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FROM THE EDITOR

Water: A Development Prerequisite

Water is indispensable to life. An adequate and reliable supply of safe water is vital to maintaining health and hygiene and to increasing the production of basic food crops and livestock. Because of its pervasive impact on human existence, water can enhance—or the lack of it retard—development in all sectors.

Yet, according to the World Health Organization (WHO), approximately 1.3 billion people, or 71% of the developing world's rural population and 25% of its urban population, lacked reasonable access to a safe water supply in 1980. WHO also estimates that 1.4 billion rural dwellers (87% of the developing world's rural populace) and 331 million urban dwellers (47% of its urban populace) were without adequate waste disposal facilities in 1980.

The outlook for the future is grimmer yet. Rapid population increases worldwide are putting mounting pressure on scarce water resources and inadequate waste disposal systems. The World Bank has projected that by 1990 more than 2 billion people will need additional provisions for safe water and safe disposal of excreta.

The human costs behind these figures are appalling. WHO calculates that 80% of all illness in developing countries can be traced to either bad water—which infects people directly or serves as a breeding ground for disease and the insects that transmit them—or to a shortage of water—which leads to poor personal hygiene and household sanitation. Typhoid and cholera occur in conjunction with contaminated water. Water-breeding insects carry malaria, filiarasis, yellow fever, and sleeping sickness, affecting huge numbers of people. It is commonly said that at any given time, an estimated 400 million people are affected by gastroenteritis and more than 200 million suffer from schistosomiasis—both water-related diseases.

Children are the most vulnerable. The majority of children who die in developing countries fall victim to a combination of malnutrition and infectious disease. The disease most often involved is diarrhea, which results from inadequate water supply and sanitation. WHO estimates that each year diarrhea kills 6 million children and contributes to the death of 18 million others.

The International Drinking Water Supply and Sanitation Decade

It was with these stark realities in mind that the U.N. General Assembly in November 1980 inaugurated the International Drinking Water Supply and Sanitation Decade and set 1990 as the target date for providing all of the world's peoples with safe drinking water and improved sanitation. The United States and eighty other nations have announced participation in the Decade.

The U.S. Agency for International Development (A.I.D.) has long played a leading role in providing developing countries with improved systems for delivering water for human consumption and for food production and in transfering the technology and skills needed to design and operate such systems. A.I.D. efforts have yielded significant benefits to public health and to agricultural production. Just as importantly, they have increased awareness in developing countries of the vital role which water plays in development.

Water and Health

As a starting point in understanding the interrelationship between water supply and health, this issue of *ARDA* offers a series of documents produced under A.I.D.'s National Demonstration Water Project. Included in the *Water for the World* series are a program guide (item 269), three executive summaries relating to the design and implementation of water supply and sanitation programs, and 160 short technical notes. (For further information on this series, see *Items of Special Interest* on page *ii* of this issue.)

Since most water supply and sanitation activities operate within the context of communities, this issue also includes a two-volume review of community water supply activities and accomplishments undertaken in Latin America, Africa, and the Middle and Far East by A.I.D. and its predecessor agencies (item 343). Another report (item 342) presents the proceedings and recommendations of a 1982 conference sponsored by A.I.D. to discuss detailed evaluations of 15 of its rural water supply projects.

Proceedings of another AID-sponsored conference (item 341), hosted by the Pan American Health Organization, examine the relationships among various diseases and poor sanitation, water quality, and water availability and discuss ways of integrating water supply and sanitation assistance with primary health care. The need for community participation in the design and maintenance of water supply and sanitation systems was stressed, as was the need for a much larger cadre of developmentalists trained in water supply and sanitation. Regarding the latter point are two reports: the first presents the proceedings of a training of trainers workshop for personnel charged with promoting the A.I.D. handpump in developing countries (item 339); the second describes the training of Peace Corps Volunteers working on a UNICEF potable water project in rural Morocco (item 262).

Other reports addressing the health impact of safe water supplies include a state-of-the-art bibliography on primary health care which includes numerous citations on water supply and sanitation (item 268); an indepth impact evaluation of a 1972-1981 A.I.D. project in Panama which helped provide 562 piped water systems and 2,400 handpumps to small villages (item 340); and a feasibility study on the use of solar gradient ponds to desalinate seawater in order to provide potable water in Cape Verde (item 339).

Water and Economic Activity

In addition to health, the International Drinking Water Supply and Sanitation Decade addresses other water-related development issues. Many health-related aspects of water have implicit economic costs (e.g., the hours women spend collecting

(Continued on inside back cover)

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ITEMS OF SPECIAL INTEREST

In keeping with the theme of this issue of *ARDA*—the importance of water to the development process—A.I.D. wishes to highlight a special series of documents, entitled *Water for the World.* This exhaustive series of reports on water supply and sanitation in the developing world was prepared under contract to A.I.D. by the National Demonstration Water Project. *Water for the World* materials are focused on providing concrete assistance to developing nations in planning and implementing programs and projects in water supply and sanitation. The series consists of the following:

Safe Water and Waste Disposal for Rural Health: *(PN-AAL-871),* an indepth, 232-page report written for people in developing countries who have, or are interested in having, the responsibility for addressing rural water and waste disposal problems through a comprehensive countrywide program.

