the southwest rim of Asia. This environmental report is a profile of the Republic's indigenous natural resources including climatic factors, water and energy sources, forests, seismic activity, soils, wildlife, minerals, and coasts and beaches. In addition, government and nongovernment agencies involved with environmental issues and legislation are described. The Philippines is plagued by a number of environmental problems. (1) Deforestation and soil erosion have increased. An estimated 5 million hectares of forest lands have been leveled, of which 1.4 million ha had been located in critical watershed areas. Deforestation is progressing at a rate of 80,000 ha per year. Although the Government does require replanting by loggers, enforcement is inadequate. Erosion is excessive in Cebu, Luzon, Masbate, Panay, and Bohol. (2) Water and air pollution are an increasing health hazard. Industrial waste is a serious problem in Manila and surveys indicate that 38 rivers are currently being polluted by industry. Sources of this pollution are mining operations, sugar mills, food processing plants, breweries, distilleries, and factories producing plastics, paper, detergents and chemicals. The National Pollution Control Commission (NPCC) has recently begun fining offenders. The NPCC has also initiated clean air campaigns directed at motor vehicles, but little has been done regarding industry. (3) The loss of natural habitats continues unabated. Important as coastal buffers and fish habitats, the reefs have been damaged by both eroded river silt and fishermen's dynamite. Approximately 50% of the coral reefs surrounding the Philippines are either dead or dying. Mangrove swamps have also been dramatically reduced due to cutting for forest products, thus eliminating the protective function swamps provide for fish and shellfish. Generally, there has been little environmental management of these areas. A 16-item bibliography (1965–79) is appended.

SA/TOA 1-77 931111300

076 PN-AAH-754

DRAFT ENVIRONMENTAL PROFILE OF SWAZILAND

Library of Congress, Science and Technology Division.
1980, 105 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Swaziland is a nation with both abundant natural resources and serious environmental problems. This report assesses Swaziland's environment after first presenting an extensive overview of the topography, health, education, climate, religion, and economy of this landlocked nation. Five main problems burden the natural environment. The first, deterioration of arable and communal grazing lands, has two main causes: overstocking of livestock, and the fact that much of the arable land is on steep slopes, making it prone to erosion. To remedy this, destocking programs combined with crop development programs are recommended. Mandatory strip cultivation, contour plowing, and cultivation over 100 feet from river banks are also required. The second problem, the high incidence of waterborne diseases such as bilharzia, is especially common in the many surface water and irrigated areas of Swaziland. Major programs to eradicate these diseases include eliminating the host snail population and providing clean water and sanitary facilities. Because the expanding activities of a growing population alter the natural environment — the third problem — strong national development planning is needed to conserve plants and animals in their natural ecosystems. To this end, the National Trust Commission has been established and 31 sites designated for nature reserves. A fourth problem, rapid urbanization, has led to shelter and environmental health problems due to inaccessible potable water and sanitation facilities, especially in squatter settlements on the urban fringe. In some cases, building these settlements has been prohibited around endangered watersheds, but physical planning and environmental controls are still needed around urban centers. The final problem, Swaziland's high rate of population growth (3.0 to 3.2%), places great pressure on land resources. The Government is attempting to deal with this problem through maternal and child health/family planning programs. Attached are technical appendices, a 38-item bibliography (1961–79), and a list of organizations and legislation relevant to natural resource management.

SA/TOA 1-77 931111300

077 PN-AAH-874

DRAFT ENVIRONMENTAL REPORT ON MOROCCO

Parker, S.A.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 96 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Desertification due to accelerating population growth rates and heavy dependence on agriculture has become a growing threat to the economic and ecological balance of many developing countries. To address this situation, environmental investigations, such as this draft environmental report of Morocco, are urgently needed. The report consists of an introductory description covering Morocco's geography, population, and economic characteristics, followed by an examination of the country's environment and natural resources, including flora, mineral resources, soils, water resources, legislation governing the environment and natural resources, and relevant organizations. In addition, demographic and economic characteristics are enumerated in various tables, and maps are presented to illustrate geological, vocational, and agricultural features. Currently, Morocco is confronted with a number of environmental problems. Population increases and pollution from urban sewage and oil are straining the environment. Soil erosion has accelerated due to overgrazing and poor water management practices. Vegetation denudation has resulted from grassland and forest destruction. Inappropriate water management practices used in irrigation projects have caused silting of reservoirs and indirectly increased the incidence of malaria and bilharzia. Ignorance of small-scale water management methods has resulted in watershed destruction while loss of habitat and other hunting pressures have caused widespread wildlife destruction. Morocco has environmental legislation that addresses some of these problems, but overcoming resistance to changing traditional land use practices destructive to the environment poses perhaps the greatest obstacle to enforcement. Appended is an extensive bibliography of English and French sources on Africa (1954–75) and Morocco (1960–78), as well as on development (1964–78), environment and natural resources management (1960–79), fauna and flora (1967–78), geology (1963–79), mineral resources (1947–79), range management (1966–78), soils (1968–77), and water (1967–79).

SA/TOA 1-77 931111300

078 PN-AAH-875

DRAFT ENVIRONMENTAL REPORT ON YEMEN (YEMEN ARAB REPUBLIC)

Speece, M.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 98 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The Yemen Republic is one of the least developed countries in the world. Lacking substantial mineral resources, its primary resources are its limited agricultural and rangelands of which only 8% are definitely cultivable. This draft report presents a profile of the country's natural and environmental resources in order to identify major environmental problems. After an introduction outlining Yemen's geographical, climatic, and demographic characteristics, the country's natural resources of water, minerals, soils, vegetation/rangelands, and fauna are described, along with a note on parks, protected areas, and reserves. A review of Yemen's environmental problems — which the Government is only now beginning to recognize — reveals that they are generally related to water or agriculture. Five major problems are noted. (1) The pollution of drinking water is serious in both rural and urban areas. Existing wells are shallow and therefore easily contaminated, a situation compounded by the lack of waste disposal systems. (2) Since most of Yemen suffers from scant rainfall and little surface water, groundwater is the major source of water for household use. Increases in this use and in groundwater irrigation are rapidly lowering the water table in many regions. (3) Soil erosion, always a problem in wadi areas, is now spreading to highland agricultural areas. The depletion of plant cover in range and woodlands has also accelerated erosion in nonagricultural areas. (4) Soil salinization is a problem in Tihama, where irrigation with groundwater is increasing. (5) Other difficulties that are not yet considered critical include spreading sand dunes in Tihama, overgrazing and depletion of range plant cover, soil depletion, and problems associated with rapid industrialization. Appended is a 180-item bibliography of German, French, Italian, and English sources covering general information (1872–1978); geology, minerals, and soils (1888–1977); flora and fauna (1834–1955); water resources and management (1925–77); land use and agriculture (1953–78); public health and nutrition (1932–72); social aspects (1939–79); and development (1964–79). A 27-item (1939–80) list of references cited is also included.

SA/TOA 1-77 931111300

079 PN-AAH-876

DRAFT ENVIRONMENTAL PROFILE ON TUNISIA

Grant, A.P.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 77 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Intensified by the country's continuing population increases, the major problem burdening Tunisia today is a swiftly eroding landbase. This report of the natural resources of this small, arid country emphasizes major environmental problems, legislation already passed for environmental protection, and provides recommendations to reverse environmental degradation. After brief remarks on farming practices in Tunisia, the impact of the population's growing migration to urban centers upon agriculture, industry and the economy is discussed. The survey of the country's water, soils,

land, wildlife, and mineral resources reveals several critical problems. Water resources, of which groundwater is the main constituent, are being depleted by the sharply increased withdrawal of groundwater for irrigated areas and by the growing needs of industry and households. In the absence of adequate water quality control systems, this growing use has increased the salinity, sedimentation, chemical, and fecal content of the country's waters. The landbase, another object of rapid depletion, is being eroded mainly by disturbance of the vegetative cover through improper cropping and overgrazing of livestock. The Tunisian government has recognized the dangers confronting the country's natural resources and has passed protective legislation to stabilize coastal and continental sand dunes by establishing forests and by developing a transnational zone with ecosystem protection devices such as conservation farming and carefully managed rangeland. Additional activities recommended to counter erosion include: contour plowing on steep slopes; crop rotation; strip cultivation; terrace construction; avoidance of grazing in the growing season; and reduction of animal numbers. Although these activities will reduce natural resource depletion, the biggest problem will be meeting the population's growing needs for land and water and at the same time, encouraging them to adopt prudent practices to sustain Tunisia's natural resources. Lists of environmental protection legislation and organizations, literature cited, supporting bibliographies (1969–79), and technical appendices are attached.

SA/TOA 1-77 931111300

080 PN-AAH-877

DRAFT ENVIRONMENTAL REPORT ON ARAB REPUBLIC OF EGYPT

Wilkinson, M.J.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 115 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Current environmental problems facing Egypt are caused by the concentration of intensive agricultural irrigation and high population densities on 4% of the nation's land area. This draft report reviews Egypt's natural resources in light of these problems. An introduction describes the nation's geography, climate, and population. The body of the report analyzes Egypt's natural resources of minerals, water, soil, flora and fauna; and the impact on these resources by irrigation projects, land reclamation, dust storms, and industry. A brief final section lists the country's major environmental problems and strategies to counter them, as follows: (1) Irrigation-induced salinization has damaged almost 30% of Egypt's irrigated soils. Dust storms and urban sprawl have also hurt soils. Suggested countermeasures include drainage of waterlogged areas; prevention of canal seepage; regulation of water systems to prevent resalinization and rewaterlogging; rangeland improvement and soil surveys; and protection of land from urban encroachment. (2) Pollution of surface and groundwater has resulted from salinized drainage water from irrigated areas, agricultural pesticides, sewage disposal, industrial effluence, and overpumping of aquifers. Improved sewage disposal systems are essential, along with enforcement of water quality regulations and control of agricultural chemicals. Research on groundwater beneath the western desert oases and the localized salinization of groundwater in the Delta region on larger groundwater bodies is also recommended. (3) The spread of endemic waterborne diseases through the irrigation system has increased health hazards. Improved water supply and sewage systems, as well as better irrigation practices, are required. (4) Perennial irrigation has increased the number of crop-destroying pests. Monitoring of current controls is needed to detect and prevent epidemic outbreaks. Also recommended are the creation of protected areas for endangered wildlife and development of an integrated environmental policy. Included is a 75-item bibliography (1935–79) and seven appendices, including a list of recent USAID projects.

SA/TOA 1-77 931111300

081 PN-AAJ-124

DRAFT ENVIRONMENTAL REPORT ON BANGLADESH

Library of Congress, Division of Science and Technology.
1980, 104 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Bangladesh is one of the most densely populated countries in the world — a situation that has placed tremendous pressures on its natural resource base. This draft report discusses the nation's plight while profiling its resources of water, soils, forests, wildlife, coastlands, fisheries, and minerals, as well as its climatic and geographic characteristics. Complementing these resource profiles are examinations of the country's environmental organizations and legislation, and its demographic and economic characteristics. Overpopulation is the critical problem confronting Bangladesh; there is an immediate need to slow the nation's 2.9% growth rate. Due to the nation's limited water storage facilities, only 10% of the population has access to potable water despite the overabundance of water during the monsoon season. This situation contributes to low agricultural productivity and the rapid spread of communicable diseases. About 50% of the population suffers from malnutrition in addition to intestinal diseases and parasitic maladies such as malaria. The most prominent water quality problem is contamination of domestic water by human waste. Water is also contaminated by fertilizer and pesticide residues and industrial wastes, especially in the southeast and around Dacca. Farming area is also inadequate. Since most arable lands are already under cultivation (thus severely limiting the area for grazing), increased agricultural output depends on expanded irrigation operations and the use of fertilizers and pesticides. Soil erosion caused by monsoon flooding and hill farming is continuous. Deforestation, due to fuelwood gathering and agricultural clearing, has left only 15% of the nation's forests intact. Wildlife has also suffered as society reduces their habitat. Rhino-

ceri, elephants, and crocodiles are endangered. Coastlands are inundated by saline waters, while exploitation of mangrove swamps in the southwest for fuelwood threatens the area's ecological patterns. The nation's fishery and mineral resources are considered underdeveloped. A 33-item bibliography (1971–79) in English and German is appended.

SA/TOA 1-77 931111300

082 **PN-AAJ-125**

DRAFT ENVIRONMENTAL REPORT ON ECUADOR

Library of Congress, Science and Technology Division.
1979, 63 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Ecuador, a mountainous country on the northwest coast of South America, is currently developing its territories east of the Andes mountains. Exploitation of natural resources, particularly oil, is an important incentive in these development activities. This draft report examines the status of Ecuador's environment and climate, water, forest, soil, wildlife, petroleum, and mineral resources, with key points illustrated by charts and maps. Also provided are overviews of the country's demographic characteristics and of the government's environmental agencies and current environmental legislation, as well as a brief description of the country's economy. Ecuador is faced with three main environmental problems. (1) Natural erosion occurs as the Andes' mountain rivers cut gorges into the countryside. This process is furthered in the highland areas of the Sierra by overgrazing, uncontrolled cultivation, and deforestation. As population increases force farmers higher up the mountain slopes, areas cleared for farm use exacerbate erosion. Improved conservation methods and agricultural production on the lower slopes and better pasturage and forage crops for livestock could help to arrest this process. (2) Deforestation, accelerated by government efforts to colonize the area and by petroleum exploration in the northeast, is most evident in the Orient, the virgin tropical rain forest that occupies over half the country's territory.

Too often, mountain ranges best suited for forestry are deforested for colonization. Subsequent overgrazing and uncontrolled cultivation can result in soil erosion as seen here in the Andes of South America.

Government policies to encourage logging have also contributed to this problem because loggers often fail to replant in cleared-out areas. (3) Desertification has increased by 31.5% over the last 25 years. Most of the arid land is along the southern coast and border with Peru, but the Santa Elena peninsula is also considered arid. Deforestation and erosion both contribute to this situation. Continuous cultivation also leads to desertification, particularly when livestock are allowed to graze on crop residues and no fallow period is possible. A 26-item (1968–79) bibliography in English and Spanish is appended.

SA/TOA 1-77 931111300

083 PN-AAJ-201

DRAFT ENVIRONMENTAL REPORT ON CAPE VERDE

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 57 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The Cape Verde Islands currently suffer from soil degradation, improper land usage, and shortages of fuel and water. Such are the conclusions of this draft report which profiles the natural resources of these 10 islands and five inlets, and provides related geographical, climatic, land use, and population data. Cape Verde's steep watersheds, torrential rains, rapid water runoff, and strong winds cause extensive soil erosion. The inhabitants add to the problem by removing natural vegetation (often by the roots) for fuel, construction, agricultural extension, and intensive livestock feeding. Since 1976, construction to modify slopes and stream gradients has included earth or stone-walled terraces, contour ditches to slow water runoff, and check-dams for streams. Regeneration of rangelands requires protection from livestock and, to restore soil organic matter, the planting of windbreaks and "green-manure" crops. Proper land usage, increased food production, and the cessation of environmentally harmful forms of farming require crop diversification, wider area irrigation, fertilizer and pesticide usage, and better grain storage facilities. To minimize soil erosion and vegetation loss, the intensive cultivation of steep and arid areas must end — even if this requires relocating current residents. Fuelwood demand drains the land and vegetation considerably, while imported fuels are too costly for rural residents. To effectively end the fuel shortage, Cape Verde must develop alternative energy sources such as windpower, biogas, and solar and geothermal energy. The scarcity of water is due to erratic or nonexistent rainfall; terrain that is unsuitable for reservoirs and conducive to runoff; and groundwater sources that are hard to locate because of the islands' volcanic formations. Water supplies can be increased by better surface water storage, slowing water runoff, and by inducing artificial recharge and increasing drilling of groundwater sources. Also needed to end the shortage are greater water usage efficiency, especially in irrigation, and improved survey information for water source exploitation. Appended is an 81-item bibliography (1935–80) in French, English, German and Portuguese.

SA/TOA 1-77 931111300

084 PN-AAJ-202

DRAFT ENVIRONMENTAL REPORT ON MALI

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 70 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

In Mali, the adverse effects of the recent drought, amplified by the increase in both human and livestock populations, have set in motion a series of events that have resulted in the desertification of large land areas. Most of the nation's environmental problems are associated with this cycle of desertification. This draft report examines this situation by providing environmental profiles of Mali's water, soils, vegetation, wildlife, and mineral resources. These profiles are complemented by brief discussions on current government responses in these areas and by overviews of the nation's geographic, economic, and demographic characteristics. Mali's environmental problems are chiefly the following. (1) Present land use patterns, together with an increase in aridity, have caused extensive soil erosion. (2) Deforestation is becoming more widespread, primarily as a result of extensive firewood and charcoal production. Other factors, such as desertification and brushfires, have also contributed to loss of vegetation. Areas particularly affected are the Mopti and Gao regions. Even in the well-watered south, forests have been cleared to a distance of a 2-hour walk from any village of 1,500 inhabitants. (3) High livestock numbers and poor distribution of herds on pastoral lands have contributed to the degradation of grazing lands. (4) Malaria and onchocerciasis are major health problems, particularly in the Senegal River Basin. The increase in perennial irrigation due to water projects suggests that schistosomiasis may also become a problem. Mali has set out a strategy to control desertification in its recent 1974–78 development plan. Appendices are included which cite specific environmental legislation, organizations, and A.I.D. country projects. A 180-item bibliography (1960–77) in English and French is appended.

SA/TOA 1-77 931111300

085 PN-AAJ-203

DRAFT ENVIRONMENTAL REPORT ON NIGER

Speece, M.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 159 p.

Sponsored by A.I.D. through the National Committee for Man and the Biosphere

Niger falls entirely within the arid and the semiarid zones of West Africa and many of its major environmental problems are related to this fact. Over half the country is uninhabitable, while only about 20% of Niger is suitable for sedentary agriculture. This draft report investigates this situation in light of the country's natural resources of minerals, water, soils, vegetation, and fauna. Also provided are five appendices which offer maps, statistical tables, and graphs regarding geography, demography, the economy, and water resources. Additional appendices include a list of former A.I.D. area projects and an outline of Niger's environmental agencies and standing enumerated legislation. Niger's major environmental problems are the following: (1) Droughts in the Sahel, such as those from 1967 to 1973, have typically lasted several years and have been responsible for losses in nomadic livestock, forcing herdsmen into southern migratory routes. In addition, agriculture, which employs 92% of the nation's labor force, suffered, placing Niger into the role of a food importer. (2) Devegetation is extensive. Agricultural clearing, burn techniques, overgrazing, and fuelwood needs have been the primary reasons for accelerating this process. (4) Soil erosion is a major problem. Sparse ground cover, a characteristic of the arid climate, leaves loose soil susceptible to intense rainstorms and wind. The degree of soil degradation is also highlighted by shortening of traditional fallow periods and the reduction of intercropping and crop rotation practices. (5) Although the country is well endowed with groundwater, surface water supplies have been limited. Public health standards are quite relaxed and many problems can be linked to hazardous water supplies. To alleviate shortages, more wells must be constructed, with care taken not to aggravate existing problems such as desertification. (6) Population must also be considered with growing concern, since increases will place pressure on the nation's resource base. A 200-item (1938–80) bibliography in English, German, and French is appended.