Three 12-page policy perspectives—an **Executive Summary** of the above-mentioned program guide *(PN-AAL-447);* **Program Planning for the Decade for Water** *(PN-AAL-449)*; and **Program Implementation for the Decade for Water** *(PN-AAL-448).*

A series of 160 **Technical Notes** written for people working in rural villages on water supply and waste disposal projects. Each illustrated Note, ranging from two to sixteen pages, addresses a narrow, technical aspect of such projects. The notes are organized according to the following subjects:

Human Resources—methods, planning, and implementation as they relate to community participation and to operation and maintenance training.

Rural Water Supply—the planning, design, construction, operation, and maintenance of structures used in developing sources of surface and ground water and in treating, delivering, and storing water.

Sanitation—the planning, design, construction, operation, and maintenance of simple excreta and washwater disposal systems, combined washwater and excreta disposal systems, and solid waste management systems.

Disease—the means by which waterborne and water-related diseases are transmitted and the methods by which they are controlled.

For a complete list of all **Technical Notes** and their prices or for more information on the *Water for the World Series* in general, please contact:

Agency for International Development
DIHF/WW
7222 47th Street
Chevy Chase, MD 20815
U.S.A.
Phone (301) 657-9319

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 AID-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.

To whom do I address additional questions regarding *ARDA?*

Please direct all correspondence and requests for further information to:

Editor of *ARDA*
S&T/DIU/DI
Agency for International Development
Washington, D.C. 20523
U.S.A.

QUESTIONS ET REPONSES RELATIVES A ARDA

Qu'est-ce qu'*ARDA?*

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

Quel est l'objectif d'*ARDA?*

Le but d'*ARDA* est de transmettre des informations techniques sur le développement à ceux qui prêtent assistance au développement.

A qui s'adresse *ARDA?*

ARDA s'adresse au personnel d'A.I.D. dans le monde entier et à certaines institutions clés situées dans les pays en voie de développement. Ces institutions comprennent des agences de gouvernement, des universités, des bibliothèques, des organisations de recherche, et d'autres organisations dan les secteurs publics et privés.

Que contiennent les résumés d'*ARDA?*

ARDA présente des résumés des recherches actuelles et moins récentes financées par A.I.D., des rapports sur l'état actuel du développement, des analyses de différents domaines, des évaluations spéciales, et d'autres documents. Le tout ensemble décrivent une vaste étendue d'expériences dans le domaine du développement international.

A qui est-ce qu'il faut poser des questions supplémentaires au sujet d'*ARDA?*

Veuillez envoyer toute correspondance et toute demande de plus amples renseignements à:

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PREGUNTAS Y REPUESTAS SOBRE ARDA

¿Que es *ARDA?*

ARDA, "A.I.D. Research and Development Abstracts" (Resumenes de Investigatión y Desarrollo de la Agencia para el Desarrollo Internacional), es un periódico trimestral de resumenes editado por la Division de Documentación e Información, Oficina de Información sobre el Desarrollo y su Utilización, Departamento de Ciéncia y Tecnología.

¿Cual es el objetivo de *ARDA?*

El objetivo de *ARDA* es comunicar información técnica y sobre el desarrollo a los participantes activos en las actividades del desarrollo.

¿Para quien se publica *ARDA?*

ARDA se dirige al personal mundial de A.I.D. y a las seleccionadas institutiones claves de los paises en desarrollo. Tales institutiones cuentan con agencias de gobierno, universidades, bibliotecas, organizaciones de investigación, y otras organizaciones de los sectores público y privado.

¿Que contienen los informes de *ARDA?*

ARDA presenta resumenes de estudios actuales y menos recientes financiados por A.I.D. relativos a la investigación, de informes sobre el estado del arte, de analisis de sectores, de evaluaciones especiales, y de otros documentos, los que todos juntos describen un panorama extensivo de experiencias dentro del dominio del desarrollo internacional.

¿A quien se dirigen preguntas adicionales sobre *ARDA?*

Sírvase remitir toda la correspondencia y los pedidos de más información a:

Editor of *ARDA*
S&T/DIU/DI
Agency for International Development
Washington, D.C. 20523
U.S.A.

USER'S GUIDE TO *ARDA* CITATIONS

Item number — **101** — Document number — **PN-AAK-592**

Microfiche/Paper Copy prices — **MF $3.24/PC $28.47**

Title — **Soybean seed quality and stand establishment; proceedings**

Author(s) — Sinclair, J.B.; Jackobs, J.A.

Institution(s) — University of Illinois at Urbana-Champaign. College of Agriculture. International Soybean Program

Meeting — (Conference on Soybean Seed Quality and Stand Establishment, Colombo, LK, 25-31 Jan 1981)

Serial title and number, date, pagination, and language — *INTSOY series, no. 22,* 1982, xiii, 206 p., En

Publisher — Published by University of Illinois at Urbana-Champaign

Supplementary note(s) — *Grant DAN-1406-G-00-1015-00*

Project number — 93105600

Contract/Grant — AID/ta-C-1294

Abstract —

Soybean research has shown that both physical and biological factors are responsible for reduced seed quality and vigor, that stand establishment depends on seed quality, and that seed quality is directly influenced by weather conditions during seed maturation and harvest and by subsequent storage conditions. Because knowledge of these facts remains largely fragmented and is not being communicated to farmers, the International Soybean Program (INTSOY) hosted an international conference in Sri Lanka for research scientists and extensionists to correlate current knowledge on soybean seed quality and stand establishment, discuss ways to communicate this knowledge to farmers, and determine future research needs.