SA/TOA 1-77 931111300

086 PN-AAJ-204

DRAFT ENVIRONMENTAL REPORT ON SENEGAL

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 105 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Senegal's slow response to rapid economic, social, and technological changes has led to several environmental problems. This draft report focuses on these issues while profiling the nation's natural resources of water, soils, vegetation, wildlife, minerals, and protected areas. The relationships of these resources to enterprises such as agriculture, fisheries, pastoralism, and fuelwood production are highlighted in terms of the country's geographical and social characteristics, economy, and political structure. The following environmental problems are evident: (1) A quarter of Senegal's territory is arid and 70% is semiarid. Desertification is widespread, particularly in the northern part of the Fleuve region, Senegal Oriental, the eastern central zone of Casamance, and the Cap Vert region. Uncontrolled grazing, inadequate control of forest exploitation for fuelwood and coal, accidental and agricultural brushfires, and the abandonment of farmland due to loss of soil fertility all contribute to this erosive process. (2) Inadequate management of water resources has caused fluctuations in the productivity of the agricultural, livestock and forestry sectors. In the next 40 years, 13 dams will be built, providing electrical power and aid to irrigation which should raise cereal production five-fold. Unfortunately, much of the country will not benefit from these efforts and will continue to suffer from limited water supplies. (3) Most water supplies are polluted. In 1975, only 37% of the population had access to a safe supply of potable water. Water-related diseases, including malaria, onchocerciasis (which prevents the establishment of permanent farming communities in the fertile river bottoms), and diseases related to fecal contamination are serious health threats. (4) Population concentrations in the relatively developed Cap Vert region have led to the loss of rural productivity on which the country's development depends. (5) Growing urbanization has accelerated air and water pollution. Appended are lists of domestic and foreign environmental organizations, current and proposed counter-desertification activities, and a 180-item bibliography (1953–79) in English and French.

SA/TOA 1-77 931111300

087 PN-AAJ-205

DRAFT ENVIRONMENTAL REPORT ON UPPER VOLTA

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 138 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The environmental problems of Upper Volta center around the country's intensive land use practices in the semiarid savannah and a lack of native water resources. Expanding patterns of aridity are decreasing the capacity of the land for carrying both human and livestock populations. The recent drought exacerbated these trends, contributing to the pace of desertification. This draft report analyzes these factors with specific profiles concerning the nation's water, soil, flora, wildlife, mineral, and energy resources. Geographic, economic, and demographic information add dimension to this presentation. The following specific environmental issues currently face the government. (1) Approximately 95% of the indigenous labor force is involved in agriculture and therefore soil conditions are extremely important to their standards of living. Soil damage from overgrazing, drought, slash-and-burn agricultural practices, and forest degradation is a growing problem. Rangelands and farmlands are both seriously degraded. (2) Increased deforestation and desertification is a consequence of the harsh climate and the whole system of degrading land use practices that are followed in Upper Volta — particularly the overharvesting of trees for fuel. Ninety-four percent of the total energy consumption is from wood resources. (3) Inadequate and hazardous water supplies have resulted from irregular precipitation and limited groundwater sources. Only 25% of the population has

access to safe water supply. These conditions have promoted the spread of communicable diseases, especially onchocerciasis and malaria. Appendices include charts and maps representing climatic data, demographic and economic information, environmental legislation, governmental structure, environment-related agencies, dam sites, and A.I.D. area projects. A 200-item bibliography (1961–80) in English and French is appended.

SA/TOA 1-77 931111300

088 PN-AAJ-206

ENVIRONMENTAL PROFILE OF THE REPUBLIC OF ZAIRE, PHASE I

Library of Congress, Division of Science and Technology.
1980, 94 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Because of its slow economic and population growth, Zaire's natural resource base is not under serious assault. With forested areas remaining largely intact, pressure on other renewable natural resources can be managed in the short term. Zaire thus has the advantage of anticipating rather than reacting to potential problems. Nevertheless, from a micro point of view, it is already experiencing significant environmental problems around the periphery of its urban centers. This draft report discusses both of these perspectives while profiling Zaire's water, soil, forestry, and wildlife resources. An overview of the nation's physical, demographic, economic, and social characteristics as well as national park and reserve data is also provided. Population density, which is low nationally, is high in such urban centers as Kinshasa. Inadequate local sanitation facilities and limited water supplies, compounded by the lack of a national sewerage system, have created hazardous health conditions in these centers, where an estimated 25% of Zaire's population resides. In 1974, only 25% of the city dwellers had access to piped water. Pollution created by mining industries located in Eastern and Southeastern Zaire has increased. Offshore oil exploration and production in Bas-Zaire is a potential environmental concern. The pollution of surface and groundwaters by industry, as witnessed at Lake Kivu, is also becoming widespread. Rural areas must obtain water supplies from unprotected natural water sources, which encourage the spread of insect- and rodent-borne diseases. The newly established Service de l'Environnement is working to control industrial pollution and improve basic sanitary conditions. Unfortunately, Zaire lacks a comprehensive legislative framework for pollution control and little information is available concerning the responsibilities of the nation's environmental organizations. Seven appendices which provide supporting data and a 55-item bibliography (1944–79) in English, German, and Franch are appended.

SA/TOA 1-77 931111300

089 PN-AAJ-272

DRAFT ENVIRONMENTAL REPORT ON GHANA

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 171 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The Republic of Ghana lies on the Gulf of Guinea on the west coast of Africa, just north of the equator. Its major environmental problems include soil damage and loss, deforestation and desertification, inadequate and hazardous water supplies, and increasing industrial pollution. This report is a preliminary review of information available in the United States on Ghana's environment and natural resources. Ghana's soils are very weathered, sesquioxide-rich, humus-poor, and mainly kaolinitic. This fragile resource has been subjected to land use practices (such as slash and burn cultivation) which have stripped away much of its fertility and promoted deforestation and desertification. Nevertheless, agriculture is Ghana's most critical economic resource. Seasonal shortages of water, especially potable water, are chronic in most of Ghana. Precipitation is irregular and groundwater is relatively scarce. Unfortunately, pollution of water by industrial, commercial, domestic, and community wastes is common. Treatment of all unprotected or surface water is recommended. In recent years, the Government of Ghana has encouraged the development of irrigation projects, most of which involve small- or medium-sized dams and pumping schemes. Short- and long-term development plans call for a total of 436,000 hectares of irrigated lands. These projects should be assessed for their impact on the environment. In addition, existing dams and water conservation practices have spread onchocerciasis, schistosomiasis, and mosquito-borne diseases. Greater insecticide and herbicide use has been recommended in a number of government-sponsored research papers. However, some of the chemicals mentioned in these papers have not been assessed for their long-term environmental impact. Other problems include the depletion of the nation's native game species. While legislation exists to protect wild species, enforcement is poor. A listing of literature cited (1959–80, 73 entries) and a general bibliography (1915–80, 64 entries) are provided. Appendices provide information on Ghana's population, economics, climate, environmental legislation, government, environmental organizations, dams, and AID-sponsored projects.

SA/TOA 1-77 931111300

090 PN-AAG-132

PROCEEDINGS OF THE U.S. STRATEGY CONFERENCE ON TROPICAL DEFORESTATION, WASHINGTON, D.C., 1978

U.S. Department of State, A.I.D.
1978, 84 p.

Conference Convened Jointly by U.S. Department of State and A.I.D.

Deforestation threatens to destroy the irreplaceable forest resources in tropical lands by the year 2000, with devastating socioeconomic and environmental results. This report on the proceedings of a U.S. Strategy Conference on Tropical Deforestation, held November 1978 in Washington, D.C., offers options to avoid those results. Conference topics included: (1) the nature of the problem; (2) international institutions' responses to date; (3) the state-of-the-art in biological research, commercial forestry and agroforestry, energy alternatives, and revegetation; (4) opportunities for industrial, environmental, and scientific actions; and (5) deforestation in humid and semiarid regions. Several specific conclusions were drawn. Population expansion, the demand for wood, and limited development opportunities are the main causes of deforestation. In-country institutional management of forest resources, especially systematic monitoring, is inadequate. Major scientific and technological efforts are needed to halt these trends. More information on deforestation rates and impact, types of lost forestation, and reforestation methods must be gathered and cooperation of local citizens and their governments in forestation activities must be enlisted. Proposed responses are: (1) improve the survey, inventory, and classification activities of tropical land-use policies and develop alternative forestry uses; (2) make forestry a major priority of broad development strategies, routinely including forestry activities in rural development programs; (3) develop population and energy programs which reduce the impetus for deforestation; (4) improve local, regional, and global monitoring; (5) improve environmental education, especially training of forest managers; (6) improve (under the lead of the United States) coordination of international efforts and information exchange; (7) develop comprehensive tropical forestry guidelines for U.S. commercial and development institutions; (8) upgrade A.I.D.'s forestry capability and interagency cooperation and increase its emphasis on agroforestry; and (9) support continuing research efforts, especially into clearcutting in tropical forests. A list of conference participants is included.

091 **PN-AAG-859**

BIOLOGICAL AND SOCIOLOGICAL BASIS FOR A RATIONAL USE OF FOREST RESOURCES FOR ENERGY AND ORGANICS: PROCEEDINGS OF AN INTERNATIONAL WORKSHOP HELD AT MICHIGAN STATE UNIVERSITY, 1979

U.S. Forest Service, Southeastern Forest Experiment Station.
1979, 205 p.

The increasing use of wood for energy purposes has many socioeconomic and environmental implications and raises important technical questions on the use of trees for fuel. This document presents the proceedings of an international workshop, sponsored by the Man and the Biosphere Program (MAB) Committees of Canada, Mexico, and the United States. Conference papers include reports on the socioeconomic consequences of and constraints to the use of land and forests for energy and organics (i.e., organic acids, aromatics, drying oils, lubricants, synthetic fibers, cosmetics, dyes, animal feed, and solvents); the resulting energy input/output relations; and the environmental consequences of intensive forestry and the removal of whole trees from forests. Reports addressing wood use and availability in individual countries are also presented. One report notes, for example, that Great Britain's forest area of two million ha produces only 8% of the nation's wood — requiring the rest to be imported at a substantial cost to the economy and clearly illustrating the obstacles to Britain's use of its forests for energy and organics. Other reports concern Canada, the United States, Mexico, India, Indonesia, the Dominican Republic, and Latin America. Bibliographies follow most of the reports. Major workshop recommendations include: (1) Each nation should assess its biological potential for using wood materials for energy and develop effective ways to monitor changes in the biological productivity of forests, trees, and shrublands. (2) Institutional arrangements should be made for international exchanges of information and technology and for the use of forests, trees, and shrublands for energy. (3) MAB should encourage countries to establish pilot sites for studies, demonstrations, and small-scale forestry operations. (4) Increasing human demands on forests and shrublands should be given priority in assessing the use of wood for energy, monitoring changes in land productivity, and designing programs to transform these resources to other uses. A list of conference participants is appended.

092 **PN-AAH-450**

FUELWOOD AND OTHER RENEWABLE ENERGIES IN AFRICA: A BRIEF SUMMARY OF U.S.-SUPPORTED PROGRAMS

Ulinski, C.A.
1979, 48 p.

Prepared for the Workshop on Fuelwood and Other Renewable Fuels in Africa, held in Paris, 1979

In response to recent Congressional mandates, A.I.D. has developed projects in renewable and nonconventional energy technologies which are responsive to rural needs, environmentally sound, inexpensive, simple to use and maintain, and easily replicable. This paper provides brief descriptions (not analyses) of 28 A.I.D. energy projects (15 in forestry and fuelwood, 13 in other renewable energy technologies) in Africa. Current and proposed A.I.D. forestry activities are mainly concerned with planting and managing trees for fuelwood production. Other activities, broader in scope, include institution building, training, land use and natural resource planning, and resource conservation pilot projects in such areas as dune stabilization and planting live fences. In addition to four studies and surveys on firewood, reforestation, and community forestry, A.I.D. is also helping to establish regional remote sensing centers in East and West Africa to provide satellite imagery for use in natural resource planning and management. A.I.D.'s development of other renewable fuels (by integrating energy components into existing projects or by supporting new projects) emphasizes energy needs for basic life functions such as cooking, heating, and water supply — activities representing 80% of all the energy consumed in Africa. Current and proposed

projects in this area involve institution building, data collection, and research and development of small-scale renewable energy technologies such as wood burning stoves, solar stills, charcoal-making techniques, and biogas digestors. The Peace Corps (PC) forestry and renewable energy program is also described. These PC activities have generally been ad hoc, their effectiveness limited by a lack of technical and material support. However, PC has been strengthening its capacity to address problems of deforestation and petroleum shortages. A major forestry initiative is underway and a global renewable energy program has been launched focusing on surveys of village energy needs and resources in seven developing countries and on renewable energy projects. More detailed information on A.I.D. energy projects is provided in a series of annexes. A 44-item bibliography is included.

AID/afr/G-1576

093 PN-AAH-451

TRADITIONAL FUELS: PRESENT DATA, PAST EXPERIENCE AND POSSIBLE STRATEGIES

Knowland, B.; Ulinski, C.A.
1979, 88 p.

Although the traditional fuels of firewood, charcoal, dried dung, and crop residues comprise 90% of all fuels used in developing countries, development of these fuels has largely been neglected. To help devise strategies for future action, this report provides an overview of available literature on the use of firewood and other traditional fuels in developing countries. In many areas, the use of fuelwood is rapidly outstripping supply — most notably in Nepal, Haiti, and parts of the Sahel, India, and Indonesia. The use of dung and crop residues for fuel has caused serious ecological problems such as erosion and reduced soil fertility and water retention. Fuelwood depletion also has severe economic effects. Substantial time must be devoted to fuel gathering, reducing the time available for economically productive activities. Solutions to the crisis range from forestry and conservation interventions to the use of alternative fuels. Interest in agroforestry is growing. A number of fast-growing tree species (e.g., *Leucaena*) are already fairly well known and could be adapted in many areas. Fuels can also be obtained from dead tree wood. Obstacles to such solutions include problems of land distribution, property rights, and shortages of nursery stock, fertilizers, and irrigation water. Other alternatives are more efficient fuel use, e.g., in stoves (an area in which basic research is just beginning); improved charcoal production technologies; and development of renewable energy sources. The most promising of the latter is biogas, which permits the use of nontraditional fuels such as animal and human waste and provides high-quality fertilizer as a residue. Biogas promotion must be balanced, however, by the realization that if wealthy farmers begin using biogas, the poor who traditionally collect the farmers' cowdung may lose their only fuel source. It is recommended that A.I.D. make a long-term commitment to traditional fuels; integrate forestry components into rural development programs; and strengthen the flow of forestry information to USAID's. Other recommendations include expansion of Peace Corps village energy surveys. Appendices include a partially annotated 26-page bibliography (1978–80).

AID/otr-147-79-59

094 PN-AAH-452

AIDING THE ENVIRONMENT: A STUDY OF THE ENVIRONMENTAL POLICIES, PROCEDURES AND PERFORMANCE OF THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

Blake, R.O.; Lausche, B.J.; Scherr, S.J.; Stoel, T.B., Jr.; Thomas, G.A.
Natural Resources Defense Council, Inc.
1980, 272 p.

A.I.D. has made significant progress during the last five years in the environmental and natural resources area. This study, undertaken as part of a project to evaluate the environmental programs of international donor agencies, analyzes A.I.D.'s environmental policies, procedures, and practices and outlines a set of recommendations to strengthen A.I.D.'s program still further. Priority recommendations are made in three areas. (1) A.I.D. must improve its environmental assessments and complete such assessments by the end of 1980 for the 20 A.I.D. countries most environmentally threatened and for all A.I.D. countries by the end of 1981. (2) To upgrade its staff capability, A.I.D. should establish, within the Development Support Bureau (DSB), an Office of Environment and Natural Resources to consist of present DSB staff and a soil conservation specialist. A.I.D. should also add four full-time environmental officers in Washington and nine in the field. (3) A.I.D. should take steps to assure environmental soundness during project implementation, especially of environmentally sensitive projects such as dams, roads, irrigation, and new lands development. The manner of such supervision should be specified in all project documentation. Other major recommendations include preparation of a comprehensive environmental and resource policy paper and completion of programmatic assessments for malaria control, housing, small-scale irrigation, rural electrification, rural water supply, and small-scale industry. Also needed is research in support of sustainable development and resource management and intensified efforts in forestry, soil conservation, energy, and pest management. A.I.D.'s in-house training should be stepped up and environmental and resource seminars should be organized annually. A.I.D.'s existing computer systems should be used to establish a central record of environmental and natural resources projects and to provide summaries of project experience to A.I.D. and other development agency personnel. A.I.D. should also tighten procedures in selecting environmental contractors and urge other development organizations to commit themselves to environmental programs.

AID/DSAN-G-0027

095 PN-AAH-464

FUELWOOD AND ENERGY IN EASTERN AFRICA: AN ASSESSMENT OF THE ENVIRONMENTAL IMPACT OF ENERGY USERS

Clark University, Program for International Development, Eastern Africa Environmental Trends Project.
1978, 153 p.

The energy future of East Africa — Zambia, Kenya, Sudan, Tanzania, and Ethiopia — seems bleak. Although rapid increases in population and energy demands have led East Africa to consume energy at a faster rate than the developed world, the region has minimal exploitable energy resources. Increasingly costly fossil fuels must be imported. Given the region's depressed economic status, fuelwood (firewood and charcoal) is the only feasible energy source for its poor. Such is the main conclusion of this report on East Africa's current energy situation. Although firewood was a viable energy source until recently, continuous firewood collection has led to progressive deforestation and desertification. Furthermore, villagers must now travel increasing distances for firewood, thereby losing increasing amounts of productive time. Accordingly, small firewood collection and distribution enterprises have evolved. Also, as forests retreat from populated areas, the use of charcoal (which is easier to transport than firewood, but whose production consumes forests even more quickly than does firewood collection) is increasing. Several constraints to an effective reforestation/fuelwood program exist. The current artificial deflation in fuelwood prices (due to the availability of "free" firewood) discourages investments in reforestation/fuelwood enterprises. Developing a regenerating fuelwood forest demands a long-term commitment. Peasants, however, fear that with the present trend toward private land ownership, the land they hold by tenure may one day be purchased by others who will harvest the fruit of the peasants' work. It is difficult to convince them to cultivate future firewood resources when their fuelwood needs are immediate. This report recommends small community forestation projects as the most viable approach to solving fuelwood needs. Implementing such projects will demand long-term commitments by concerned institutions; enactment of laws ensuring community ownership of the lands cultivated; selection of suitable tree species; and inclusion of the communities in project planning — especially to educate community members in the methods and benefits of reforestation. Nine substantive appendices are included.

AID/afr-G-1356

096 PN-AAH-466

COMMUNITY PARTICIPATION IN AFRICAN FUELWOOD PRODUCTION, TRANSFORMATION, AND UTILIZATION

Hoskins, M.W.
1979, 75 p.

Prepared for the Workshop on Fuelwood and Other Renewable Fuels in Africa, held in Paris, 1979

The main source of fuel for cooking and heating in the vast majority of African homes is wood — the supply of which is rapidly dwindling. New approaches to local involvement in fuelwood production and use are often subsumed under the title, Forestry for Local Community Development (FLCD). FLCD initiatives employ a "bottom-up" rather than a "top-down" approach, involving local residents in management decisions on integrated land and resource use and showing communities how to share the benefits of fuelwood production. The FLCD approach raises several issues not considered important in industrial forestry. It calls for reorienting goals and expectations and redesigning training, equipment, and managerial supports. It also calls for donors, technical support agents, and local residents to recognize the need for integrated natural resources and energy planning at regional, national, and local levels. Not all FLCD projects have succeeded. Most projects which failed did so because of inadequacies in one or more of the following six elements: (1) identification of and criteria for participants; (2) clearly stated long- and short-range goals; (3) identification, adjudication, and dedication (for the duration of the project) of project lands; (4) start-up and maintenance planning with a schedule of inputs and with responsible parties identified; (5) distribution of benefits; and (6) an evaluation plan to support or, if need be, redirect the program. After wood is produced, it must be transformed to usable fuel as efficiently as possible, a process which includes harvesting, charcoal production, transporting, and drying and storing the fuelwood. To diminish waste, regional and national energy, fiscal, and transportation policies must be coordinated. The introduction of fuel-efficient stoves could have an immediate impact on available fuel. Models of such stoves developed to date have not been accepted by villagers due to failures to conduct experiments under real conditions before making attempts to place experimental models in use. To rectify this situation, local women should be hired as active members of the experimental team. A 49-item bibliography (1975–79), of which six entries are in French, is appended.