The conference proceedings presented in this volume include: (1) 19 invited papers and abstracts of 13 volunteered papers on soybean seed maturation, genetic differences in seeds, the effect of weather, harvesting and planting procedures, and the role of insects and pathogens; (2) 11 country reports from various Asian nations; and (3) reports from three working committees on soybean production, crop protection, and storage and mechanization

In the plenary sessions, the speakers voiced a number of proposals on what emerged as a major concern among the delegates—the importance of seed quality in expanding soybean production in tropical and semi-tropical areas. Pointed out in particular was the complexity of soybean seed production in the tropics and semi-tropics due to the high humidity and temperature levels that prevail throughout the year. Other themes sounded were the necessity for good seed to make soybean an economical crop and the nutritional importance of soybeans.

All information presented during the conference related to seed production, technology, and storage and to seed certification in tropical and semi-tropical developing countries. Such information is directly related not only to INTSOY goals, but to complementary efforts of other international donors such as the Food and Agriculture Organization's ongoing Regional Field Food Crops project in North Africa and the Middle East.

To facilitate rapid and accurate processing of your requests for documents from this issue of *ARDA,* please observe closely the ordering instructions found on the page following the last abstract.

151 PN-AAK-373
MF $1.08/PC $4.68

Regional management education institutions in Central America and Mexico

Schaeffer, Wendell G.
National Association of Schools of Public Affairs and Administration
U.S. Agency for International Development. Bureau for Development Support. Office of Rural Development and Development Administration
Jul 1980, 33p. : En
936009600
AID/DSAN-CA-0180

Given Central America's turbulent sociopolitical situation, regional institution-building approaches are more important than ever. A.I.D. should therefore strengthen and expand its Regional Office for Central America and Panama (ROCAP) to enable it to vigorously promote regional ties and national development by supporting two institutions that serve as active symbols of mutual interest among member nations: the Central American Institute of Business Administration (INCAE) and the Central American Institute of Public Administration (ICAP). So concludes this review of the management training institutions serving Central America and Mexico.

Included are reviews of the history, programs, curricula, leadership, staffing, and physical facilities of INCAE and ICAP and of the historical rivalry between them; of the possible role of Costa Rica's Inter-American Institute of Agricultural Sciences and Mexico's National Institute of Public Administration in promoting regional development; and of the region's current political circumstances in relation to possible U.S. policy initiatives.

ROCAP, it is suggested, should develop a series of joint INCAE/ICAP projects (which could include other institutions as well) specifically designed to strengthen institutional capacity and management capability in the region. Such projects might include: (1) a survey of regional management needs over the next decade and the institutional resources available to deal with them; (2) a survey of the roles, functions, performance, and management resources of the numerous regional organizations in Central America; (3) a project to identify ICAP and INCAE alumni and organize them into management improvement associations; (4) a program to support national institutes of administration and to create them where they do not exist; (5) a project to identify rural development needs and ways to meet them through better management; and (6) an executive development program for top government leaders. Project teams should be comprised of members of the two or more institutes involved, with team leadership given to the institution primarily responsible for the project. Cooperation between INCAE and ICAP, it is noted in conclusion, could help to end the mutual rivalry that to date has worked against INCAE's acceptance as an official regional institution.

152 PN-AAJ-611
MF $2.16/PC $13.13

Effective institution building: a guide for project designers and project managers based on lessons learned from the AID portfolio

Barnett, Stanley A.; Engel, Nat
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation
AID program evaluation discussion paper, no.11, Mar 1982, v.p. : En
930008500
AID/SOD/PDC-C-0393

Based on a review of the 659 institution-building field projects undertaken by A.I.D.'s four geographic bureaus over a 10-year period, this paper develops guidelines for institution-building project planning and management.

A pattern analysis of project design and evaluation assessments reveals that A.I.D. has focused on helping existing organizations (75% of the projects) rather than on creating new ones (25%) and on helping single (56%) rather than multiple groups (44%). A total of 64% of all projects focused on national organizations, with the rest divided among sub-national entities and organizations with a multinational focus. The majority of the groups assisted were in the economic/development planning and food/agriculture sectors. Assistance to educational, health, and community development and housing groups was in the 16-12% range, while 9% of the total went to groups related to infrastructure. These patterns were exemplified in all bureaus, although institution building activity was found to be most prevalent in Latin America (44%), followed by Africa (28%), Asia (18%), and the Near East (10%).

An analysis of project evaluations (over 49% of which came from Latin America, with evaluations of African projects being the fewest in number) shows that issues most dealt with are project management and achievement of initial project outputs (34% of all comments), with comments equally distributed into positive and negative; together with project planning (31%), with negative comments outweighing the positive by nearly two to one. Other areas focused on were the quality of project staff (13%), with an equal number of positive and negative comments; non-monetary support (7%) and financial arrangements (6%), with both areas receiving more negative than positive comments; and commodity procurement (2%), which received only negative comments.