097 PN-AAH-678

WOMEN IN FORESTRY FOR LOCAL COMMUNITY DEVELOPMENT: A PROGRAMMING GUIDE

Hoskins, M.W.
1979, 64 p.

To deal effectively with local forestry problems in developing countries, it is necessary to focus on the group using forest products the most: the women whose principal chores are centered around wood. This report explores the problems and issues related to women's participation in forestry. In the past, traditional forestry efforts, i.e., those focusing on industrial plantations and parkland management, have failed. Enlisting community participation, especially from women, in forestry development seems to be the only viable means of implementing successful forestry programs. Studies show, however, that communities willingly participate only in those forestry projects that directly benefit their own needs. Constraints to community participation in forestry programs include:

(1) the difficulty of motivating communities to plant trees communally on scarce, overused farmland, without guarantee of direct economic benefit; (2) the lengthy timeframe between tree planting and harvesting; (3) the distance between the forestry project and the villages and the fact that the projects may benefit a distant area rather than the one in which the trees are planted; (4) the cultural belief that trees are "God-given" and not something one plants; and (5) the lack of forestry management skills. Women's roles in forestry development include the important tasks of gathering fuelwood and obtaining food and medicine from trees. Women are more likely to participate in projects that expand upon familiar activities, especially if women have direct control over, and benefit from, the project. Two models for forestry programming are proposed. The first model, the integrated approach, involves a project design directly suited to the needs of a particular community. The second model entails designing the forestry project first and then finding a community which could benefit from this type of project. Community responsibilities toward forestry projects include agreeing upon long- and short-range goals; plans for integrated resource use; a maintenance plan; projected benefits; and an evaluation plan. A 26-item bibliography in French and English (1975–79) and a suggested format for a project management plan are appended.

AID/otr-147-79-83

098 **PN-AAH-748**

THE WORLD'S TROPICAL FORESTS: A POLICY, STRATEGY, AND PROGRAM FOR THE UNITED STATES: REPORT TO THE PRESIDENT

U.S. Interagency Task Force on Tropical Forests.
1980, 53 p.

U.S. Department of State Publication No. 9117

President Carter's Environmental Message of August 2, 1979 prompted this U.S. Interagency Task Force report on the growing problem of deforestation in tropical lands. The report is in three parts. First, the world's forest resources are surveyed, together with the causes, rates, and consequences of deforestation. Next, national and international technological and institutional capabilities to meet the deforestation problem are outlined. Finally, the U.S. stake in tropical forests is analyzed and recommendations are made for a U.S. forest policy and a strategy to achieve it. The report confirms the widely held view that the world's tropical forests are in jeopardy and that serious social, economic, and environmental costs are being incurred, especially by the rural poor in developing tropical countries. The report also indicates that the United States has a vital stake in preserving both its own and other tropical forests and that, together with other nations and international organizations, it has the capability to help alleviate the deforestation problem. Several important perspectives emerged in the course of the study. (1) Wood harvesting for in-country uses and large-scale conversion of forest land to other, mainly agricultural, uses are by far the principal causes of tropical forest loss. (2) Although substantial in monetary value, U.S. imports of tropical hardwood account for an insignificant percentage of total hard and soft woods used in this country. (3) Legitimate reasons for tree removal and forest land conversion exist. What is needed is an expansion of the long- and short-term benefits of tropical forests through improved management. This includes their management as a renewable timber resource under the principle of sustained yield and the maintenance of other values (ecological, recreational, scientific, educational, etc.) that will be increasingly important in the future. (4) The future of tropical forests will be determined largely by decisions of governments on seemingly unrelated issues, e.g., food production, energy, and land use. Efforts must be made to address the effect of these decisions on tropical forests while also providing a new focus of policy for tropical forests.

099 **PN-AAH-919**

FORESTRY ACTIVITIES AND DEFORESTATION PROBLEMS IN DEVELOPING COUNTRIES

Zerbe, J.I.; Whitmore, J.L.; Wahlgren, H.W.; Laundrie, J.F.; Christophersen, K.A.
U.S. Forest Products Laboratory.
1980, 196 p.

To what extent have forestry activities alleviated deforestation problems in developing countries? To answer this question, an AID-sponsored 5-man team visited 17 developing countries, interviewed personnel from dozens of donor agencies, and reviewed forestry literature emanating from these countries and agencies. Their findings are presented in this overview report. An inventory of current forestry projects revealed a dominance of industrial efforts — that is, the establishment of capital-intensive pulpmill or sawmill complexes rather than the management of on-the-ground forestry stands. The second largest activity was reforestation/afforestation. Still fewer donors were involved in conservation activities. The authors conclude that forestry-related problems in developing countries are far worse than ongoing A.I.D. programs indicate. The authors note that forestry projects are often imposed on local residents totally from outside their communities and as a result fail to gain local cooperation. If these projects are to succeed, the local political structure must be involved and local political leaders made to feel that some of their needs are being met by that involvement. Overall, the authors recommend a balance between long-term environmental/forestry goals and immediate energy/food production needs. More coordination is needed among the various international donors and the developing country governments. A.I.D. and other international donors should cease their studies and take action. Sufficient knowledge already exists for sound programs. The authors point out that A.I.D. hiring practices are highly centralized and bureaucratic; more forestry personnel should be hired. In addition, Mission directors should be given authority to hire on the spot. A bibliography on forestry in the developing world (199 entries, 1947–80) is provided. Fifty-eight of the titles are in Spanish.

PA/AG/TAB-1080-10-78

100 **PN-AAH-942**

PROCEEDINGS OF THE USAID/ASIA BUREAU CONFERENCE ON ENERGY, FORESTRY, AND ENVIRONMENT, MANILA, 1979

A.I.D., Bureau for Asia, Office of Technical Resources.
1979, 309 p.

In response to increasing energy needs among Asian countries, a USAID Asia Bureau Conference was held in Manila, November 12–16, 1979, on energy problems and policies in Asia and their related forestry and environmental aspects. This report contains the proceedings of that Conference. The specific purpose of the Conference, which was attended by energy experts, host country specialists, A.I.D. and USAID officials, and donor agency representatives, was to make preliminary recommendations for A.I.D. assistance to Asian countries in ameliorating their energy problems. Conference presentations, to which brief bibliographies are attached, were of three types: papers presenting overviews of major issues, papers analyzing current energy planning, and A.I.D. country background papers. The role of energy in development was addressed from international, national, regional, functional, and sectoral perspectives. Workshop discussion groups examined the energy situation and program options in India, Nepal, Philippines, Thailand, Indonesia, Sri Lanka, and Bangladesh and the possible A.I.D. roles supporting energy interventions in these countries. Several conclusions were drawn: (1) Since many countries are experiencing a critical firewood crisis, A.I.D. should assist in augmenting fuelwood supplies and developing energy alternatives for rural areas. (2) A.I.D. needs to address the effects of the oil crisis in Asia by promoting conservation and developing renewable energy sources. (3) Energy strategies should be devised to meet the needs of both rural and urban sectors. (4) The energy implications of non-energy projects must be addressed more thoroughly in project development. (5) A central training course in energy issues must be established for A.I.D. Mission personnel and the inclusion of energy specialists on Mission staffs should be considered. (6) A.I.D. should increase collaborative energy assistance activities with other donors, particularly with the Government of Japan and the Asian Development Bank. (7) A problem-oriented regional conference such as the present one is an effective vehicle for developing sound A.I.D. energy policy. A list of conference participants is included.

101 **PN-AAH-980**

BOLIVIA: STATE OF THE ENVIRONMENT AND NATURAL RESOURCES — A FIELD STUDY

Freeman, P.H.; Cross, B.; Flannery, R.D.; Harcharik, D.A.; Hartshorn, G.S.; Simmonds, G.; Williams, J.D.
JRB Associates, Inc.
1980, 97 p.

Executive Summary Published Separately: PN-AAH-981, 13 p.

The gradual deterioration of the environment in many Third World countries is threatening to become a major constraint to development. This report, the first in a series of field studies commissioned by A.I.D. for its beneficiary countries, presents an environmental profile of Bolivia. An introduction defining the study's methods and scope is followed by illustrated chapters on wildland and wildlife, natural forests, plantation forests, soils and watersheds, the Altiplano range, and on the pollution and health impacts of environmental deterioration. Bolivia's renewable natural resources are affected by serious problems including soil erosion, range degradation, illegal settlement, hunting, logging, and deforestation. Health-related problems include pollution caused by pesticides and industry. These concerns are compounded by institutional weaknesses that inhibit corrective measures. Contributing further to the deteriorating environmental situation are the lack of pollution controls, regulations for the 1978 Health Code, and Government of Bolivia (GOB) emphasis on the eastern regions at the expense of the overpopulated Altiplano regions. Specific recommendations are presently aimed at improving natural resource management through training and educational activities and at reducing health hazards through pollution control and the development of improved sewage treatment technologies. On the institutional level, the development of comprehensive environmental planning is especially recommended, along with encouragement of environmental activities by non-government groups, developing appropriate conservation technologies, and integrating conservation activities with community development. Priority areas recommended for A.I.D. support (upon consultation with the GOB) include forestry; wildlands and wildlife; research with native forage species; community conservation efforts; development of the San Jacinto sub-watershed; pest management for cotton and horticultural crops; environmental education, especially regarding pesticide pollution; air and water quality standards; and coordination of environmental projects. An 81-item bibliography (1947–78) of English and Spanish sources is appended.

AID/SOD/PDC-C-0247 511000100

102 **PN-AAJ-019**

PRELIMINARY GUIDE TO AUDIOVISUAL MATERIALS ON ENVIRONMENTAL AND NATURAL RESOURCE ISSUES IN DEVELOPING COUNTRIES: A SURVEY FOR THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT/MAN AND THE BIOSPHERE PROGRAM

Scherr, S.J.; Tanenbaum, S.; Maddamma, A.; Johnson, S.
Natural Resources Defense Council, Inc.
1980, 41 p.

In response to a 1977 Congressional Mandate, A.I.D. established its Man and the Biosphere Program to strengthen its technical and informational capability to address environmental and natural resources problems facing developing countries. In support of this objective, the International Project of the Natural Resources Defense Council conducted a preliminary survey to locate films, slides, and videotapes for use in training programs intended to increase the understanding of A.I.D. personnel and their host country counterparts on the importance of maintaining environmental quality and a sound resource base to sustain economic

development. Results of this survey are presented in this report. A total of 84 selected audiovisual materials are listed alphabetically by title and are identified by date, medium, length in minutes, color/black and white, language, distributor, producer, price, availability, and content description. They are also indexed by subject matter and geographic location. A selected list of the sources of the guide materials is included.

103 PN-AAJ-021

DIRECTORY OF SELECTED U.S. TRAINING PROGRAMS, SHORT COURSES AND WORKSHOPS IN ENVIRONMENTAL PROTECTION AND NATURAL RESOURCE MANAGEMENT: A SURVEY OF PROGRAMS FOR THE AGENCY OF INTERNATIONAL DEVELOPMENT AND THE UNITED STATES MAN AND THE BIOSPHERE PROGRAM

Taylor, J.G.
Sierra Club, International Earthcare Center.
1979, 181 p.

Recent U.S. Government mandates and a surge of worldwide concern for environmental and natural resource management have created a demand for training programs in these subjects. Several U.S. institutions now offer training programs in various aspects of environmental protection, including forestry; agriculture; biological sciences; sociology; environmental science and engineering; ecology; agronomy; natural resource planning; urban planning; and sanitary engineering, health, and facilities design. This directory provides a selected listing and brief description of courses in these subject areas offered by U.S. universities, government agencies and departments, and private associations. University entries are listed alphabetically by state and name of institution. Pertinent program information follows, including institution address; name of course, program, and college or school; name of dean; degree granted; brief description of program content; admission information; types of English-language training available; number of foreign students enrolled; and areas of concentration in which Man and the Biosphere projects are particularly concerned. The latter include tropical and temperate forests; grazing lands; arid zones; fresh waters, mountains, and islands; biosphere reserves; pesticides and fertilizers; engineering works; urban ecosystems; demographic change; perception of environmental quality; and pollution. U.S. Government and private association training programs are listed with a brief description, respectively, of course content and participants, and of workshop, conference, or meeting content. The directory concludes with tables in matrix form ranking the institutions and their programs by degree of difficulty from most difficult to noncompetitive. Production of this directory was assisted substantially by the U.S. National Committee of UNESCO's Man and the Biosphere Program, government agency training personnel, and use of computer data bases and several college and university catalogues. Its use is intended for A.I.D. Mission personnel, foreign nationals, and others concerned with balancing the conflicting needs of development and environmental preservation.

104 PN-AAJ-273

FIREWOOD CROPS: SHRUB AND TREE SPECIES FOR ENERGY PRODUCTION

National Research Council, Board on Science and Technology for International Development.
1980, 247 p.

Report of an Ad Hoc Panel of the Advisory Committee on Technology Innovation for the Commission on International Relations

Over 33% of the world's population depends on fuelwood for cooking and heating; this is especially true for the developing nations, where 86% of all wood consumption is for fuel purposes. As growing populations increase demands for fuelwood and deforestation becomes more acute and widespread, the severity of the wood scarcity problem is receiving increased attention. This report, written by a panel of 22 international experts, reviews firewood crop species as an aid to effective management of scarce wood resources. The authors briefly describe the ramifications of wood scarcity for agriculture, environment, and world hunger and discuss the potential for proper fuelwood management, including wood plantations and use of fuel-efficient stoves. Inadequate local and national support and other potential obstacles to tree-planting activities are also discussed. The text is primarily devoted to a discussion of 60 aggressive, fast-growing fuelwood species and their appropriateness for use in each of the following areas: humid tropics, tropical highlands, and arid/semiarid regions. For each species, information is given on the botanic and common names; description, distribution, and yield; potential for firewood or other uses; environmental requirements; planting and establishment; pests, diseases, and limitations; and related species. The description of *Leucaena leucocephala's* wide range of potential uses — as fuel and forage and in soil improvement/reforestation programs — is of particular interest. The authors' intention is to provide a reference source to enable development planners, faced with severe wood shortages, to choose that species of tree most likely to thrive and be of use in a particular regional setting. To this end, attached to the report are a master list of firewood species, including those described in the report; selected readings organized by species; names of research contacts, their specialties and addresses; and an index of plants mentioned in the text. Also appended are a chapter on efficient wood-burning devices; case studies on Ethiopia and South Korea; a glossary of technical terms; biographical notes on the authors; and a list of the report's contributors (divided by country).

AID/csd-2584

105 PN-AAG-685

REACHING THE RURAL POOR: INDIGENOUS HEALTH PRACTITIONERS ARE THERE ALREADY

Pillsbury, B.L.K.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 63 p.

A.I.D. Program Evaluation Discussion Paper No. 1

Obstacles to improving the health and nutrition of the rural poor include not only a dearth of trained physicians and modern facilities, but also the economic, social, and cultural differences that often exist between the health professional and the rural patient. Because over 2.3 billion people worldwide continue to rely on traditional healers and midwives rather than utilize a system they neither understand nor trust, a sensible policy to improve rural health is to encourage and utilize the resources represented by indigenous health workers (IHW's). This paper examines the potential for incorporating IHW's into formal primary health care (PHC) systems to increase community acceptance and improve the utilization of PHC services. The author recommends a comprehensive evaluation of all past and present projects containing a traditional health component to assess the problems and benefits involved in working with IHW's. Several common objections to the use of IHW's and countervailing arguments are presented. The objections include the tendency to disparage low-cost PHC as "second-class medicine"; donor fears that indigenous PHC is dangerous or of inferior quality; and the hypothesis that traditional medicine competes with modern medicine for patients. Since IHW's provide excellent services in drug distribution, birth attendance, and care of the mentally ill, their services in these areas should be encouraged. Where formal collaboration with IHW's is not possible, emphasis should be placed on understanding and building upon the concepts which underlie traditional practices, thereby making modern innovations more acceptable. The author recommends that A.I.D. follow the World Health Organization's lead in adopting the following policy changes: (1) encourage and support programs which train and utilize IHW's; and (2) focus attention on traditional practices in training professional health workers and in PHC project designs. Specific program guidelines and recommended sector studies conclude the report. Annexes on information needs, a 1977 World Health Assembly resolution, recommendations of a congress sponsored by the Pan American Health Organization, and a 100-item bibliography (1962–79) are attached.

930008500

106 PN-AAH-850

THE POTABLE WATER PROJECT IN RURAL THAILAND

Dworkin, D.; Pillsbury, B.L.K.
U.S. Agency for International Development.
1980, 96 p.

A.I.D. Project Impact Evaluation Report No. 3

The greatest impact of the Potable Water Project in Thailand was not health-related, but occurred in the form of economic benefits such as increased gardening, livestock raising, and crafts production. This surprising conclusion is a primary finding of this evaluation report. After brief sections on health sector background and on project objectives and implementation, the effectiveness of the project is considered. Some 250 water systems were constructed under this project, with an additional 550 systems built later by the Thai government. An estimated 17% of the rural population is now served by piped potable water as compared to only 3% prior to the project. Most of these water systems are not only still operating, but also financially self-sufficient, with users paying full costs of maintenance and operation. With only a few exceptions, operators appear competent and motivated, and have received consistent supervision from the Rural Water Supply Section of the Thai Ministry of Public Health. The economic, social, environmental, and health impacts of the project are evaluated. Although lack of initial baseline and village-specific health data prohibit confirmation of claims that health has improved, the convenience of direct, reliable water delivery close to villagers' homes has resulted in considerable time savings and increased water use, both of which have contributed to the above mentioned economic benefits. At first, almost all socioeconomic groups benefited equally from public-tap access. But as revenues lagged, metered private connections had to be installed to finance systems' operations — effectively cutting off the poorer villagers from service. In conclusion, successful water systems were found to have resulted from initial community contribution of time, labor, and funds; training and subsequent support for local operators; and the evolution of viable rate structures for delivery of water to rural households. It is recommended that piped water projects be considered and planned not just for health gains, but for their economic benefits as well. Other recommendations, some generally applicable to A.I.D. projects, others specific to water projects, are included.

493018600

107 PN-AAH-878

ASSESSMENT OF THE PUBLIC HEALTH SECTOR IN HONDURAS, 1975–85

USAID/Honduras.
1980, 176 p.

The Honduran health sector is complex, ranging from a sophisticated teaching hospital in Tegucigalpa to health workers providing simple treatment in village homes. This health sector assessment concentrates on human resources, management, logistics, and financing in three priority areas — communicable disease control, environmental sanitation, and personal health care. Diarrhea is a principal cause of general morbidity and high infant mortality in this nation. Despite efforts to vaccinate against immunopreventable diseases, outbreaks continue. In 1979, a polio epidemic occurred, with 226 paralytic cases and nine reported deaths. In addition, almost 5,000 cases of measles and 5,252 cases of whooping cough were reported (with 280 and 184 deaths, respectively). Many elements in the Government's malaria

eradication effort were discarded due to political and program changes. As a result, a marked increase in reported cases occurred — 7,503 in 1974 and 34,606 in 1978. Other common health problems include tuberculosis, malnutrition, and pregnancy and birth complications. Since 1974, high priority has been placed on water and waste disposal and basic health care coverage for all people. However, a reorientation within the Ministry of Health (MOH) toward integrated, regional-level preventive health care did not eliminate a long-standing predisposition toward nationwide programs and hospital-based care. The sheer growth of the MOH in recent years has produced a critical need for reorganization. Its major weaknesses relate to weak lines of authority, poor communications, poor use of volunteer workers, inadequate financing, and the politics of hospital construction. Authors recommend the establishment of clear lines of responsibility, creation of position descriptions for all MOH personnel, and promulgation of policy guidelines. In addition, regular performance inspections of regional sanitation programs should be carried out; logistical support should be provided to community-level health workers on a priority basis; and continuing education should be provided to volunteer workers. Basic medical education should be oriented toward nonclinical public health services and preventive medicine.

522014800

108 PN-AAH-964

HEALTH SECTOR POLICY PAPER

A.I.D.: Bureau for Program and Policy Coordination, Office of Policy Development and Program Review; Bureau for Development Support, Office of Health.
1980, 64 p.

Developing nations suffer from a lack of basic health care services, limited access to safe water and sanitary human waste disposal facilities, widespread incidence of communicable diseases, and shortsighted planning of the projects designed to alleviate these and other problems. This paper describes A.I.D.'s program to address developing country health needs, a program based on the belief that health is basic to human well-being and essential for achieving development goals. A.I.D. will provide training, essential equipment and supplies, and planning and analysis for programs in the following four areas: (1) The delivery of primary health care (PHC) is A.I.D.'s main priority due to its potential for providing a cost-effective, ongoing impact upon health problems. PHC programs receiving highest priority are those emphasizing mother and child health, nutrition, and family planning services. A network delivery system, relying upon locally-based "outreach" workers, is favored. (2) A.I.D. will sponsor the construction or rehabilitation of appropriate water systems to ensure safe water and proper sanitation, thus minimizing the spread of water-related diseases. A.I.D. requires local participation, skilled project personnel on all levels, and eventual system self-sufficiency for all projects. (3) In the area of communicable disease control, A.I.D. favors including basic immunizations in PHC programs, although special control programs are also needed. In the latter respect, A.I.D. will continue its long-standing support of anti-malaria projects and research for the development of a cost-effective means of controlling schistosomiasis (snail fever) and onchocerciasis (river blindness). (4) Finally, A.I.D. encourages institutionalizing health planning at local and national levels and linking health planning efforts to the development of other sectors such as nutrition, education, population, and agriculture. To maximize resources, A.I.D. advocates health planning which focuses on training of country personnel in health program design and management; establishment of baseline health data systems; and collaborative special studies to identify the most promising health interventions.

109 PN-AAJ-008

SENEGAL: THE SINE SALOUM RURAL HEALTH CARE PROJECT

Weber, R.F.; Kerr, G.B.; Smith, H.B.; Seymour, J.M.
U.S. Agency for International Development.
1980, 91 p.

A.I.D. Project Impact Evaluation Report No. 9

Have A.I.D.'s health care projects helped alleviate malaria, infant diarrhea, and other health problems afflicting the people of Senegal? This evaluation of the Sine Saloum Rural Health Care Project to establish a network of village health huts to deliver basic health services provides a partial answer to this question. Despite difficulties from the start, several important achievements were realized. With the help of villagers, health huts were constructed and equipped in 200 target communities. Training materials and a records system were developed and a village health staff was trained in their use. Three conditions must be met, however, if the project is to succeed: the huts must earn enough to cover operating costs; government supervision and support must improve; and the medicine resupply system must function. Other problem areas include a high turnover of hut health workers; the close proximity of the huts to each other which forces some to close; and the high salaries paid to village health workers which drain the system's capital. Finally, the project's scale is too large and project management unsatisfactory. Although the huts have not operated long enough to make the project's impact clear, records show that visits to village health huts are often for the same treatment already obtained at larger, more distant health centers. However, the continuous closing of health huts because of poor project management may well negatively affect villagers' attitudes toward primary health care. Recommendations include: altering the health hut financial system to avoid collapse; closing health huts which overlap services; halting construction of additional health huts until the existing huts are improved; including a family planning component; obtaining firm assurances of budgetary support from the government; and strengthening A.I.D.'s project management team. Since this evaluation, several corrective measures have been made such as delaying project expansion; recruiting an experienced project manager; studying similar, more successful projects; and redesigning the project. A 24-item French and English bibliography (1968–80) and technical appendices are attached.

685021000

110 PN-AAJ-207

TUNISIA: CARE WATER PROJECTS

Bigelow, R.E.; Chiles, L.
U.S. Agency for International Development.
1980, 59 p.

A.I.D. Project Impact Evaluation Report No. 10

Some 100,000 Tunisians living in dispersed rural settlements are using wells and springs that have been improved with U.S. assistance. This report evaluates a series of projects conducted by Cooperative for American Relief Everywhere (CARE), with partial funding by A.I.D. and assistance from the Peace Corps, in which 600 existing Tunisian water sources were renovated. According to the report's project implementation section, the projects involved little local participation. To control water contamination, the springs and wells were enclosed with relatively low-cost technology requiring little maintenance. Four subsequent report sections describe the impact on availability and use of potable water, on health and quality of life, on beneficiary participation, and on local institutions. Based on Tunisian records and standards, about 75% of the project sites were not producing potable water. Only 50% of the project sites visited were fully operational and adequately protected from surface contamination. No relationship between the CARE water projects and a change in the incidence of water-related disease could be determined. A negative impact on health may have occurred where users discontinued their own disinfection practices thinking the water was safe when in fact it may have been contaminated because project-provided treatment had ceased. Although most local disinfection and health education teams established under these projects are still in existence, they have not generally been effective. Included among the lessons learned from the CARE projects are: (1) future AID-supported water projects should concentrate on increased water quantity, dependability, and accessibility; (2) project design should reflect demonstrated community need rather than prepackaged donor solutions; and (3) U.N. water quality standards will have to be scaled down if ambitious potable water goals are to be met during the Drinking Water Decade (1981-90). The authors recommend that A.I.D. work with the Tunisian government to agree on a long-term public health strategy, experiment with alternative potable water technologies, and evaluate projects in a collaborative fashion. Various project-specific appendices are included.

664028600; 664028800; 664029800; 664029900

111 PN-AAH-149

ORAL REHYDRATION THERAPY: AN ANNOTATED BIBLIOGRAPHY

Baumslag, N.; Davis, R.; Mason, L.G.; McQuestion, M.; Sabin, E.; Snyder, J.; Wiesenthal, A.
U.S. Office of International Health.
1980, 125 p.

Collaborative project by Pan American Health Organization, A.I.D., U.S. Center for Disease Control, U.S. Office of International Health

Oral rehydration therapy (ORT) is quickly becoming an inexpensive, easily administered, and universally available way of combating dehydration caused by diarrheal diseases. This annotated bibliography was compiled to assist in understanding ORT as a means to treat dehydration and is organized in five sections. The first section contains 17 references pertaining to the history of the development of solutions used for oral rehydration. Glucose and electrolyte solutions have been used over the past 30 years and studies showed that the coupled transport of glucose and sodium in the small intestine results in accelerated transport of electrolytes and water. Studies conducted on ORT and its relationships to cholera are also included. Contained in the next section are 28 references describing clinical trials yielding information on methods of ORT administration, the reduced need for intravenous therapy, and the limitations of ORT. Most of these references address the efficacy of ORT as a means of treating cholera and infant diarrhea. References on the composition of oral rehydration solutions, treated in the next 23-item section, investigate the use of a single sodium concentration for all diarrheal cases, the feasibility of using sucrose instead of glucose, and the determination of the optimal potassium concentration. The next section, containing 12 references, treats the impact of ORT on morbidity and mortality resulting from diarrheal diseases. Accurate impact measurement is confounded by multiple factors such as wide variations in environmental, socioeconomic, and cultural characteristics; unreliable epidemiological data; and differences in the levels of training of those administering ORT. The last 58 references examine issues concerning implementation of ORT such as the training needed for administration, where ORT should be administered, the method of distribution, the mode of preparation, and the assessment of fluid requirements. Appended are a sequential bibliography (1949–79) and author and country indices.

RS/HEW/OIH-01-77 931119800

112 PN-AAH-928

ORAL FLUID THERAPY IN DIARRHEA AND DEHYDRATION: CURRENT CONCEPTS AND PRACTICAL CONSIDERATIONS

Parker, R.L.
Johns Hopkins University, Department of International Health.
1980, 30 p.

Dehydration — the loss of water and electrolytes through diarrhea — can fuel a vicious cycle in a child in which malnutrition begets diarrhea and diarrhea causes further malnutrition, until the child ultimately dies. The recent widespread use of oral fluid therapy (OFT) has significantly reduced diarrhea mortality, showing it to be an effective cure of relatively lower cost and greater convenience than intravenous feeding therapy. This report outlines the major approaches to OFT, ways of implementing these approaches, and issues still unresolved. OFT does not prevent the incidence of diarrhea but does minimize its effects. It replaces the child's water and electrolytes, aiding and sustaining the child's recovery and inhibiting fluid loss at the onset of diarrhea. The ideal OFT solution consists of sodium, potassium, chloride, sodium bicarbonate, and glucose; although glucose or sucrose combined

with salt is an effective early diarrhea retardant. The report recommends the usage of a standard mixture of 90 millimoles of sodium per fluid liter; continual feeding despite diarrhea, except in cases of severe dehydration; preparation of the solution with boiled water when possible; the non-use of antibiotics due to their limited effect and potential hazard; and minimal reliance upon packets and kits, because of their expense and logistical problems. The OFT program should be a multitiered system relying on early home treatment of diarrhea with sugar/salt solutions; peripheral health workers to disseminate the solution and to train and monitor families in dosage preparation and administration; a peripheral rehydration center equipped to provide complete oral fluids and intravenous feeding treatments and to reinforce the health workers' training; and a referral center to handle the most serious cases and to oversee the program. Unresolved OFT issues include the ability of families to administer the solution correctly and sanitarily; the possible ineffectiveness of a solution composed solely of sugar and salt; and OFT's nonapplicability to patients who are vomiting, in severe shock, or have an enzyme deficiency preventing the consumption of sugar. A 44-item bibliography (1948–80) is appended.

AID/DSPE-C-0055 932063200

113 PN-AAH-929

SCHISTOSOMIASIS CONTROL IN THE DOMINICAN REPUBLIC: RECOMMENDATIONS FOR APPROPRIATE COURSE OF ACTION

Farwell, A.E.
1980, 44 p.

Prior to approving a request from the Government of the Dominican Republic (GODR) to USAID to provide assistance in a schistosomiasis control program, a team of scientists was called on to evaluate the present status of schistosomiasis and of ongoing eradication programs. This report presents the findings of an economic analyst contracted to work with this team, review their findings, and recommend an appropriate course of action to USAID. Current schistosomiasis programs of the Center for the Eradication of Bilharzia (CEB) rely on incorrect prevalence data, which fail to account adequately for the possible spread of schistosome parasites by migration from known areas of infection in eastern provinces. Moreover, these programs are oriented toward case treatment and haphazard extermination of the host snail *Biomphalaria glabrata*, rather than toward arresting further infection and molluscicide at identified transmission points. Major reorientation of the present control effort is required if *Schistosoma mansoni* (bilharzia) is to be controlled adequately. To this end, the following resources can be exploited without substantial new or additional funding: academic community capability to undertake *S. mansoni* infection and malacological research; and village health services and education, potable water, and sanitary excreta disposal programs. Because the GODR is able to carry out the former, the author emphatically recommends that USAID assume responsibility for neither the execution nor the financing of the reoriented program. Rather, USAID should encourage program improvement by recommending to GODR an extensive survey to delineate the locations where *S. mansoni* infection is now found and to provide data on prevalence, intensity, and incidence of infection. Also recommended is a control program — such as that outlined by the scientific team — aimed at better detection and identification of transmission points; molluscicide *B. glabrata* at those points; and treatment of identified *S. mansoni* infection. USAID should also consider geographic realignment of existing AID-supported programs to permit their beneficial application to areas of *S. mansoni* infection. A 19-item bibliography (1973–80) is appended.

AID/lac-C-1401

114 PN-AAJ-007

WATER SUPPLY AND DIARRHEA: GUATEMALA REVISITED

Dworkin, D., Dworkin, J.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 49 p.

A.I.D. Evaluation Special Study No. 2

Evidence indicates that improved water supplies in rural communities reduce the incidence of diarrhea. To demonstrate this phenomenon, two communities in Guatemala, Florida Aceituna and Guanagazapa, were selected for study due to their similar population, environment, and health characteristics. The former, which obtained water from shallow wells and rivers, served as a control to establish a norm for diarrheal incidence without project assistance. The latter was provided with a piped chlorinated supply system. Data from both communities were analyzed independently. Halfway through the project, a program to alter sanitary behavior and encourage latrine construction was instituted in Guanagazapa, allowing changes in diarrheal incidence to be ascribed either to water alone or to both water and the new program. The mean amount used per person over the project was 25 liters daily for each person in Florida Aceituna and 68.4 liters in Guanagazapa. Eighty percent washed their clothes and bathed at home in Guanagazapa compared to less than 1/3 who did laundry and 1/5 who bathed in the control village. Guanagazapa showed a significant improvement in sanitary awareness over the project period and 79 new latrines were installed. Latrines continued to be built at a rate of two per month following the project. Almost no construction occurred in the control village. Data suggest that water alone was a sufficient condition to reduce diarrheal rates. Diarrhea declined substantially among the 1–45 age group in Guanagazapa, with children 1–7 benefiting the most. The health program and the increased use of latrines did not appear to decrease diarrhea notably. Data also indicate that water quantity rather than quality was responsible for improved health — the amount of water used at home was three times greater in the experimental than in the control village. Water quality, however, while good at the tap, deteriorated in the transfer to domestic containers. Analyses determined that half of the samples from domestic containers had fecal coliform bacteria and three quarters had some coliform bacteria. Three appendices and a 17-item bibliography (1948–79) are appended.

115 PN-AAG-792

STUDY ON THE DEMAND AND MARKET DEVELOPMENT OF LOW COST NUTRITIOUS BREAD IN KOREA

Whang, I.C.; Jo, S.H.
Sogang University, Seoul, Korea, Research Institute for Economics and Business.
1978, 219 p.

In 1975, under USAID financial sponsorship, Sam Lip Foods Co., Ltd., one of Korea's largest bread manufacturers, began production of soy-fortified bread. This study analyzes and evaluates findings from a subsequent survey of consumer attitudes and sales in a test marketing of the product. Data sources included first-hand information from consumers (obtained through the mail and in interviews at retail stores and residences), secondary sources from food balance sheets, and sales data from the producer of the bread and a sample of its dealers. The test marketing of this high protein bread was a failure, with only a small proportion of consumers buying the bread repeatedly. The authors attribute the poor results of this test marketing to the following factors: (1) the poor quality of the bread in terms of taste and odor; (2) the existing preference of consumers for milk bread; (3) inadequate and ineffective use of promotional materials; (4) the high price of the bread due to rigid government price controls and the unavailability of good quality soy flour at reasonable prices; and (5) the lack of a strong marketing program. In addition, rice remains the preferred staple of the Korean diet — a factor which restricted the market for soy bread from the outset. Despite the poor response to soy bread, the authors stress the importance of developing soy protein-supplemented foods. The rising costs and limitations of supplying animal protein foods will make these products increasingly necessary. The authors recommend that the Sam Lip Co. consider developing new soy flour products such as pastries — products which are assumed to have a larger market than soy bread. If the price of soy flour can be reduced, the company should consider eliminating regular bread and producing only soy-fortified bread. Also, if the company resumes marketing of the bread in the near future, it should be distributed only in large city supermarkets where a reasonable level of sales can be maintained.

AID-489-2-75-T 931083100

116 PN-AAH-242

ANALYSIS OF NUTRITION-RELATED ACTIVITIES IN HONDURAS

Stanfield, D.; Eckroad, J.; Sahn, D.
Community Systems Foundation.
1979, 150 p.

Present estimates indicate that nearly 75% of Honduras' preschool population and nearly 50% of its school-age population suffer from some degree of malnutrition. In 1976, the Government of Honduras (GOH) established the Sistema de Analisis y Planifacion de la Alimentacion y Nutricion (SAPLAN) to plan and stimulate the implementation of nutrition programs. However, SAPLAN has encountered numerous problems. A major difficulty has been the inability of the Honduran and U.S. bureaucracies to operate smoothly and to reach agreement on administrative procedures satisfying the legal requirements of both governments. A second difficulty has been the slowness, cost, and limited impact of many of SAPLAN's projects. For example, some agricultural projects, while increasing food production, did not increase on-farm or local consumption of these foodstuffs. SAPLAN is operating in a country where the common mechanisms for linking it to the social groups most in need of assistance are weak and in a constant state of flux. Authors' recommendations include: (1) investigating the institutional capabilities of both SAPLAN and the participating international agencies, especially those involved in supplemental feeding; (2) scrutinizing agricultural sector policies to determine their nutritional impact; (3) examining the differential impact of macro-policies in terms of nutrition on various segments of the population; and (4) studying the Ministry of Health's extended health coverage program to determine its impact on the rural poor. To improve SAPLAN's internal operations, the authors suggest the establishment of a Commission of Ministers, composed of representatives from its six coordinating agencies. The creation of such a council could elicit the necessary commitment from the ministries to assure effective implementation of SAPLAN's projects. The authors recommend that USAID form a multisectoral nutrition team, drawing from its agricultural, education, health, and engineering sections; establish an internal planning group; and develop a simplified model of the development process in Honduras. Final sections of the report discuss supplementary feeding programs and the GOH's nutrition-related health sector programs.

AID/SOD/PDC-C-0082 522002300
Also available in Spanish: PN-AAH-243, 166 p.

117 PN-AAH-528

REPUBLIQUE UNIE DU CAMEROUN ENQUETE NATIONALE SUR LA NUTRITION: RAPPORT FINAL

University of California at Los Angeles, School of Public Health; Cameroon, Ministry of Economy and Planning.
1978, 381 p.

Cooperative effort of the Government of Cameroon, USAID/Cameroon, and the University of California at Los Angeles

The extent of malnutrition among mothers and children in Cameroon has prompted the Government of Cameroon to undertake a joint research study with the University of California, Los Angeles, School of Public Health to determine the causes and characteristics of this malnutrition. This report, written in French, presents the results of that study. The study is based on a control group of 506 children, 5-years old or under, of relatively high economic rank whose nutritional status can serve as a point of reference for Cameroon and an experimental group of 5,689 children (5–59 months), 3,350 mothers, and 3,383 households. After introductory sections on Cameroon's demography, economy, and health conditions, the study's goals and the methodology used in its compilation are explained. The physical and laboratory signs (i.e., hemo-

globin concentration) of malnutrition in children and mothers are discussed. In the ensuing analysis of research results, the age and sex distribution of the sampling group, the nutritional status of children, and the levels of malnutrition are examined. The mortality associated with anemia, edema, and measles, and the characteristics of the target households and each of its members are also discussed. A survey of the types of milk (i.e., breast or bottle) and food consumed by children is presented as the basis for forming national nutrition programs. The proportion of children and families consuming various food types and the portion of family food given to children are discussed. Connections are drawn between mothers afflicted with goiters and tests to detect the presence of a certain acid in mothers' saliva that is indicative of ingestion of undercooked food types. Conclusions of this study include: chronic malnutrition in young children reflects prolonged deficiencies in calories and proteins; and evidence of malnutrition based on physical traits is more difficult to define in mothers than in children because of the greater impact of environmental factors on the former. Extensive annexes, tables and diagrams, as well as a 64-item bibliography (1955–78) of French and English references are appended.

AID/ta-C-1240 931088500
Also available in English: PN-AAG-664, 403 p.

118 PN-AAH-576

TOPICAL INVESTIGATION AND ANALYSIS OF NUTRITIONAL SUPPLEMENTS IN FAMILY PLANNING PROGRAMS IN INDIA AND PAKISTAN

Rulison, M.E.
Research Triangle Institute.
1970, 73 p.