A 30-page check list, incorporating over 70 lessons learned, is then presented for use in planning and managing future institution-building projects. Areas covered include program planning, host country factors, project inputs, training, the target institution, special situations (such as projects with construction elements), program delivery, and delivery of inputs.

Appendices include a discussion of the study's methodology, of institution-building models, and of three country programs; and a 30-item bibliography (1966-81).

GENERAL DEVELOPMENT

153 **PN-AAJ-612**

MF $3.24/PC $26.65

Turning private voluntary organizations into development agencies: questions for evaluation

Tendler, Judith
U.S. Agency for International Development. Bureau of Food and Voluntary Assistance. Office of Program and Management Support (Sponsor)
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation (Sponsor)
AID program evaluation discussion paper, no.12, Apr 1982, vii, 151p. + 3 appendices : En

To improve the analytic quality and policy relevance of A.I.D.'s evaluation of projects carried out by private voluntary organizations (PVO's), this report, based on a review of 75 such evaluations (conducte by A.I.D., third party contractors, and PVO's themselves), discusses key issues in PVO project evaluation.

To help evaluators move beyond the rhetoric which PVO's generally use to distinguish their approach from that of large donors (e.g, that it is participatory, targets the poor, and is innovative), the author probes, often by way of questions left unanswered, the features of PVO projects and finds them paradoxical. Participation, for example, often signifies decentralized decisionmaking by local elites, a feature which may or may not benefit the poor (examples are provided) or may benefit them only through the trickle down effect criticized by PVO's themselves. Discussion is given to three aspects of PVO projects which make the poor seem more unreachable than they actually are: the PVO turns from relief to income-earning efforts and from small to large projects and PVO neglect of women's issues.

Although PVO's contrast themselves with the public sector, their efforts partly depend on their various types of relations with host country governments (complementarity, competition, replication, filling in "unoccupied territory", takeover by the government, and brokering between government entities and the poor). Evaluators of PVO efforts must determine which relations are operative, whether project success was due to PVO efforts, and instances of impact (e.g., when a PVO project serves as first stage of an effort later amplified by the government). Although PVO's claim to be innovative, many of their projects fall below the state-of-the art. The innovativeness of PVO small-business credit projects is examined in detail.

A discussion of deficiencies in evaluations of PVO projects concludes by noting that evaluations should determine how decisionmaking is being done, who benefits from the project, and what is successful or not, including unanticipated successes. Key elements to be considered in determining project success are project type, time or place of implementation, and the PVO-government relationship.

Appendices include extensive suggestions to evaluators and a 178-item bibliography (1966-82).

154 **PN-AAK-497**

MF $2.16/PC $24.57

Evolving technologies for project management improvement; international workshop proceedings

Practical Concepts, Inc.
U.S. Department of Agriculture. Technical Assistance Division. Office of International Cooperation and Development. Development Project Management Center (Sponsor)
U.S. Agency for International Development. Bureau for Development Support. Office of Rural Development and Development Administration (Sponsor)
(Evolving technologies for project management improvement, Rosslyn, VA, US, 15-16 Jan 1981)
Feb 1981, v, 35p. + appendices : En
931009600
AID/SOD/PDC-C-0190

Although the public sector project has become the prototype development activity throughout the Third World, the record of project management – the planning and implementation of projects to meet national objectives – has not been very good. This report presents the proceedings of a workshop sponsored by A.I.D.'s Development Project Management Center (DPMC) to examine the experience of key development practitioners, highlight important lessons, and determine the factors which constrain or facilitate application of various management techniques.

Participants analyzed case studies of a multi-faceted project to implement sub-projects and train project managers in Jamaica; a training of trainers in management project with the Tanzanian Rural Development Bank; and a pilot effort to support the institution-building objectives of the Provincial Area Development Program in Central Java, Indonesia. The findings of the study groups which analyzed each case are presented regarding common deficiencies in project management, characteristics of successful management, the presence of these qualities in the three case studies, and the applicability of these three projects to other developing country situations.

Participants emphasized the importance of: a commitment to the project and to a project management system; clear, compatible, and realistic project objectives; a system for improving decisionmaking and/or project management; ongoing communication; identifying or building a constituency; the policy context and administrative setting; effective time management; and monitoring and evaluation. Finally, the participants' conclusions, topics for future research, recommendations for improved A.I.D. and other donor project management, and suggested actions for the DPMC are detailed.

Appended are a list of participants, the workshop agenda, a project management glossary, and the full text of the case studies.

155 **PN-AAK-812**

MF $3.24/PC $29.38

Voluntary efforts in decentralized management

Ralston, Lenore; Anderson, James; Colson, Elizabeth
University of California, Berkeley. Institute of International Studies
1981, 226p. : En
931105300
DSAN-CA-0199

The growing emphasis on small-scale rural development has increased the need for decentralized management. This report, however, cautions that there are major differences in perspectives, interests, and expectations among rural peoples, their governments, and donors.