The theory that improving the nutritional status of mothers and infants lowers fertility rates has been divided into several hypotheses concerning the effects on fertility of nutrition interventions in family planning (FP) programs. This report uses a modified systems analysis approach to test these hypotheses in India and Pakistan in terms of such variables as numbers of births and deaths, nutritional levels, and numbers of FP acceptors. The nine hypotheses tested commonly assumed that improved infant and maternal nutrition increases infant survival and decreases the number of children desired; that providing food supplements at FP clinics increases the number of clients; and that decreased infant mortality resulting from improved maternal nutrition lengthens the birth interval, thus reducing birth rates. Test results were as follows: (1) declines in infant mortality precede declines in birth rates by as little as 10–20 years; (2) FP is used when desired family size is achieved and the survival of at least one male is assured (except if a woman experiences the death of her own child); (3) malnutrition affects up to 50% of the people, primarily infants and preschoolers; (4) high infant and child mortality is partially due to poor maternal and child nutrition; (5) malnutrition lowers fecundity by increasing fetal wastage and infant mortality; (6) nutrition interventions motivate persons to visit FP centers only when actual family size approaches desired family size; and (7) a decrease in mortality at ages 0–4 years does not significantly increase population growth for 20 years; after which the rapid population growth rate, due to high numbers of persons entering their reproductive years, is offset by a reduction in total fertility rates. Recommendations based on these results include combining nutrition interventions with sanitation and child health programs; establishing experimental nutrition interventions for children aged 4–18 months; and collecting baseline data on factors such as changes in death rates by age and cause and in fertility rates by age and child mortality experiences. A seminar on the most current findings is also recommended. A 75-item bibliography (1945–70) is appended.

AID/nesa-460

119 PN-AAH-710

PERSPECTIVES IN MATERNAL–INFANT NUTRITION

Baumslag, N.; Sabin, E.
U.S. Office of International Health.
1978, 26 p.

Malnutrition is a major contributor to high LDC infant mortality rates. This paper examines the special problem and nutritional needs of those most vulnerable to malnutrition — infants, children, and pregnant and lactating mothers — and recommends specific remedial practices and programs. Pregnant mothers are usually undernourished, one cause of their offspring's contraction of preventable diseases or deficiencies, such as anemia or cretinism. The incidence of "low birth weight" babies is due to maternal infections, anemia, and reduced food intake; such infants are quite susceptible to infection, congenital defects, and death. Malnourished mothers also produce 33–50% less milk than their nourished counterparts. More mothers are either reducing the period of infant breast-feeding or abandoning it entirely in favor of formula feeding. This shift to formula feeding is due to such factors as convenience, urbanization, the lack of encouragement by health professionals for breast-feeding, and the aggressive advertising and local sales campaigns conducted by the formula companies. Formula feeding often transmits fatal bacteria, such as those causing diarrhea, through the polluted water used in its mixture. Due to its high cost, mothers dilute the formula to obtain larger quantities, resulting in the child's undernourishment. On the other hand, breast-feeding leads to lower infant morbidity and mortality rates due to its sterility, nutrients, and high antibody count. Its other benefits are its comparative low cost, ideal use as a weaning supplement, and child spacing effect. This report recommends that health personnel strongly encourage the practice of breast-feeding to dispel misconceptions and to ensure better child nutrition. Calorie-protein studies should be instituted and followed by integrated health and nutrition interventions, especially in family planning and mother/child health programs. The mother should be the focus of these efforts as the most cost-effective and enduring means of ensuring the infant's health. Marketing practices and misleading information by formula companies should be minimized. A 28-item bibliography (1966–78) is appended.

RS/HEW/OIH-01-77 931119800

120 **PN-AAH-851**

MOROCCO: FOOD AID AND NUTRITION EDUCATION

Gilmore, J.W.; Adelman, C.C.; Mayer A.J.; Thorne, M.C.
U.S. Agency for International Development.
1980, 63 p.

A.I.D. Project Impact Evaluation Report No. 8

Although Morocco has a high per capita GNP relative to most developing countries, its income distribution pattern is skewed and the health and nutrition status of many is deficient. In this report, the impact of the introduction by Catholic Relief Services of nutrition education into 250 Moroccan social education centers (SEC's) which distribute PL 480, Title II food is described. To launch this education program, a nutrition institute was established at Marrakech to train a cadre of Moroccan women in basic nutrition and health. This cadre developed a curriculum of practical lessons in nutrition, sanitation, and the treatment of childhood diseases which were presented at monthly nutrition classes held at the SEC's. Class attendance was spurred on by the prospect of obtaining Title II food. There was a significant correlation noted between increased education and improved nutrition in the children taking part in the program. Moreover, mothers enrolled in the program demonstrated a greater knowlege of proper breastfeeding practices, appropriate pregnancy and nursing diets, treatment of infant diarrhea, diseases requiring vaccination, and animal and vegetable protein sources. Management of this program was exceptional, as indicated by prompt food deliveries, an excellent record-keeping system, uniform and accurate infant weighing procedures, weekly home follow-up visits for absent or sick mothers, and monthly visits from the provincial directrices. It was learned from the program that dependence on Title II foods inhibits the potential expansion of this program and endangers its continuation; Title II programs can be used to gather data for project design; and requiring all mothers to pay to participate in the food and nutrition education program kept the individual centers self-sustaining and created a sense of responsibility for the mothers. It is recommended that Title II organizations establish cooperative relationships with relevant ministries; that methods be devised to phase out the donated food component; and that attendance be increased without diminishing the education program's impact. A 29-item French and English bibliography (1972–80), footnotes, and various other appendices are included.

608012300; 608014100

Nine-year-old Maria-Luisa Cantero learns the dietary value of locally-grown fruits and vegetables.

121 PN-AAH-322

ON ALLOCATING RESOURCES FOR FERTILITY REDUCTION IN DEVELOPING COUNTRIES

Berelson, B.; Haveman, R.H.
The Population Council.
1979, 90 p.

Center for Policy Studies Working Paper No. 40

Population growth in LDC's has led to a yearly allocation of $200 million by donor agencies to programs designed to reduce fertility. In view of the expense, surprisingly little investigation of resource allocation efficiency has taken place. To determine a superior allocation method, the authors of this paper analyze responses from recognized population planning experts on the effectiveness of current donor-funded programs; they also identify the most efficient strategies of intervention by analyzing variations in fertility response according to changes in resource allocation. The paper presents a 108-cell matrix composed of 12 strategies of supply- and demand-oriented interventions; three social settings (SS's) delineated by favorable responses to fertility interventions; and three program implementation (PI) categories describing the strength or weakness of LDC government support. The effectiveness of each cell is rated and the results analyzed. The most effective strategies are judged to be supply-oriented, specifically, family planning progams augmented by abortion and/or an unspecified new method. In every case, the ratings were positively related to the average strength of the SS and PI variables — without favorable conditions even the most efficient strategy will be ineffective. Using these findings, the authors estimate how expenditures should be allocated among the 108 Strategy–SS–PI combinations for the most effective results in reducing fertility. According to the model, only 25 of the 108 cells would be reasonable investments, and the five most favorable combinations would receive 35% of the total available resources. If applied, these standards would lead to a great disparity in country allocation. Since program effects would be better guaranteed if supported by established systems, funding would tend to be 100 times greater in countries which have family planning programs than in those which do not. The result of the analysis, then, is that the most effective method tends to be the least feasible. Included in the report are appendices on the questionnaires used, supply and demand interventions, profiles of respondents, and procedures for specifying diminishing economic returns.

AID/pha-C-1199 932063200

122 PN-AAH-324

POPULATION: CURRENT STATUS AND POLICY OPTIONS

Berelson, B.; Mauldin, W.P.; Segal, S.J.
The Population Council.
1979, 75 p.

Center for Policy Studies Working Paper No. 44

In the past 15 years, the amounts of money, time, and personnel allocated by developed and developing nations alike toward the study and resolution of the problem of overpopulation have increased dramatically. In almost every instance these inputs have been directed toward research, training, and policy measures to reduce fertility. In this paper the authors review actions taken to date, then use their conclusions to make projections for future demographic trends and policy. They point out that fertility rates are declining in the developing world as a whole, particularly in the 13 most populous countries. In fact, 28 out of 91 developing nations with a population of 1,000,000 or over showed 10% or greater declines in fertility from 1969 to 1979. Marital patterns, social development, and family planning (FP) programs have all contributed to these declines. Most LDC's have also experienced a reduction in mortality rates, but this decline appears to be slowing, while average life expectancy is slowly increasing. LDC populations thus continue to grow at an average rate of about 2.2% per year. The authors conclude that financial, political, and social pressures to reduce population growth remain strong. After an analysis of the status of ongoing fertility-reducing programs and technologies, the authors turn to a discussion of what lies ahead in the demographic development field. Based on current trends, substantial demographic momentum will persist into the next century; by the year 2000 the world's population will increase by 40–60% over today's levels. The authors divide the larger developing countries into four categories on the basis of their likelihood to reach a crude birth rate of 20 (certain, probable, possible, and unlikely) by the year 2000. The authors conclude with an analysis of projected contraceptive technology and various policy options to improve both the supply (via more integrated FP services) and the demand (via increased education and information on FP) for fertility and mortality-reducing programs. Included are appendices on priority donor-recipient countries, changing population rates, and means of fertility regulation and contraception, as well as a 69-item (1962–79) reference list.

AID/pha-C-1199 932063200

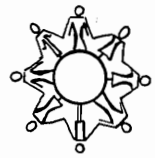
123 PN-AAH-326

TECHNOLOGY AND THE SOCIAL REGULATION OF FERTILITY

McNicoll, G.
The Population Council.
1979, 26 p.

Center for Policy Studies Working Paper No. 46

The 25-year history of efforts by modern national governments to limit high fertility has concentrated solely on biological approaches such as legitimizing and increasing the use of contraceptives and introducing family planning programs. Fertility behavior, however, is at the core of society's economic, cultural, and institutional patterns; therefore, sole reliance on applied biomedical approaches is invariably insufficient. In this paper, the author examines the effects of contemporary patterns of technological and institutional change on fertility and on possibilities for its regulation. He examines the structure of fertility demand, i.e., the desire for a specific (usually rather high) number of children. The author points out that the distribution of fertility costs (loss of the mother's income, costs of raising children, etc.) cannot be sepa-



rated from the distribution of income and wealth in society; it is society's institutional arrangements that diffuse or concentrate the economic costs of children. Such institutional arrangements include the nuclear family, local communities, and economic classes. As the development effort proceeds, the costs of children are increasingly relegated from larger groupings to the family. Likewise, the power of institutional arrangements to regulate fertility decreases. In addition, nonmedical technologies (e.g., those of transportation, communication and production) continually impact on society's institutions and consequently on fertility behavior. It follows that successful resolution of the world's fertility-related problems will have to go beyond family planning programs and other biomedical techniques to respond to the reality of rapid technological and institutional change faced by developing nations. Footnotes supporting the author's study are appended.

AID/pha-C-1199 932063200

124 PN-AAH-327

FEMALE MIGRATION IN DEVELOPING COUNTRIES: A FRAMEWORK FOR ANALYSIS

Thadani, V.N.; Todaro, M.P.
The Population Council.
1979, 52 p.

Center for Policy Studies Working Paper No. 47

Potentially significant gender-related differences in the migratory process suggest the need for a specific analysis of female migration. The emergence of a new category of migrants — unattached women — reveals the inadequacy of existing research approaches which are based on the assumption that female migration reflects patterns of family or household migration. This report uses research conducted in Latin America, Africa, and India to develop a mathematical model of female migration patterns in LDC's. The authors show that where increased economic and/or educational opportunities for women are greater in urban than in rural areas, the increase in female migration rates from countryside to city is marked, and in many cases even greater than male migration levels. The authors argue that two additional variables, mobility marriage (marriage as a means to financial or social improvement) and marital/marriage migration (movement to join or to seek a mate) are particularly important as determinants of the individual woman's propensity to migrate. The authors then introduce a mathematical model to demonstrate that the proportion of women in a given society who choose to migrate is a function of: (1) the differential between expected urban income and average rural income; (2) the probability of marriage to males employed in the modern sector ("mobility marriage" factor); (3) the probability of marriage to any eligible male; (4) sex role constraints on spatial mobility for women; and (5) residual factors such as distance and extended family contacts. The net effect of including the two marriage-related variables in the equation is to find a mathematical basis for the increased female propensity to migrate which has been noted in a number of studies based strictly on economic models. The authors point out the value of their model in answering the critical need in developing nations for policy options to deal with migration and related development problems. However, more accurate measurements of the new parameters they introduce as determinants of female migration will be necessary in order to successfully use the model to estimate levels of migration. A 75-item reference list (1955–79) is appended.

AID/pha-C-1199 932063200

125 PN-AAH-950

RURAL DEVELOPMENT AND FERTILITY TRANSITION IN SOUTH ASIA: THE CASE FOR A BROAD-BASED STRATEGY

Lieberman, S.S.
The Population Council.
1980, 52 p.

Center for Policy Studies Working Paper No. 55

A point of contention for many population planning and development experts is the relationship, if any, between rural development programs and fertility — how can the two be integrated to simultaneously achieve gains in employment and output while reducing fertility? This paper addresses this issue by examining a broad-based strategy of agricultural development inspired by the Japanese experience and by discussing the applicability of that strategy to South Asia in general. Presented first are the major aspects of the broad-based strategy which integrates rural development and fertility reduction through a small farmer approach — the so-called "green revolution." The success of this approach in Japan is documented and a number of advantages to the small farmer strategy are listed. Of particular interest is the traditional view that fertility reduction is exclusively and specifically a function of the improved standard of living for small farmers which results from development actions. The author contradicts this view by providing evidence that fertility decline in Japan was caused, not by improved living conditions, but by changes in the productive contribution of children and in their perceived value as investments or security assets. He argues that it is only by introducing organized forms of security and support to replace the old age and disaster insurance roles of children that fertility will decline. He also discusses the limited applicability of the Japanese model in the South Asia situation because of differences in the political, economic, and agricultural structures between the two regions. Finally, two alternative broad-based strategies are presented; their major departure from the Japanese model is that a much more extensive scope of government involvement in development policy is envisioned. The two strategies, integrated rural development and guaranteed employment, are explained and their possibilities for the South Asia context are discussed. The report concludes with supporting footnotes and a 156-item reference list (1951–79).

AID/pha-C-1199 932063200

126 PN-AAH-954

CHANGING PATTERNS OF FERTILITY: THE IMPACT OF CONTRACEPTIVE TECHNOLOGY ON A MAYA VILLAGE

Elmendorf, M.
Research Institute for the Study of Man.
1980, 90 p.

Acceptance and implementation of strategies to limit family size have increased among the women of Chan Kom, a Mayan peasant village located in Yucatan. This report explores the factors supporting fertility control by analyzing the counseling and services of the family planning program and the age, health condition, and desired number of children of women who accept and use some form of birth control. Also assessed are socioeconomic variables such as the education level of women and children and income-generating work of women and men both in and outside the village. Charts of demographic and socioeconomic data further illustrate these findings. The determinants of fertility control were found to be highly complex, with acceptance of family planning methods cutting across age, economic, and educational lines. The marketing and production of sewn and embroidered crafts by women, as well as their participation in the work force outside of the home and village, were found to foster acceptance of family planning. Further, the development of new technologies for producing honey and raising cattle has increased women's contacts with outside businesses and fostered changes in family life. A surprising finding was that, having been introduced to sex education and family planning in grades five and six, unmarried children were encouraging their mothers to use contraceptives.On the basis of these findings, the author recommends the formation of discussion groups among community members on the new schoolbook materials and preparation of tape cassettes covering the latter materials for use in women's groups and/or the home. The importance of an appropriate time and method of presenting family planning information is also stressed. Appendices include an analysis of the rate of acceptance of contraceptive methods, a series of charts profiling the background of married women in Chan Kom, and a computer analysis of changing fertility patterns. A 58-item bibliography (1929–79) includes Spanish and English references.

AID/pha-G-1184 932061600

127 PN-AAJ-144

TURKISH FERTILITY SURVEY, 1978: A SUMMARY OF FINDINGS

International Statistical Institute.
1980, 21 p.

World Fertility Survey Country Report No. 28

From 1945 to 1975, Turkey's population grew at an annual rate of 2.5% until it numbered over 40 million people. Now, however, there are signs that the nation's fertility rate is beginning to decline. This report summarizes the results of the "Turkish Fertility Survey", which was based on interviews with a representative sample of 4,431 Turkish women. The survey revealed that Turkey has pronounced urban–rural, regional, and social differentials in practically every aspect of fertility investigated, indicating that the nation is in a demographic transition. This report details Turkey's trends toward later marriages, reduced cumulative childbearing, increased knowledge and use of contraceptives, and moderate family size preferences. The institution of marriage is widespread and strong: only 1% of women over 35 have never married and over 92% of the ever-married women are still in their first union. Although marriage usually begins at an early age, the change in the median age of marriage for older and younger women from 17.5 to 18.8 years reflects a moderate shift towards later marriages. This shift affects population growth through the reduced cumulative fertility of late-marrying women in comparison to early-marrying women of the same age, as evidenced by a substantial reduction in the total fertility rate from 6.33 to 4.33 live births between the latter two groups. When averaged over the past 9 years, this indicates a fertility reduction of 25% during the 1970's. The current norm of preferred small family sizes, an average of three children, is smaller than the achieved family sizes of older women. However, nearly half of the third and fourth births are unwanted, which may be connected to the reliance upon traditional birth control methods (e.g., withdrawal) instead of the modern methods (e.g., the pill). Knowledge of contraception is widespread and many women have tried modern methods, only to return to more traditional ones, possibly due to poor medical supervision or supply problems. That 55% of the women ever married have used contraceptives at least once attests to the concern Turkish families give to child spacing and limited family sizes.

AID/csd-3606 931054700

128 PN-AAJ-146

THE KENYA FERTILITY SURVEY, 1978: A SUMMARY OF FINDINGS

International Statistical Institute.
1980, 17 p.

World Fertility Survey Country Report No. 26

At its current annual population growth rate of 4%, Kenya's population of about 15.3 million people will double in 18 years. This International Statistical Institute (ISI) survey report assesses factors contributing to Kenya's growth rate: the strength of marriage, high fertility rates, preference for larger families, limited contraceptive usage, and the slight effect of noncontraceptive factors upon fertility. From 8/77 to 5/78, ISI interviewed 8,100 single and married women from 8,891 households. ISI's most important discovery was Kenya's extremely high fertility rate, an average of eight children per woman. Of these, an average of 6.3 survive — with only 2.5 children required for a balanced population level. Additional data suggest an increase in population fertility over the past 15 years. Responses to questions about preferred family size indicate that Kenya has a very pronatalist culture. Most women wanted large families and only a few, including those who already

had six children, wished to have no more. Although 88% of the women (in all categories) had heard of at least one contraceptive method, only 29% had tried one and only 11% had used a modern one. Of the 4,217 married women surveyed on current contraceptive usage, only 6% used modern methods. Breast-feeding, which reduces fertility by delaying menstruation, seems to be widely practiced. However, there is evidence of its decline among younger, educated, and urban women. Sexual abstinence due to recent childbirth or spouse separation seems to have little effect upon fertility. Only 16% of those ever married (defining marriage, as per the 1969 Kenya census, as a union sanctioned by religious or civil law including stable sexual relationships between partners living together) had their first marriage dissolved; 52% of these remarried. While data indicate the widespread practice of polygamy is declining, further study is needed in this area. The female age at first marriage is rising — 18.1 was the median age at marriage for those now 20–24 years old, as opposed to 17.1 for those now 30–34 years old. While the postponement of marriage lowers the fertility rate somewhat, more effective policies are needed to reduce the rate still further.

AID/csd-3606 931054700

129 PN-AAG-672

STUDY OF FAMILY PLANNING PROGRAM EFFECTIVENESS

Sinding, S.W.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 28 p.

A.I.D. Program Evaluation Discussion Paper No. 5

It is generally accepted by population experts that a decline in fertility rates depends upon the interrelationship between the supply of family planning (FP) programs, determined by a government's political commitment and its administrative capability, and the demand for FP services, determined by the acceptability and adoption of the small family norm. This paper analyzes the results of a review of the literature on the relation of demand and supply determinants to FP effectiveness; it also develops guidelines to determine the conditions under which a major FP action is appropriate. The literature review found that FP programs do make a difference in the rate of fertility decline; progress in development alone is not enough. Key variables such as adult literacy, education, life expectancy, infant mortality, and GNP per capita combine to create the social context within which FP programs are implemented. The existence of favorable levels of achievement in these areas does not, however, necessarily guarantee the success of FP programs, just as their absence does not guarantee failure. For example, Indonesia and the Philippines have achieved high levels of contraceptive use despite development conditions that should preclude a demand for FP services, while Venezuela and Mexico have progressed rapidly on the development scale but are unable to achieve real decline in fertility levels. A set of theoretical guidelines to achieve rapid fertility decline are presented for further study. First, a country's social setting should be examined to determine the appropriate role for the public sector. If the setting is favorable, and fertility is declining even in the absence of a major public effort, the role of the state can be limited to ensuring the availability of FP services. If, on the other hand, decline in fertility is slow or nonexistent, the state needs to be more active. The paper's major conclusion is that political will and administrative capability alone cannot overcome basic sociocultural obstacles unless direct government action on reproductive behavior is an important feature of the program. Recommendations for specific countries conclude the paper.

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More than 75 family planning clinics have been established in Nepal, whose population growth rate of 2.5% could result in 22 million inhabitants by the year 2000.

130 PN-AAH-321

THE FERTILITY IMPACT OF TRADITIONAL AND CHANGING CHILDSPACING PRACTICES IN TROPICAL AFRICA

Bongaarts, J.
The Population Council.
1979, 31 p.

Center for Policy Studies Working Paper No. 42

Modernization in traditional societies in tropical Africa is gradually breaking down the custom of postpartum abstinence during the lactation period, raising concerns that changes in these customs could lead to a substantial increase in fertility and birth rates. This paper presents a mathematical model to study the relationship between fertility levels and intermediate fertility variables such as the proportion of reproductive years spent in marriage and the frequency of use of natural or artificial contraceptive measures. This analytic framework is demonstrated by calculating and comparing the fertility rates of one African and two Western societies. Next the author discusses the role of variations in the duration of postpartum abstinence on fertility levels. The relationship between lengths of abstinence (3–30 months) and the proportionate female use of contraceptives on fertility is calculated, and the strong fertility-inhibiting effect of lactation is made evident. For example, according to the model, an 88% decrease in the length of the abstinence period doubles fertility, while a 50% increase in use of contraceptive measures reduces fertility by 50% for all durations of infecundability. The author's conclusion is that, contrary to accepted knowledge, modernization does not always decrease fertility; in fact, an increase in fertility is likely if contraceptive use does not increase rapidly enough to offset the effects of a decline in traditional abstinence and lactation periods. Two important policy implications are: (1) attempts should be made to discourage the abandonment of traditional child-spacing methods; and (2) use of contraceptive methods should be encouraged as an alternative means to achieving desired spacing between children. Further research into the prevalence of postpartum abstinence customs in Africa is encouraged. Appended is a 42-item reference list (1954–70) of documents supporting the author's positions.

AID/pha-C-1199 932063200

131 PN-AAH-325

RESEARCH IN POPULATION AND DEVELOPMENT: ISSUES AND COMMENT

Demeny, P.
The Population Council.
1979, 34 p.

Center for Policy Studies Working Paper No. 45

The diversity of issues in the field of population and development poses a problem for the researcher, who must decide where and how to allocate his efforts. Before embarking on any research effort, two specific questions should be answered: (1) Does the emphasis accorded by the investigator to various aspects of a chosen topic accurately reflect the relative importance of those aspects? (2) How should efforts be allocated within the field of economic demography as a whole? These questions underly three commentaries on methodological issues presented by the author at conferences of the International Union for the Scientific Study of Population and the Annual Meeting of the Population Association of America. The following issues are addressed: (1) demographic variables in development policies and plans; (2) disciplinary perspectives on economic demography; and (3) estimating fertility and mortality in developing countries. The author emphasizes the responsibility of each researcher to approach scientific problems with sensitivity to their social significance. The author also suggests that research in economic demography should proceed along two main lines. First, work should be organized around territorially defined populations and should attempt to draw a comprehensive view of past, current, and future trends. Second, policy issues should be defined politically rather than demographically. This would mean that traditional issues such as fertility, mortality, migration, and growth would be replaced by family policy, public health programs, rural development policy, and the like. In his final commentary, the author suggests that demographers not rely solely on statistics supplied by national governments in formulating policy recommendations. Rather, decentralized statistical information should be used since it corresponds more closely to the reality of how people live, work, and interact.

AID/pha-C-1199 932063200

132 PN-AAH-425

A.I.D.'S ROLE IN INDONESIAN FAMILY PLANNING: A CASE STUDY WITH GENERAL LESSONS FOR FOREIGN ASSISTANCE

Heiby, J.R.; Ness, G.D.; Pillsbury, B.L.K.
A.I.D., Bureau for Asia and Bureau for Program and Policy Coordination.
1979, 83 p.

A.I.D. Program Evaluation Report No. 2

The AID-financed family planning program in Indonesia is one of the world's most successful, prompting the question of how to replicate that success in other family planning assistance programs. This report uses data collected from field visits and interviews to evaluate A.I.D.'s assistance to the Indonesian program and identify the underlying reasons for its success. The report describes the program's service network, its consumers, demographic impact, and A.I.D. inputs. A sociocultural study of the country shows that high population growth, administrative support, and community acceptance are the three factors whose convergence most favored the project's success. The history and description of the program, particularly the types and extent of service, are given. A.I.D.'s support is described in terms of leadership, commodities, organization, resources, local-cost programming method, and interagency linkage. Major strengths of

the program are: (1) a high level of national political support; (2) strong Mission commitment to the goal of the project and to Indonesia's national family planning program; (3) provision of grant rather than loan assistance; (4) responsiveness of the local cost programming process to local needs; (5) effective decentralization; (6) strong support from the Mission director and a competent, tenured staff; (7) close collaboration between Mission staff and local counterparts; (8) rapid adaptation based on field experiments; (9) a management rather than demographic orientation to the data system; (10) effectiveness of participant training; (11) integration, emphasizing process over structure, of health and nutrition services into family planning (not the reverse); (12) use of non-material incentives for acceptors; and (13) abundance of oral contraceptive supplies. Future problems faced by the A.I.D. program are imminent staff turnover; failure to extend services to urban areas and the outer islands; management; data, and logistical problems of expanding services into health and nutrition; and relations with the reorganized country planning board.Four appendices tabulating data on the program and an organization chart of the Mission are included.

133 **PN-AAH-577**

TOPICAL INVESTIGATION AND ANALYSIS OF PROMOTING FAMILY PLANNING THROUGH HEALTH SERVICES

Kennedy, F.D.
Research Triangle Institute.
1970, 129 p.

What role can health services (HS) play in the Near East–South Asia regions to optimally fulfill family planning (FP) objectives? It is speculated that combining FP and general HS programs can have two principal advantages: making FP services more accessible and cost-effective can increase the number of FP recipients; and decreases in infant mortality can reduce desired and actual family size over the long run. This report presents the results of a study of 11 hypotheses on the use of HS as a tool for promoting FP after the hypotheses were tested in three different models: a health effects model describing the effects of improved health on fertility behavior; a delivery systems model determining the best allocation of FP funds among potential HS programs; and a decision model representing the optimal sequence of decisions to be made relative to the budget allocation among several programs. The hypotheses tested included: that there is an important relationship between increased HS expenditures and decreased mortality; that HS clients are effective contraceptors; that the anonymity provided by an HS program enhances the adoption of contraceptive techniques; and that favourable attitudes toward FP result from its inclusion in an HS program. The major test conclusion drawn was that the data for the health effects model were more complete and appropriate than for the second and third models, for which these data were inadequate to generate any absolute conclusions. Recommendations based on these conclusions are: to conduct a complete information search for the health effects model in those areas not previously examined; to develop the decision model (but not the delivery systems model) utilizing professional opinion to augment the available data; and to conduct a series of experiments using the decision model, data, and professional opinion to determine the sensitivity of this model to data variation and the optimal sequences of decisions for various environmental conditions. A 191-reference bibliography (1955–70), a 100-item list of footnotes, and a structural model and objective function are attached.

AID/nesa-460

134 **PN-AAJ-314**

THIRD EVALUATION OF THE THAILAND NATIONAL FAMILY PLANNING PROGRAM

American Public Health Association; A.I.D., Bureau for Asia.
1980, 116 p.

A.I.D. Program Evaluation Report No. 3

Since the development of the first family planning (FP) project implemented in Thailand in 1968, great progress has been made there in FP and the use of contraceptives. The findings from an evaluation of the current National Family Planning Program (NFPP) are presented in this report. The NFPP has had the following significant impact upon population growth: contraceptive use, especially of the pill, has increased substantially since the commencement of NFPP; fertility is decreasing faster in rural areas than in urban areas; the steady decline in the fertility rates since the mid-1960's has accelerated since NFPP began; and the population growth rate has decreased from 3.6% to 2.6% during 1960–75. Despite these achievements, Thailand still faces unmet FP needs in such subgroups as the hill tribes and Indo-Chinese refugees. Also included in this report are the findings from the NFPP statistics system and from operational research studies in FP conducted in Thailand; the current status of specific NFPP program components such as information dissemination and education, manpower training, and contraceptive services; and a list of sources of support for NFPP. For the success of this program to continue, increased support is required from the Royal Thai Government (RTG) and international donors. Other recommendations arising from this evaluation include: (1) giving priority to geographic regions and subpopulations where FP acceptance is low; (2) emphasizing improved management and supervision at the village level; (3) including information about FP in health education programs; (4) giving all health education personnel formal training in rural health and FP delivery; (5) evaluating the impact of NFPP on health status, particularly with respect to maternal and infant mortality; (6) continuing pilot projects to determine the use of nonphysician personnel in FP service delivery; and (7) continuing subsidy by RTG to health facilities for voluntary surgical sterilization. Consultation reports and technical appendices are attached.

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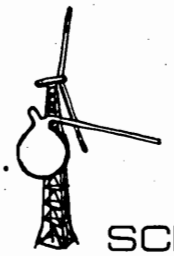


135 PN-AAG-825

RODENTS IN TROPICAL RICE

Fall, M.W.
Denver Wildlife Research Center, International Programs Section.
1977, 44 p.

Rodent Research Center, Philippines, Technical Bulletin No. 36

Rodent damage to rice causes widespread waste, storage contamination, and small-farmer economic problems. This report provides agricultural technicians working in the tropics with a summary of information on rodent-associated rice problems and major rat control methods used in Southeast Asia — particularly the Philippines — where evaluation of these control methods has been centered in recent years. Initial sections sketch the characteristic traits and activities of rats, their population levels (which increase during floods) in rice fields, feeding patterns, and harborage; as well as the calculation of rat-infested damage and extent of economic loss it causes, farmer attitudes toward rat control, and the often politically motivated government programs of rat control. Damage during early crop stages is often undetected due to the virtual invisibility of the rats and green plant damage. Rats inconspicuously inhabit rice fields and eat the grain of seedlings. By the time grain heads develop and plant damage is visible, the crop has nearly matured, and it is too late to initiate effective rat control to save the crop. Since rat control methods are costly in materials and effort, many farmers do not implement them as a preventive measure. Physical, chemical, biological, and other control methods to reduce or prevent crop damage are also discussed. Physical methods involve direct killing or extrusion of rats by digging or flooding burrows, trapping, drives, frightening devices, barriers, and electrocution. Chemical approaches include acute and chronic toxicants, fumigants, chemosterilants, and repellents. Biological methods utilize predators, disease and parasites, genetic manipulation, habitat modification, and rat-resistant rice varieties. Other control methods include bounty systems and human consumption of rats. Choice of a method or combination of methods by farmers and extension workers should be based on cost, practicality, potential side effects, and cultural and political acceptability; but above all, on the degree of crop protection they afford. A 62-item bibliography (1942–76) and a six-page paper, "Rat Control in Rice Fields," are appended.

PA/ID/TAB-473-1-67

136 PN-AAH-435

EVALUATION OF LOW-COST EXTRUSION COOKER IN SRI LANKA: SPECIAL REPORT

Ackels, A.A.; Gaylord, R.E.; Kuphal, E.E.
Colorado State University, Department of Agricultural and Chemical Engineering.
1977, 130 p.

LEC Report No. 3

The low-cost extrusion cooker (LEC), a simple system used to convert indigenous grains into low-cost, nutritious foodstuffs, was developed to reduce dependence on food-for-peace programs as a means of solving LDC food supply problems. This paper evaluates the performance of a pilot LEC system in Sri Lanka, determines its suitability for use in other LDC's, and recommends changes and improvements. The investigating team spent 10 days onsite evaluating Sri Lanka's LEC system, which used the Brady Crop Cooker to cook soybeans for farm animal consumption. The evaluation focused on the raw materials used, grain cleaning and storage processes, operation and performance of the Brady Cooker, and support equipment performance. The system's major problems were found to be maintenance-oriented. Out of a total loss of 50 production days, 43 were the result of maintenance-related problems. The team noted improper usage of tools and parts, lack of spare parts, and machines operating with missing or damaged parts. After a detailed analysis of its observations, the team's conclusions are that the intermittent-duty LEC system, if adequately managed, operated, and maintained, is capable of producing a product of satisfactory quantity and quality. Solution of the parts supply problem alone would increase LEC productivity by 30%. Specific recommendations on how to "debug" the equipment and suggestions on needed improvements in sanitation and health measures are given. Final recommendations for the Sri Lanka LEC are: (1) to investigate, select, and install continuous-duty auxiliary equipment so that a system-wide 98%, 120-hour equipment reliability factor may be reached; and (2) to improve LEC maintenance so as to increase production to at least 70% of its maximum production capacity. Until this level of dependability is reached, widespread distribution of LEC's could be counterproductive. The authors also suggest that a U.S. university work to make the Brady Cooker suitable for continuous duty operation and develop the system's capacity to increase the food self-sufficiency of LDC's. The authors urge prompt initiation of a pilot plant LEC development program to increase world use of the system.

RS-01-74 GTS

137 PN-AAH-712

EFFECTIVENESS OF FOUR RODENTICIDES IN DEEPWATER RICE

Poche, R.M.; Mian, Y.; Haque, E.; Sultana, P.
U.S. Department of the Interior; Bangladesh Agricultural Research Institute.
1980, 24 p.

Technical Report No. 4

Over one-half of Bangladesh is flooded each year, causing villages to become small, separated islands infested by rodents driven from the flooded fields. The rodents are a terrible problem for the production of deepwater rice, a major crop in Bangladesh's delta regions, as they raid the crop for food and nest materials. This report was based on a study that identified the rodent species that damage deepwater rice and compared the efficacy of four rodenticides used for their control. The study was conducted in five villages typical of deepwater rice areas of Bangladesh. The major rodent problem species were the black rat (*Rattus rattus*),

lesser bandicoot rat (*Bandicota bengalensis*), and bandicoot rat (*Bandicota indica*). The rodenticides used in the study include 1% benzenesulfonic hydrazide (DRC-4575), 0.005% difenacoum (DF), 2% zinc phosphide (ZP), and 0.005% brodifacoum (BR). The rodenticides were baited in wooden boxes that were monitored weekly, and an average of 10 boxes were placed on each island. Baits were placed in separate dwellings (to be moved every 3 days) and along the islands' peripheries. Bait was dispensed at stations in amounts of 100 gm (DRC-4575 and DF) and 200 gm (ZP and BR). Dyes were added to the rodenticides to verify the cause of death. Within 2 weeks, islands treated with DRC-4575 and DF experienced a rodent population decline to near zero; islands using ZP and BR realized a slower population decline, due to their larger size and the limited number of baits. DRC-4575 reduced rodent population by 90.1%; DF by 94.1%; BR by 90%; and ZP by 87%. DRC-4575 was noted for its quick effect, which may inspire greater local support for pest control efforts, and its high toxicity to rodents while not harming birds. DF's further examination is recommended. BR is very effective against anticoagulant-resistant rats. Black rats shied from ZP, which has good potential but requires more research for good bait formulation before any large scale usage. ZP may be sufficient for field-oriented campaigns. However, the effective control of Bangladesh's field and storage pests, while concurrently addressing public health problems, requires a broad spectrum rodenticide compound.

PA/ID/BNG-0003-78

138 PN-AAH-730

KNAPSACK SPRAYERS

Fraser, F.; Burrill, L.C.
Oregon State University, International Plant Protection Center.
1979, 31 p.

Knapsack sprayers (KNSP's), which have long been standard equipment for applying pesticides in developing countries, are now being introduced into developed areas as a low-cost alternative to larger mechanical sprayers for general use on small farms, for spot treatment on larger farms, and for spraying areas inaccessible to larger equipment. This report assesses the factors to be considered in determining which sprayer is best suited for any particular task. These factors are the sprayer's size, availability, cost, and the user's personal preference. The authors begin by contrasting KNSP's with hand-held sprayers. The latter come in different sizes and shapes, but all employ internal or external compression pumps. The spray is discharged onto the target for a short time before the pressure drops, requiring the user to pump it up again. Hand-held sprayers are better suited for use in home gardens. The typical KNSP, on the other hand, requires continuous hand pumping, since it is not prepressurized. KNSP's handle more liquid with greater user comfort and freedom of movement than hand-held sprayers and are used for bigger jobs. They can differ widely, however, in ease of pumping. KNSP's have a carrying capacity of 8–20 liters and can be made of stainless or galvanized steel, brass, or plastic. KNSP's must be properly cleaned and their chemical–water mixtures agitated for effective usage. Spray nozzles regulate the flow of liquids, atomize them into droplets, disperse the droplets in specified patterns, and provide hydraulic momentum. Nozzles used for manual sprayers include the flat spray type to produce an elliptical pattern, the flood type for wider angle and lower pressure spraying, and the hollow cone for high pressure and insecticide usage. A table of various spray angles and distances is provided to evaluate the nozzle's theoretical coverage and its proper spacing. Booms are spray extenders that carry several nozzles to ensure thorough area coverage. The report describes the components of various boom types and the proper way to assemble them. Also listed are instructions for sprayer calibration and for proper pesticide storage, disposal, and application.

AID/ta-C-1295 931046300

139 PN-AAH-823

DIPHACINONE RESIDUE FROM WHOLE BODIES OF VAMPIRE BATS: A LABORATORY STUDY

Burns, R.J.; Bullard, R.W.
Denver Wildlife Research Center.
1979, 5 p.

Bulletin of the Pan American Health Organization, Vol. 13, No. 4, p. 365–369

Rabies transmitted by the bite of the vampire bat, *Desmodus rotundus*, destroy approximately 1 million head of livestock per year in the Americas. A recently developed vampire bat eradication method is to capture some vampire bats, paint their backs with a paste containing the anticoagulant diphacinone (2-diphenylacetyl-1,3-indandione), and release them to contaminate other bats that groom them in their roosts. Because this method has met with consistent success when utilized — a 90–95% reduction of bites on livestock — the method is being proposed for wide usage throughout the affected regions. The possible effects, however, on nontarget species by diphacinone residues remaining in the corpses of bats intoxicated by diphacinone have not been widely investigated. This article describes one such study. Ten male and 10 female vampire bats from a laboratory colony were placed in a plywood cage, and fed *ad libitum* on defibrinated cattle blood. At least three weeks later, four bats were removed from the cage, coated with 1.5 ml of a commercial vampiricide containing 15.0 mg of diphacinone per ml, and returned to the cage to mix with the 16 untreated bats. A total of 90.0 mg of the diphacinone was introduced into the colony, a level and treatment ratio suggested for field use. Gas chromatography testing for diphacinone residue was performed according to established procedures using whole bat corpses. Untreated bats from a control colony showed no diphacinone residues. Treated and exposed bats showed great variations both in residue levels and dates of death and 90% showed external signs of anticoagulant poisoning. However, the bats surviving longest were found to have lower residue levels. The total amount of diphacinone recovered from all the bats was 1.17% of the 90 mg originally introduced (about 0.053 mg per bat). This low recovery rate was presumably related to rapid metabolism of the chemical and loss of the chemical on the cage structure and suggests that the eradication method described

poses little danger to nontarget species. Because of possible roost contamination, however, this method should be applied only by adequately trained personnel. A 9-item reference list (1966–76) is provided.