Chapter I analyzes the shift to small-scale rural development which resulted from a growing awareness of food and energy scarcity and of the failure of past interventions. Chapter II explains how local elites may benefit more than the poorest of the poor from development efforts. Chapter III investigates the role and the views of the rural poor, arguing that what may appear to be negativism, hostility, or passivity is actually a strategy for maintaining local control over local resources.

Chapter IV highlights the fact that donors and national governments emphasize increased farm production, while the local people instead seek improvements in amenities (e.g., transportation and schools) to make life easier. Chapter V analyzes the difficulties in recruiting local voluntary organizations to assist in development efforts and provides examples from Thailand, India, and the Caribbean. Continuing, Chapter VI describes the spectrum of grassroots organizations in terms of recruitment and purpose and explains the role these qualities play in decentralization.

In Chapter VII, the authors recommend that when there is neither time nor personnel for on-site preparation, projects should be simple, short-term, require little maintenance, and depend on local resources. For more complex projects, local people must be involved and room for change allowed; decentralization is not applicable to refugees. Also, it must be realized that there are different standards of success and urgency. Project evaluations should account for changes in local organizational capacity, living standards, and perceptions. The authors conclude by outlining the characteristics of a local organization likely to succeed within a decentralized framework: access to power and funds, trust of the local people, ombudsmen-like staff, a long-term commitment, attention to education, realistic expectations, flexibility, and a willingness to analyze a project's ramifications. An extensive, 43-page bibliography (1939-80) is included.

156 **PN-AAK-372**

MF $1.08/PC $4.68

Food aid and development: a policy discussion paper

McClelland, Donald G.
U.S. Agency for International Development. Bureau for Program and Policy Coordination
Jul 1981, 33p. : En

Food aid (FA) can have a positive, long-term impact on development only in the context of a broadly-based agricultural development strategy aimed at providing equity to poor farmers. Against a background discussion of this principle, this paper discusses measures that need to be examined to ensure that FA will in fact complement such an equitable growth strategy and sets forth corresponding program implications for A.I.D. Specific measures discussed are agricultural production incentives; market interventions by the government; agricultural price stabilization; food reserves; and direct food distribution.

The following conclusions are offered as a point of departure for analyzing the development utility of FA in any particular country: (1) sell concessionally procured foodgrains at or near the domestic price in order to generate revenues for development and avoid undercutting private grain sales, thus discouraging domestic production; (2) mitigate the disincentive effect of large, unsubsidized programs by macroeconomic policies which encourage private investment and by investing in labor-intensive activities which employ low-income people with a high potential demand for food; (3) sell subsidized FA only to the poor; (4) encourage the use of commodities which self-target the poor, especially those that can be produced in the host country (even in the event such commodities are not available under P.L. 480); (5) decide, along with the host government, on activities in which to invest revenue generated by the sale of FA commodities, with priority given to expanding agricultural production and increasing employment; (6) when concessional FA is needed, direct the local currency generated, the foreign exchange saved, and the FA itself to assist development efforts; (7) provide technical and financial assistance to improve inadequate host country administrative and analytical capability in designing sound development activities (especially in the public sector) using the local currency generated by FA programs; and (8) in countries where U.S. FA levels are high, make sure the host country and donors are aware of alternative policy options recommended in various food and agricultural analyses or have such analyses carried out by USAID's.

157 **PN-AAL-210**

MF $2.16/PC $21.19

Working together: an overview of worker mutual assistance organizations

Cohen-Rosenthal, Edward
ECR Associates
U.S. Agency for International Development. Bureau for Science and Technology. Office of Urban Development (Sponsor)
Sep 1981, ix, 146p. + 2 appendices : Bibliography, p.123-146, En
AID/SOD-147-0464

Worker mutual assistance, defined as workers making decisions on issues which affect them, is intertwined with the emerging thrust toward cost-effective, responsive, self-help development. This review highlights exemplary cases of worker mutual assistance – in the form of production cooperatives and worker participation in management and in community development – in sub-Saharan Africa and southern Asia.

Production cooperatives, the focus of this review, are the smallest category of co-ops both in number and membership. Although a seemingly ideal type of organization for the development process, they have generally fallen short of their potential. Too often they serve the relatively affluent and lack broad participation in management; they also tend to enter ventures where success is rare.

Examination of worker participation in management – in the form of ownership, governance, policy determination, or setting

terms and conditions of work – indicates a startling gap between legislative mandate and actual results. The need to animate existing structures, not to build new ones, is thus indicated.

Trade unions and other groups participate in community development by founding rural organizations, channeling urban earnings into rural areas, and by forging alliances with rural workers. In general, workers and their organizations have not been involved in development decisionmaking, especially at the local level.

Several general themes emerge from this review. (1) Self-reliance in cooperatives, government, and industry is lacking. (2) Worker participation can improve productivity and product quality. (3) Technological and human capacity in developing countries are severely underutilized. (4) Worker groups, particularly co-ops, give little thought to multiplying the impact of their accumulated capital. (5) Harmony between managers and workers creates a common stake in enterprise development. (6) Worker-inspired improvements in the workplace or the community can have marked spread effects.