PA/RA(ID)-01-67 RES

140 **PN-AAH-824**

ACUTE TOXICANT IDENTIFICATION IN WHOLE BODIES AND BAITS WITHOUT CHEMICAL ANALYSIS

Johns, B.E.; Thompson, R.D.
Denver Wildlife Research Center.
1979, 13 p.

American Society for Testing and Materials, Special Technical Publication 693, p. 80-91

The identification of toxicants in baits and in animals' digestive tracts is a valuable tool for detecting poisons hazardous when ingested by wildlife and domestic animals and for developing more effective rodenticides. The research results presented in this report contribute toward finding a rapid and inexpensive method for toxicant identification without using traditional chemical analyses. A system was tested whereby color-coded plastic particles suited for use in bait formulation and subsequent retrieval from digestive tracts, and comprised of layers of fluorescent and ferromagnetic material, were combined with toxicants such as zinc phosphide. Comparisons were drawn between control and experimental groups of selected animals to determine their willingness to ingest both nontoxic and toxic bait containing the particles. Tests were also conducted to demonstrate the intactness and location of the coded particles in the animals' digestive tracts after death and to determine a practical recovery method. Results of these tests showed that: (1) the presence of the particles on nontoxic and toxic bait did not deter the rats' consumption; (2) the particles remained intact in the digestive tracts; (3) their location in the digestive tract was consistent for each animal species tested; and (4) the most practical recovery method involved using an ultraviolet light to illumimate the particles suspended in a fecal solution and removing the particles with a rod magnet. The report concludes by noting that, while additional work is needed to determine the percent of marker to be used in baits, the identification system sketched above should be included in the manufacture of toxic baits, and if possible, a rapid code identification system should be established at poison control centers. Appended are summaries discussing the validity of these research results, the pro's and con's of standardizing these testing methods, the difficulties of accurately simulating natural environments and choosing test species which represent endangered animals, and a 13-reference bibliography (1946–76).

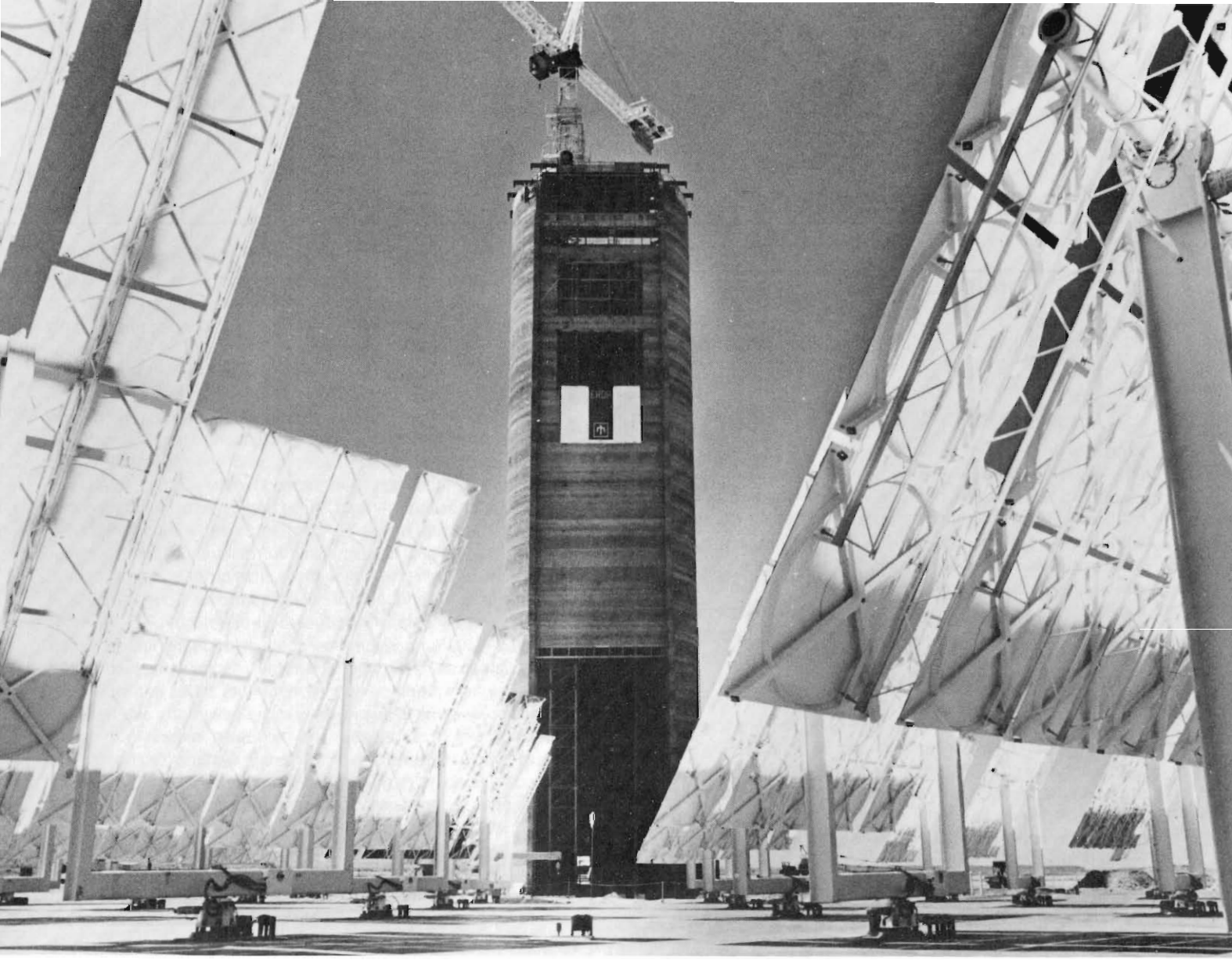
PA/RA(ID)-01-67 RES

141 **PN-AAH-746**

SOLAR ENERGY DOMESTIC POLICY REVIEW, INTERNATIONAL PANEL REVIEW OF EXISTING FEDERAL PROGRAMS

A.I.D., Bureau for Development Support, Office of Energy.
1978, 106 p.

Due to their increasing importance to U.S. foreign policy, international solar development activities have been funded at $25–30 million for FY 1978, 67% of which is for A.I.D. programs. This international panel report reviews recent international solar activities of U.S. agencies, especially those of A.I.D., the Department of Energy (DOE), Department of Commerce (DOC), and the International Energy Department Program (IEDP), as well as the major legislative authorities for them. A.I.D.'s integrated approach, which emphasizes cooperative programs with developing countries having decentralized renewable energy resources, focuses on solar technology development and demonstrations and requires that solar development depend ultimately on the countries themselves. DOE solar activities with other industrial countries have technically benefitted the U.S. domestic solar program. DOE, however, has not adequately stressed the expanded global use of solar technologies. DOE international cooperative solar R&D activities are not centrally administered; each project is managed by its related solar program office, limiting DOE's ability to implement overall strategies. The IEDP pilot program promotes developing country formulation of a comprehensive framework for national energy policy and strategy analysis. IEDP has drafted a country energy assessment for Egypt and has collected data for another in Peru. The assessments examine solar energy within the context of national energy resources and options. DOC's international promotion activities are effective but are based on a country's measurable potential for marketing existing technology and U.S. domestic goods. Although the current or potential effectiveness of these programs is difficult to assess due to their recent origin, rapid adoption of an overall solar development strategy as a component of U.S. international energy policy is recommended. The panel also notes the need for closer cooperation between U.S. agencies, especially in developing country energy assessments; additional resources for DOC and A.I.D.; and an examination of agency/solar activity roles. The report has extensive, detailed appendices, including a list of A.I.D. energy-related projects.



At the U.S. Department of Energy's Thermal Test Facility, solar energy technologies are developed for worldwide application.

142 **PN-AAH-940**

PROCEEDINGS OF THE INTERNATIONAL WORKSHOP ON ENERGY SURVEY METHODOLOGIES FOR DEVELOPING COUNTRIES, JEKYLL ISLAND, GEORGIA, 1980

National Research Council, Board on Science and Technology for International Development.
1980, 226 p.

The inadequacy of current information on escalating LDC energy consumption prompted the National Academy of Sciences to hold an international workshop in January 1980 to review existing surveys of energy consumption and potential demand in LDC's. Proceedings of that workshop are provided in this report. Working group reports on LDC energy needs in urban, rural, transportation, and industrial settings are presented, along with excerpts from 12 energy-related LDC studies and abstracts of 55 studies on energy assessments, energy survey design, and data analysis systems. Two preconditions for an energy survey that serves national and local planning needs were identified: (1) Institutions at both levels must have the capacity to accurately perceive energy problems and identify areas of most urgent concern. (2) The effectiveness of a survey depends on the existence of an institution that can use the results of the survey in policymaking. The workshop concluded that, generally, no survey methods are universally acceptable. Surveys should be designed for local situations and should be carried out in a flexible manner, using appropriate methods of analysis. Whenever possible, those cognizant of local energy issues and the survey's methodology should be employed and mechanical approaches avoided. Since energy decisions are usually a trade-off between energy and other elements, data on related sectors should be gathered, particularly in rural energy surveys. Secondary sources of energy information such as tax records and national census data should also be used. From the above, the following implications were drawn: (1) Survey priorities must be based on national needs determined by the country itself. (2) Technical advice at the design and analysis stages of a survey and financial support for practical training which can be implemented by local survey supervisors are both essential. (3) Centralized channels of exchanging information on data and survey methodologies are required at the international and especially the regional levels. (4) High priority should be given to information gathering and associated analysis. Bibliographies are appnded to the individual articles.

AID/DSAN-G-0190 936570300

143 PN-AAG-670

NEW DIRECTIONS RURAL ROADS

Tendler, J.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 81 p.

A.I.D. Program Evaluation Discussion Paper No. 2

In order to increase the impact of road projects on the rural poor, emphasis has gradually shifted from paved highways to rural roads and from capital-intensive to labor-intensive construction methods. The author of this paper analyzes the benefits of the labor-intensive approach and the options A.I.D. can pursue to encourage its use. Various research findings on the cost-effectiveness and employment-generating potential of labor-based construction are reported. Several reasons are given for the continued preference of host countries and contractors for capital-intensive designs despite these findings. One simple reason is that both donors and developing country governments are more accustomed to working with equipment than with labor management. In fact, donor requirements for financing tend to encourage adoption of the capital-intensive mode. However, rural road construction, which is increasingly frequent, is more conducive to the labor-based mode than are highway or paved road projects. Since most central government highway departments lack the capabilities needed to manage labor-intensive rural road projects and have maintained a high priority on arterial road construction, A.I.D. should resist pressure to invest in the latter, investigate possibilities for complementary rural road construction, and remove management of such projects from national highway departments. Site selection criteria are discussed and recommendations are made to facilitate the adoption of labor-based construction. By refraining from subsidizing equipment costs and by seeking more acceptable environments, A.I.D. will lessen the relative costs of such techniques. It is emphasized that decentralized management can increase the political appeal of such projects and improve the chronic problem of maintenance, particularly use of the "no-maintenance model" (paving roads before the volume of traffic warrants the investment). Finally, to improve A.I.D.'s rural road policy, it is recommended that a country's road system be examined in its entirety rather than project by project and that community-based construction, including participation in road financing, be encouraged.A 94-item bibliography (1966–78) is attached.

930008500

144 PN-AAH-750

IMPACT OF RURAL ROADS IN LIBERIA

Cobb, R.; Hunt, R.; Vandervoort, C.; Bledsoe, C.; McClusky, R.
U.S. Agency for International Development.
1980, 49 p.

A.I.D. Project Impact Evaluation Report No. 6

Since the construction in Liberia of four all-weather rural roads, some villagers of the Lofa, Nimba, and Grand Jide counties enjoy increased accessibility to markets, schools, and health clinics. Because these projects have apparently succeeded in providing such services, other villagers are now clamoring for similar assistance. First, however, it is necessary to assess who the actual beneficiaries were and how they benefited. A five-person evaluation team found that substantial implementation and road design difficulties were encountered in construction of the four roads by local contractors under the supervision of the Ministry of Public Works; and that the roads were economically justified in terms of the volume of passenger and cargo traffic. It was also found that the roads have had a mixed impact. Improved transportation has bettered educational opportunities for children of tribal communities, stimulated the cultivation of the cash crops of coffee, cocoa, and rubber; and reduced not only produce loss due to spoilage but also cargo costs of agricultural products by 90% in more isolated areas. Perhaps the most serious, long-term impact which negates these short-term benefits is the change in the land tenure and use system. Land belonging to farmers' tribes has increased in market value due to its proximity to the new roads and hence is sought by wealthy Liberians. Their renewed interest in this land impinges upon the traditional land tenure system, forcing farmers to relocate to areas removed from the benefits the roads provide. The net effect is the loss of a fundamental component of economic security and social stability. If people are to take full advantage of the access the roads offer, questions of resource and benefit distribution need to be addressed. Other negative impacts were identified. Roads have induced expanded lumbering activity and altered cropping practices — both of which threaten the environment. Vehicle repair costs have risen sharply due to the damage vehicles suffer from poorly maintained roads. Appendices discuss the evaluation's methodology; project design, implementation, maintenance and feasibility issues; and the impact of Liberia's coup d'etat on rural development.

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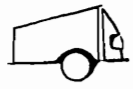
145 PN-AAH-751

EFFECTIVENESS AND IMPACT OF THE CARE/SIERRA LEONE RURAL PENETRATION ROADS PROJECTS

Anderson, G.W.
U.S. Agency for International Development.
1980, 111 p.

A.I.D. Project Impact Evaluation Report No. 7

After years of dependence on declining mineral exports, the Government of Sierra Leone (GOSL) recently shifted its focus to agricultural development. The feeder roads projects reviewed in this report were intended to complement that shift. Overall, the Cooperative for American Relief Everywhere (CARE), which is implementing these projects, has performed well, successfully coping with funding delays and other difficulties. CARE has also displayed considerable innovation in several instances — using Peace Corps and other volunteer engineers, involving local chiefs



and villagers in construction and maintenance, and helping the GOSL to improve its road selection process. Whether the Ministry of Works will provide continued maintenance is a major question. Project benefits have included more frequent visits by extension agents, increased stops by light vans providing local transportation, increased ownership of motorcycles and bicycles, and greater access to health care. Fertilizer use and marketing of greater varieties and quantities of crops are also more prevalent. According to some reports, commercial activity (new rural markets, bank lending, new rice mills) has been stimulated. On the negative side, indications are that CARE roads may have precipitated shorter fallow periods for upland rice cultivation, greater rice scarcity, and increased swamp rice cultivation. These factors suggest that food crops are being replaced with cash crops such as cocoa, coffee, and oil palm — and are thus associated with reduced soil fertility, erosion, deforestation, and increased exposure to waterborne diseases. During project implementation, there was a shift from labor-based to equipment-based road construction. Unfortunately, A.I.D. and CARE did little to document this shift. The author recommends that in future projects A.I.D.: (1) determine whether the agricultural development strategy supported by the road project will benefit the poor; (2) obtain a commitment from the host government regarding road maintenance; (3) carry out baseline and impact surveys of new and old roads; and (4) provide incentives to A.I.D. personnel to carry out impact evaluations. A more detailed version of this report is appended.

636010100; 636011100; 636012600

146 **PN-AAH-768**

COLOMBIA: SMALL FARMER MARKET ACCESS

van Raalte, G.R.; Singer, S.; Severn, B.; Colon, J.C.
U.S. Agency for International Development.
1979, 15 p.

A.I.D. Project Impact Evaluation Report No. 1

Can labor-intensive (pick and shovel) construction of market access roads in the mountainous regions of Colombia result in significant improvements in the welfare of local campesinos? This document assesses the impact of one such effort — A.I.D.'s Small Farmer Market Access Project. Some 900 km of all-weather, unpaved access roads were planned to link isolated mountain communities with the nearest market road in order to stimulate agricultural production and trade and to open these communities to agricultural extension, health, and educational services. Construction was directed by the host government agency Caminos Vecinales, but as most of the work was performed by the intended beneficiaries, 60–65% of road construction costs were paid as wages to local campesinos. Substantial underestimates of the cost of construction will cause the final total of 59 roads averaging 8 km in length to fall well short of the projected total. Impacts of road construction and road use are discussed in detail. Marginal farmers, the landless, and the unemployed provided the main labor source, using the income gained to make improvements on house and farm, for fertilizer and improved seed, and for purchase of consumer goods. The resulting switch from animal to motorized transportation sharply reduced transport costs, leading to increased agricultural production without changes in policy or agricultural extension services. Wages in the areas near the roads have also increased, as the landless now have alternative employment opportunities. The anticipated increase in government services such as health and education has yet to take place, however. The evaluators raised long-term questions concerning the inadequacy of maintenance funds, the need to guard against erosion and siltation of rivers, and the lack of political support for replication of the project. In conclusion, the project was found to offer a replicable model for labor-intensive construction of rural roads under specific conditions. Attached to the report are various annexes regarding evaluation methodology, development strategies, alternative construction methods,and environmental considerations.

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147 **PN-AAH-970**

RURAL ROADS IN THAILAND

Moore, F.J.; Alton, C.T.; Lefferts, H.L.; Soonthornpasusch, S.; Suttor, R.E.
U.S. Agency for International Development.
1980, 51 p.

A.I.D. Project Impact Evaluation Report No. 13

Nearly 30 million people in the formerly isolated villages of North and Northeast Thailand have benefited from the 8,000 miles of roads built between 1964 and 1974 under the Accelerated Rural Development (ARD) Project. This report focuses on the impact of ARD on Thais who experienced for the first time a wide range of opportunities within and away from their home community. ARD's institutional objective was to increase the capability of provincial governments to respond to rural needs by delegating to local governors the responsibilities of planning, designing, building, and maintaining rural roads, water facilities, and other public works. Although the degree of decentralization sought by A.I.D. has not been sustained, the existing ARD system does encourage local initiative. The roads have generally impacted favorably on those in formerly isolated areas. Continued education beyond the primary grades has been introduced to rural people, along with educational programs in health care and nutrition; and there have been increases in job opportunities both within and away from villages and in access to food, agricultural credit, inputs, and technical assistance. The land under cultivation and the intensity of land use increased dramatically wherever roads provided access to markets. Availability of water and better transportation increased rice production and encouraged crop diversification, especially of corn, soybeans, and peanuts in the North and of cassava and kenaf in the Northeast. The most serious negative impact of the roads has been rapid deforestation and soil erosion due to increased demands, stemming from population and income growth, for food and agricultural products. Also, the social benefits of roads have been somewhat offset by a spread of

various epidemic and contagious diseases in areas from which it had previously disappeared. ARD has created a strong national institutional capacity to sustain the rural development effort, with most of the AID-funded equipment still in use in the project's original 31 provinces. Future ARD activities — which will focus on maintaining existing roads — will be constrained mainly by budget limitations. Appendices include a 17-item bibliography (1966–80).

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148 **PN-AAH-971**

HONDURAS RURAL ROADS: OLD DIRECTIONS AND NEW

Hamilton, J.; Chapin, N.; DeMetre, M.; Fletcher, L.
U.S. Agency for International Development.
1981, 41 p.