In addition, specific recommendations are offered regarding low-cost participatory education, seminars, gathering and dissemination of information, and technical assistance in initiating projects. A 293-item bibliography (1953-1980) and a list of those contacted in preparing this study are appended.

158 **PN-AAK-343**

MF $1.08/PC $10.53

United States and the middle income countries: technical cooperation to assist the low-income countries

Hurley, John
International Science and Technology Institute, Inc.
Institute for Scientific and Technological Cooperation. Planning Office (Sponsor)
1979, 54p. + attachments : En
AID/DSAN-C-0131

Middle-income nations (MIN's) which have "graduated" from many A.I.D. development programs can now collaborate with A.I.D. in providing technical assistance to low-income nations (LIN's), according to this report.

Defining MIN's as having per capita incomes in the $500-$1,500 range and arguing that it is in the United States's economic and security interests to collaborate with MIN's (who supply, for example, more that half of the world's cobalt, aluminum, tin, and rubber), the report makes the case for U.S.-MIN collaboration in promoting LIN development by illustrating the trade, resource, and security interests that the three parties currently share. Specifically, the report suggests that U.S. technical, financial, and human resources, combined with MIN's social, geographical, and linguistic similarities to LIN's and the low cost of MIN capital and labor make U.S.-MIN cooperation practicable.

A final section provides recommendations for specific programs, namely, that A.I.D. create an Institute for Scientific and Technological Cooperation (ISTC) to administer the proposed collaborative program. Projects should be selected that have a wide impact (useful results within 5-10 years), transfer technology or improve management and planning, and yield continuing institutional linkages between the three parties. Criteria for choosing countries to collaborate with the United States in the program are that they have institutions or individuals expert in the project area, are interested in the project, are willing to bear a share of costs, have adequate support structures, and have geographic proximity and environmental and socioeconomic similarities. An assessment of the ability of 14 MIN's to participate in the proposed program is provided, and areas of potential cooperation are defined. Overall, it is recommended that the ISTC: encourage U.S. experts to participate in joint activities on an equal basis with non-U.S. collaborators; use 20% of its unprogrammed funds for direct collaborative efforts; and carefully coordinate U.S. government agencies involved in its projects.

A 17-item list of references and an annotated, 90-item bibliography are appended.

159 **PN-AAK-355**

MF $2.16/PC $19.11

Evaluating smallscale enterprise promotion: state of the art methodologies and future alternatives

Goldmark, Susan G.; Rosengard, Jay
Development Alternatives, Inc.
U.S. Agency for International Development. Bureau for Development Support. Office of Urban Development (Sponsor)
May 1981, vi, 90p. + 6 appendices : Bibliography, appendices C, D, En
931109000
AID/DS-C-OTR-0016

As part of a project to develop a handbook to evaluate the impact of small-scale enterprise (SSE) projects, this state-of-the-art paper reviews methodologies currently used in evaluating SSE projects.

After defining common terms of reference for SSE practitioners, the author reviews the key determinants of SSE evaluation methodologies (level and users of and data bases for evaluation; budgetary and timing parameters) and points out the need to examine the trade-offs between these determinants critically. An analytical framework for assessing the impact of SSE's, focusing on the development hypotheses underlying SSE projects and the hierarchy of impacts (on enterprises, on the community, and on benefit and cost distribution), is delineated, as are linkages within the hierarchy.

Alternative SSE evaluation methodologies are examined in terms of their functional components (indicators of an SSE project's direct impact on an enterprise's profitability and sustainability and on community income and employment; data collection techniques; and methods of data analysis). Stress is given to: the importance of indicators of why the project was helpful or not; its qualitative effect on the enterprise; and enterprise-community interaction. Suggestions are made to improve formal and informal data collection techniques.

The following deficiencies in past SSE evaluations are identified: the evaluation's level, user, budget, timing, and data base heavily determine the methodology chosen; the diverse nature of SSE projects and the lack of standardized impact indicators impede legitimate comparison of SSE projects; attributing impact to SSE projects is the most difficult methodological issue in assessing SSE project impact; the cost-effectiveness of tracking impact indicators over the life of an SSE project has not been documented; direct and indirect income and employment generated by SSE projects are the two most difficult and costly effects to quantify; and the trade-offs between cost, accuracy, and utility of alternative SSE impact indicators and data collection techniques have not yet been

explored. A detailed plan of action for follow-on field work in four countries is presented.

Appendices detail the U.S. institutions and the literature reviewed (101 items, 1964–80) for the study, and include abstracts of 10 SSE impact evaluations.

160 **PN-AAK-507**

MF $1.08/PC $4.81

AID impact evaluations: the lessons of experience

Morton, Alice; Harbeson, John
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation (Sponsor)
Jun 1981, 28p. + 2 annexes : En

Since 1979, A.I.D. has conducted a series of project impact evaluations in order to gain a better understanding of how a project can improve the lives of beneficiaries and facilitate equitable development and to improve the planning, design, and implementation of future A.I.D. projects. This report reviews the first 23 of these impact evaluations in order to identify cross-cutting development variables and policy issues.

The authors found that: (1) participation by project beneficiaries is essential but has not been present often enough; (2) the incidence of a project's benefits is a function of the desirability, deliverability, targetability, acceptability, and durability of inputs; (3) projects have the greatest impact when connected with local programs assigned high host government priority and are most successful when inputs are complementary; (4) insufficient attention has been given to institutional analysis, the use of appropriate technology, the strengths of different intermediaries, and to developing cross-sectoral linkages between projects; (5) realization of the links between host government and economic policies and project implementation has been inadequate; and (6) there is a need for longer project life, greater decentralization, and more social analysis.

In addition to addressing the above points, the authors recommend that increased attention be given to the socioeconomic and political processes at work in the prospective project site, to developing strategies to overcome foreseeable obstacles, and to respecting or influencing the peceptions of potential project beneficiaries.

Future impact evaluations should give greater attention to: the appropriateness of technology and availability of alternative technologies, environmental impact, cost, the institutional dimensions of a project, and the roles of technical assistance in institutional improvement. In addition, surveys of project beneficiaries should be made in advance and the evaluation should be written so as to be relevant to future project social analysis.

Appended are a report on economic analysis in impact evaluations and a list of impact evaluations reviewed.

161 **PN-AAK-265**

MF $5.40/PC $60.84

Food aid: the political economy of international policy formation

Hopkins, Raymond F.
Swarthmore College
U.S. Agency for International Development. Bureau for Program and Policy Coordination (Sponsor)
Sep 1980, v, 456p. : En
930004900
AID/otr-G-1672

What principles have and should guide the giving and accepting of food aid? This report seeks to answer this question by describing current food aid flows, with special reference to the United States; explaining trends in food aid over the past 30 years; and proposing steps to improve food aid's effectiveness as a development tool.

The author traces the history of food aid from the 1950's to 1980's and notes several trends – an increasing number of donors dispersing a falling volume of aid, changes in donor motivation from surplus disposal to development promotion, and the use of food aid as a replacement for instead of a complement to other assistance. Weighing food aid's costs and benefits to both donors and recipients, the author cautiously argues for continued aid because it costs donors less than cash assistance but gives recipients comparable benefits and because it can compensate developing countries for exclusion from protected donor agricultural markets.

An exploration of the donor's role finds the motivation for food aid to combine humanitarianism and self-interest. Fluctuations arise from changes in the donor's domestic economy; allocation is a product of recipient need, political considerations, and other donor programs. Using case studies of Kenya, Tanzania, and Egypt, the author explores the motivation for seeking and/or accepting food aid and the political and economic impact of receiving it. The author finds recipients could better use food aid by improving both food production policies (e.g., food subsidies) and management of food stocks (e.g., reducing waste). He highlights the need to consider pride, corruption, incompetence, subsidies, bureaucratic interests, dependency, export potential, and planning horizons in the recipient country.

The author argues that donors should: become more reliable food aid suppliers; base allocation more on need; take steps to improve recipient countries'food systems; better coordinate their policies; integrate food aid and other aid programs. Finally, the author notes that international organizations such as the Committee on Food Aid Policies and Programs and the World Food Program can assist these efforts by bringing pressure to bear on both donors and recipients. Appended are supporting reports, interviews, and statistical analyses.

162 **PN-AAK-296**

MF $2.16/PC $13.52

Bolivia: a country profile

Evaluation Technologies, Inc.
U.S. Agency for International Development. Bureau for Private and Development Cooperation. Office of U.S. Foreign Disaster Assistance (Sponsor)
Feb 1978, vi, 94p. : Bibliography, p.92–94, En
Country profiles of 37 nations are available
AID/SOD/PDC-C-0283

GENERAL DEVELOPMENT

An accessible information base is essential for effectually dealing with a national crisis. This profile on Bolivia, one of a continually updated series of country profiles, provides baseline data to support planning and analysis of relief operations by A.I.D.'s Office of Foreign Disaster Assistance.

General sociocultural information is provided, along with a brief description of national and regional government organizations, a list of key political figures and international treaties, and a history of recent events.

An assessment of Bolivia's disaster preparedness includes an outline of the Government of Bolivia's (GOB) National Civil Defense Plan which sets forth types and phases of disasters and lines of national and provincial authority for emergency procedures; assigns functions such as relief supplies and communications to members of the GOB Disaster Relief Committee; addresses public order, evacuation, public health and medical services (treatment priorities, epidemiological and sanitary concerns, rodent control, corpse disposal, and health education), transport logistics, communications; and provides disaster planning for earthquakes, brush and forest fires, and flooding. Although the plan was published in 1977, legislation on relief and finance has not been drawn up. Evaluation of the plan must await its translation. Also outlined is USAID/B's disaster plan, including procedures for commodity transfer and delegation of responsibilities. Also provided in this section are lists of Bolivia's most serious disaster types (floods and epidemics) and of U.S. and international voluntary organizations.

Population distribution according to Bolivia's 1976 census, followed by an overview of major diseases, health facilities, medical manpower resources, dietary customs, and housing statistics, are found in tabular form. The economic, agricultural, transportation, and power and communications sectors are reviewed and Bolivia's topography is outlined. A 31-item bibliography (1958-81) is included.

To date, 28 profiles on countries in Asia, Africa, South and Central America, and the Caribbean have been provided and are available upon request.