A.I.D. Project Impact Evaluation Report No. 17

Honduras has the lowest ratio of roads to area and population in all of Central America. To assist Honduran road construction, A.I.D. developed two roads approaches differing in inputs and impacts. In 1965, A.I.D. approved a project to build feeder roads in areas isolated from marketplaces on the "trickle-down" theory that the roads would benefit rich and poor alike, lead to cash crop production, and reduce subsistence farming and cattle ranching. The project called for road construction with no complementary credit, extension, or marketing services. Case studies of two of the feeder roads showed that the roads stimulated the cultivation of additional land, the production of cash crops, and also improved local access to medical and educational services. Project benefits varied, however, depending on external factors. In one case, sugar cane production increased due to a sugar mill built after road completion, while in the other, an agrarian reform program initiated by the National Agrarian Institute promoted production of palm oil and citrus by small farmer cooperatives. In 1974, A.I.D. approved a project to assist agrarian reform by providing credit and technical assistance to model rural cooperatives and by constructing roads to connect cooperative fields to all-weather highways. Project delays prevented the planned use of local construction crews, education regarding the roads' benefits, and the establishment of an ongoing local road maintenance unit. These roads encouraged cash cropping, the availability of credit and extension services, and the cooperatives' development of schools. The evaluation team concluded the following: roads are needed for development, but do not guarantee it; corollary policies affect the roads' distribution of socioeconomic benefits; access roads are more consistent with A.I.D.'s new policy than are feeder roads, since the former allows specific selection of beneficiaries; and, a road's long-term impact makes it difficult to render a final project assessment. Appended are descriptions of evaluation methodology, a technical analysis of the roads, and an aerial study of the first project's impact in one area.

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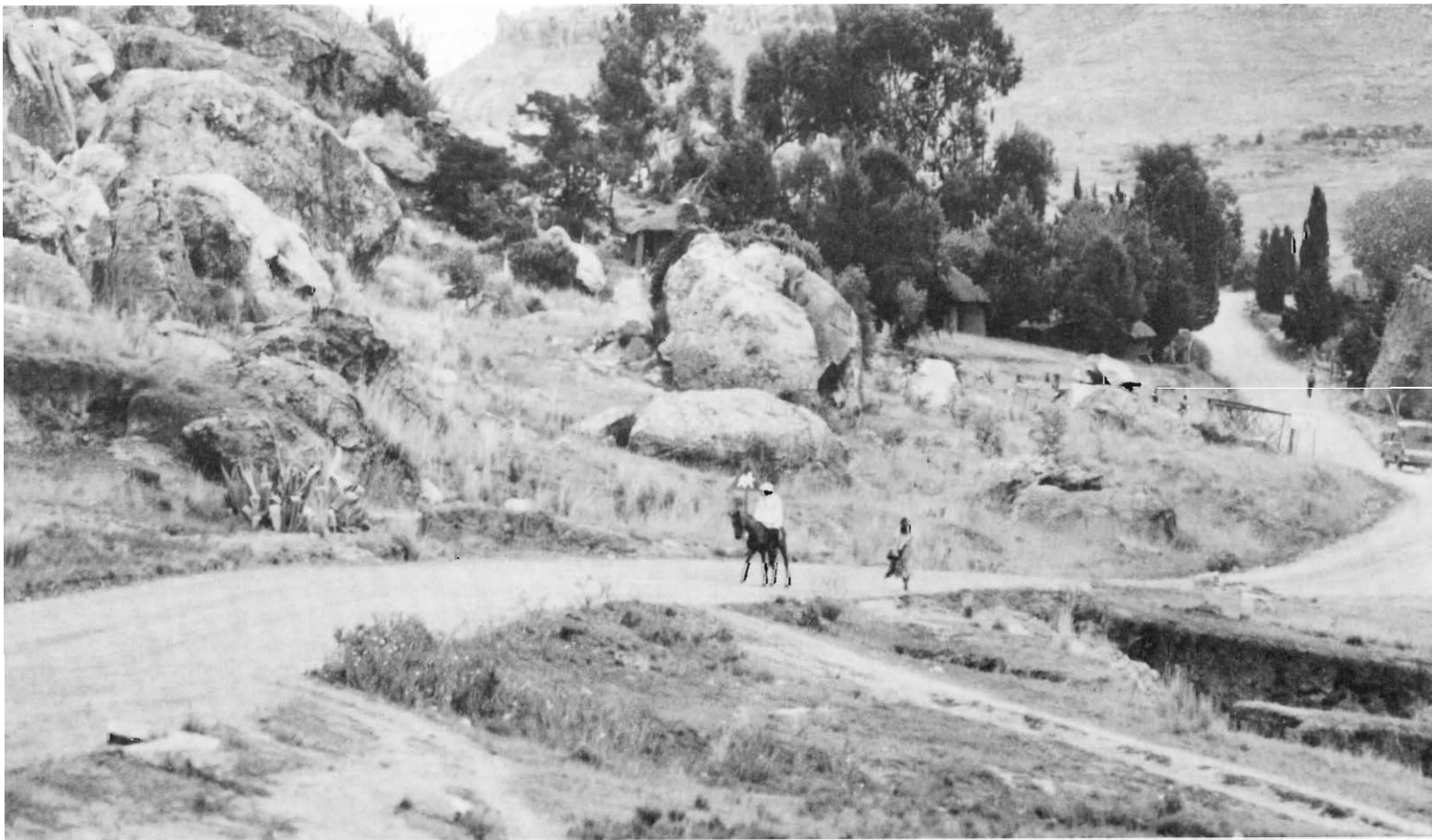
To facilitate agricultural production and food transport in landlocked Lesotho, A.I.D. financed construction of a $31 million perimeter road.



149 PN-AAJ-135

SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF LOW VOLUME RURAL ROADS

Devres, Inc.; A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 173 p.

A.I.D. Program Evaluation Discussion Paper No. 7

The focus of current development investments in transportation has shifted from highways and railroads to low-volume rural roads, but few evaluations of the socioeconomic and environmental impacts of these roads have been conducted. This study reviews the available evaluative literature and presents issues to be considered in designing future rural road projects. Emphasis is placed on the broad social impact of rural roads and the diffusion of benefits to the rural poor. Impact areas in which roads are a significant factor are identified, e.g., agricultural production, employment, health, and education. Examples are offered of the potential benefits and problems of road construction in each impact category and questions are proposed for use in future evaluations. Roads must be location-specific in design if maximum benefits are to be derived, since roads are only one aspect of a region's development process. Roads almost invariably facilitate agricultural production and permit changes in crop composition (in response to increased market access), although it is usually the larger, wealthier farmers who benefit most. Roads also expand the use of technology by wealthier farmers, aggravating regional income disparities. Increased government extension services and cooperatives also tend to benefit the wealthier farmers. Increased availability of raw materials and markets encourages agribusiness and other commercial enterprises, but tends to discourage cottage industries. Road construction increases short- and long-term employment and land values and intensifies land use, while lower transport costs encourage a greater flow of consumer goods and travel. New roads also increase access to health, nutrition, and education services. Road development commonly causes local environmental problems such as deforestation, erosion, and decrease in soil fertility. The effects on national integration, community development, women, and minorities are too complex and regionally influenced to be generalized. Finally, criteria for designing projects in furtherance of social, environmental, and economic goals are suggested. Attached are a 170-item bibliography (1950–79) and lists of sources consulted.

930008500

150 PN-AAJ-199

JAMAICAN FEEDER ROADS: AN EVALUATION

Berg, R.J.; Gardner, C.; Horowitz, M.M.; Stearns, P.; Vandervoort, C.
U.S. Agency for International Development.
1980, 102 p.

A.I.D. Project Impact Evaluation Report No. 11

Although it upgraded a total of 181 miles of rural roads between 1972 and 1976, the Jamaican feeder roads project failed to have any demonstrably significant benefits. This report investigates the causes of that failure by examining the logic, appropriateness, and achievement of the project's goals. It was planned that road improvement would generate rural employment and help to stabilize the political climate. Furthermore, the roads were to facilitate market access, thereby stimulating increased agricultural production and income for small farmers. However, A.I.D. made a fundamentally illogical decision in relying on a feeder roads project as means to these goals. The projected labor-based construction mode was never actively pursued either by contractors or by the implementing agency and no significant employment was generated. Even had rural employment increased, the authors show that each step in the planned chain of events — decrease in migration and urban crime, increase in tourism, and political stabilization — was only loosely linked to the preceding condition, making their achievement highly unlikely. From the developmental perspective, the project neither lowered transport costs nor increased land under cultivation, once again because of a flawed program logic. The project also had limited (even adverse) social, environmental, and institutional effects. It demonstrated the inadvisability of relying on central departments to implement labor-based construction and the need to consider rural roads projects as a part of integrated rural development, not as isolated infrastructure. The authors conclude that the haste brought about by the project's high political priority ultimately caused its failure. A more methodical design and review process would have revealed the ineffectiveness of the rural roads approach and its propensity for failure. These conclusions are particularly important since politically-oriented foreign assistance from any source could encourage repetition of similar difficulties. Detailed project strategies and economic, social, environmental, institutional, and engineering analyses are attached.

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   Agency for International Development
   Washington, D.C. 20523

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AUTHOR INDEX

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GEOGRAPHICAL INDEX

CONTRACT/GRANT INDEX

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001	PN-AAH-351	7.41	1.08
002	PN-AAH-492	24.31	2.16
003	PN-AAH-529	49.01	4.32
004	PN-AAH-723	8.06	1.08
005	PN-AAH-858	2.21	1.08
006	PN-AAH-859	1.95	1.08
007	PN-AAH-922	4.55	1.08
008	PN-AAH-977	14.43	2.16
009	PN-AAJ-140	18.46	2.16
B. Irrigation and Water Management			
010	PN-AAG-691	7.02	1.08
011	PN-AAG-841	37.05	3.24
012	PN-AAH-575	2.99	1.08
013	PN-AAH-668	17.42	2.16
014	PN-AAH-724	5.85	1.08
015	PN-AAH-749	8.58	1.08
016	PN-AAH-936	12.74	1.08
017	PN-AAH-968	4.55	1.08
018	PN-AAH-974	4.03	1.08
019	PN-AAH-975	11.57	1.08
020	PN-AAJ-208	10.66	1.08
C. Livestock Production and Range Management			
021	PN-AAG-922	14.95	2.16
022	PN-AAH-238	11.18	1.08
D. Plant Diseases and Parasites			
023	PN-AAH-721	0.39	1.08
024	PN-AAH-722	23.92	2.16
025	PN-AAH-743	6.89	1.08
026	PN-AAJ-094	18.85	2.16
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027	PN-AAH-602	18.85	2.16
028	PN-AAH-640	3.51	1.08
029	PN-AAH-822	1.17	1.08
030	PN-AAH-825	0.78	1.08
031	PN-AAH-826	0.65	1.08
032	PN-AAH-870	24.05	2.16
033	PN-AAH-931	4.42	1.08
034	PN-AAH-937	13.26	2.16
035	PN-AAH-951	19.11	2.16
036	PN-AAH-969	5.46	1.08
037	PN-AAJ-141	40.95	4.32
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038	PN-AAH-909	2.34	1.08
039	PN-AAH-933	21.19	2.16
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041	PN-AAH-244	3.77	1.08
042	PN-AAH-417	39.52	4.32
043	PN-AAH-434	13.00	2.16
044	PN-AAH-533	16.77	2.16
045	PN-AAH-642	20.15	2.16
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047	PN-AAH-868	13.39	2.16
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049	PN-AAH-725	14.04	2.16
050	PN-AAH-982	11.44	1.08
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051	PN-AAG-671	10.92	1.08
052	PN-AAH-976	12.35	1.08
053	PN-AAH-978	7.28	1.08
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054	PN-AAG-795	3.38	1.08
055	PN-AAH-103	3.64	1.08
056	PN-AAH-330	4.81	1.08
057	PN-AAH-371	25.22	2.16
058	PN-AAH-742	3.38	1.08
059	PN-AAH-871	3.90	1.08
060	PN-AAH-920	4.29	1.08
061	PN-AAH-921	6.76	1.08
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062	PN-AAH-747	38.09	3.24
063	PN-AAH-923	3.25	1.08
B. Country Specific Environmental Reports			
064	PN-AAG-972	12.22	1.08
065	PN-AAG-973	10.79	1.08
066	PN-AAG-974	17.81	2.16
067	PN-AAG-975	7.93	1.08
068	PN-AAG-977	5.59	1.08
069	PN-AAG-978	6.89	1.08
070	PN-AAG-979	13.39	2.16
071	PN-AAG-980	9.10	1.08
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073	PN-AAG-982	9.88	1.08
074	PN-AAH-752	22.75	2.16
075	PN-AAH-753	10.01	1.08
076	PN-AAH-754	13.65	2.16
077	PN-AAH-874	12.61	1.08
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080	PN-AAH-877	15.08	2.16
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083	PN-AAJ-201	7.41	1.08
084	PN-AAJ-202	9.88	1.08
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089	PN-AAJ-272	23.27	2.16
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094	PN-AAH-452	35.36	3.24
095	PN-AAH-464	19.89	2.16
096	PN-AAH-466	9.75	1.08
097	PN-AAH-678	8.32	1.08
098	PN-AAH-748	6.89	1.08
099	PN-AAH-919	25.48	2.16
100	PN-AAH-942	40.17	4.32
101	PN-AAH-980	12.61	1.08
102	PN-AAJ-019	5.33	1.08
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106	PN-AAH-850	12.48	1.08
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108	PN-AAH-964	8.32	1.08
109	PN-AAJ-008	11.83	1.08
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111	PN-AAH-149	16.25	2.16
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113	PN-AAH-929	5.72	1.08
114	PN-AAJ-007	6.37	1.08
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115	PN-AAG-792	28.47	3.24
116	PN-AAH-242	19.50	2.16
117	PN-AAH-528	49.53	4.32
118	PN-AAH-576	9.49	1.08
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120	PN-AAH-851	8.19	1.08

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123	PN-AAH-326	3.38	1.08
124	PN-AAH-327	6.76	1.08
125	PN-AAH-950	6.76	1.08
126	PN-AAH-954	11.70	1.08
127	PN-AAJ-144	2.73	1.08
128	PN-AAJ-146	2.21	1.08

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129	PN-AAG-672	3.64	1.08
130	PN-AAH-321	4.03	1.08
131	PN-AAH-325	4.42	1.08
132	PN-AAH-425	11.05	1.08
133	PN-AAH-577	16.77	2.16
134	PN-AAJ-314	15.08	2.16

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135	PN-AAG-825	5.72	1.08
136	PN-AAH-435	16.90	2.16
137	PN-AAH-712	3.12	1.08
138	PN-AAH-730	4.03	1.08
139	PN-AAH-823	0.65	1.08
140	PN-AAH-824	1.69	1.08

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141	PN-AAH-746	13.78	2.16
142	PN-AAH-940	29.38	3.24

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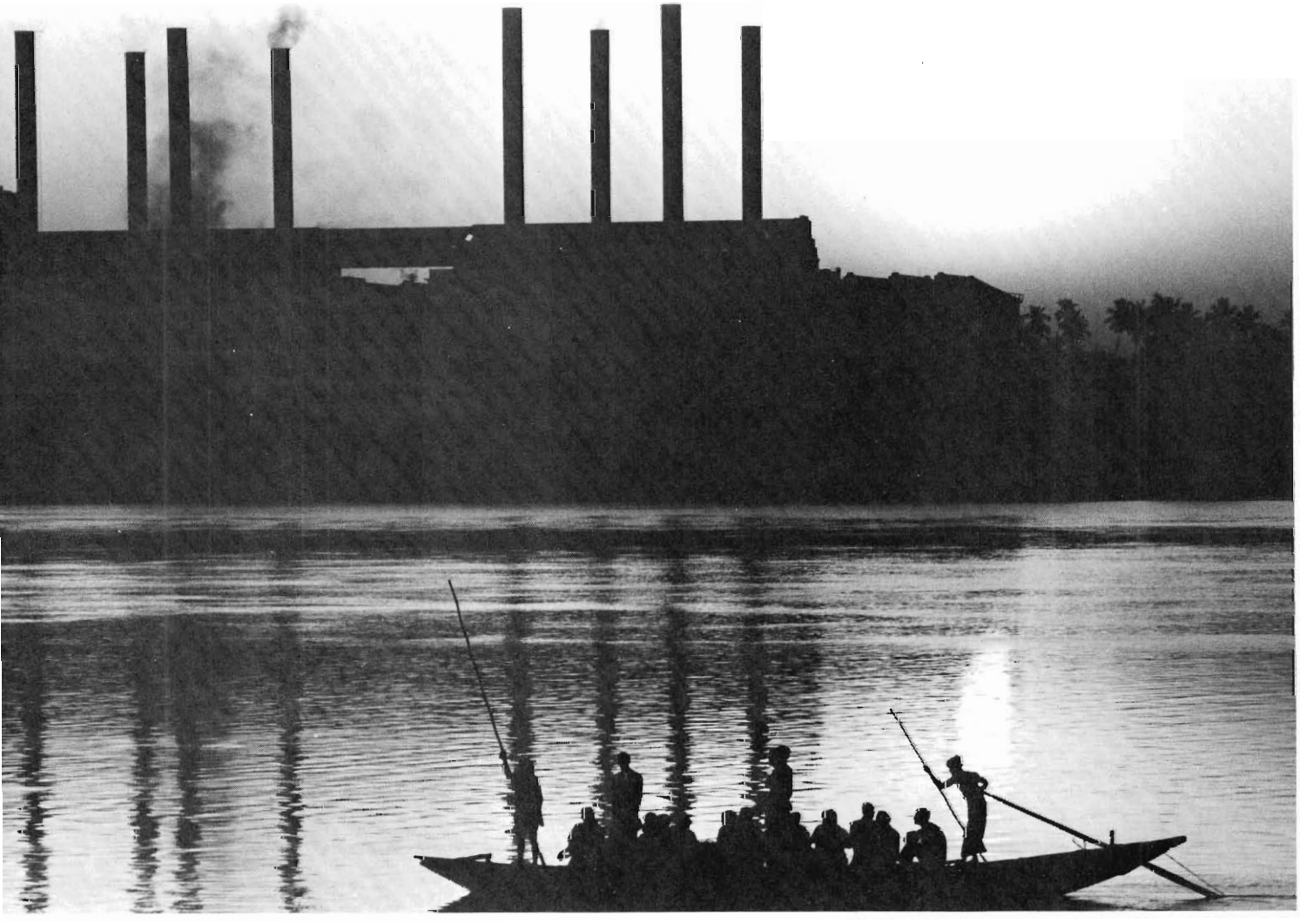
144	PN-AAH-750	6.37	1.08
145	PN-AAH-751	14.43	2.16
146	PN-AAH-768	5.98	1.08
147	PN-AAH-970	6.63	1.08
148	PN-AAH-971	7.28	1.08
149	PN-AAJ-135	23.79	2.16
150	PN-AAJ-199	13.26	2.16

(continued from inside front cover)
and energy, strategies for expanding the use of traditional fuels, and summaries of A.I.D.'s environmental policies and programs. Especially interesting is item number 104, which provides a detailed and practical overview of fast-growing shrub and trees species such as *Lucaena leucocephala* which are suitable for fuelwood plantations.

Environmental degradation is a reality and a growing threat, especially in developing countries, where diminishing natural resources are being consumed by increasing numbers of people. Development planners are thus confronted with an urgent challenge to find practical ways to reverse this downward spiral. It is the hope of the publishers of ARDA that the informational resources on the environment found in the pages of this and subsequent issues may assist planners to meet that challenge.

Abstracts describing the draft environmental reports and forestry studies are located under the following item numbers:

Country Specific Environmental Reports 064-089
Forest Resources Reports 062, 063, 090-104



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