163 **PN-AAK-483**

MF $2.16/PC $12.87

Applied survey methods for development projects

U.S. Agency for International Development. Office of Personnel Management. Training and Development Division

Sep 1981, iv, 93p. : En

Scientific sampling methods can reduce the need for detailed recordkeeping, reporting, and accounting, and can provide useful data to project personnel. This step-by-step illustrative guide is thus designed to familiarize A.I.D. personnel responsible for project formulation, monitoring, and evaluation with the underlying principles and processes of data gathering and analysis so that they may make better quantitative analyses.

This guide contains 87 short units covering basic statistical techniques and concepts including: data collection methods; average, mean, median, mode, and range; standard deviation; determining sample size; judgement, scientific, and random sampling; standard error of the mean; cluster samples; confidence interval and standard error of percentage; the "T", "Z", and "Chi Square" tests; and regression analysis. Principles of designing and carrying out surveys are explained, including analysis and presentation of results in written reports and in briefings. Numerous sample problems and calculations are included throughout the guide. Appended are six calculation tables, including random digits, and the normal curve and related probability.

164 **PN-AAK-354**

MF $2.16/PC $15.86

Cost - benefit analysis and project design

Donahue, John D.

Midwest Universities Consortium for International Activities. Program of Advanced Studies in Institution Building and Technical Assistance Methodology

U.S. Agency for International Development. Office of Personnel Management. Training and Development Division (Sponsor)

1980, 118p. : En

Tape complement: PN-AAK-362

931117200

AID/TA-G-1444

Cost-benefit analysis can provide valuable information on the likely direct and indirect impacts of alternative project designs. This volume offers noneconomists involved in project planning, design, and approval twelve readings on the theory and techniques of cost-benefit analysis.

First, an introductory essay describes the way cost-benefit analysis works in project design, defines fundamental concepts, and outlines the problems connected with cost-benefit analysis. Part I then presents practical guidelines for carrying out cost-benefit analysis and suggests ways that these guidelines can be used in decisionmaking. The first essay in this section outlines the structure and process of cost-benefit analysis, introduces sensitivity analysis, and suggests a format for organizing and communicating the results of an analysis. The second essay examines economic analysis of agricultural projects, while the third focuses on cost-effectiveness analysis, a technique used with projects having benefits that are difficult to quantify.

The first three readings in Part II introduce from a theoretical viewpoint the three major methodologies for social cost-benefit analysis that appeared in the 1970's: (1) Little and Mirrlees's use of "accounting," or shadow, prices; (2) the United Nations Industrial Development Organization's system of shadow pricing, which emphasizes national economic profitability; and (3) Squire and van der Tak's less theoretical, more easily applied "World Bank" approach for projects involving external financial institutions. A fourth reading compares the three methodologies' emphases, assumptions, and techniques.

Part III presents four critiques of cost-benefit analysis and/or specific approaches. The first essay warns against undue enthusiasm for shadow prices, while the second argues that cost-benefit analysis neglects the realities of class struggle in developing countries. The third reading asserts that cost-benefit analysis techniques are needlessly complex. The fourth examines A.I.D.'s requirements for and use of cost-benefit analysis, pointing out some potentially significant ambiguities in the A.I.D. Handbooks and surveying actual A.I.D. economic analyses of 110 projects approved between 1970-76.

165 **PN-AAL-221**

MF $1.08/PC $3.38

Bureaucratic reorientation for participatory rural development

Korten, David C.; Uphoff, Norman T.
National Association of Schools of Public Affairs and Administration
U.S. Agency for International Development. Bureau for Science and Technology. Office of Rural Development and Development Administration (Sponsor)
NASPAA working paper, no.1, Nov 1981, 24p. : En
936009600
AID/DSAN-CA-0180

Little attention has been given to the requirements of poverty-oriented rural development and the bureaucratic structures through which such action is taken. This paper examines the need for reorientation of development bureaucracies to promote community participation, the impediments to bureaucratic change, the essential elements of a responsive bureaucracy, and a framework for further action.

Awareness of the need for bureaucratic reorganization is impeded both by a lack of research and by substantial skepticism. In addition, the assumptions that expenditures equal results, education equals superiority, and projects equal development tend to reinforce prevailing bureaucratic practice.

In light of these factors, the author favors a learning process approach to bureaucratic reorientation, as is being pioneered by two Philippine Government agencies. The approach has three steps: (1) learning to be effective – finding which interventions strengthen community participation; (2) learning to be efficient – simplifying successful problem-solving methods for large-scale application; and (3) learning to expand – institutionalizing the new methods.

Existing theory and emerging experimentation suggest that the essential elements of a responsive bureaucracy are: strategic management; a reward structure stressing effective service to beneficiaries; flexible planning systems which value local input; monitoring and evaluation which focus on beneficiaries reached and benefits achieved; internal use of social science data; long-term staffing; flexibility in making expenditures; a differentiated structure to better relate to different client groups; staff training to develop problem-solving and interaction skills; and an institutional doctrine which stresses beneficiary needs.

Finally, the author calls for greater experimentation with bureaucratic reorganization. Efforts should focus on building a body of theory and a methodology, disseminating findings, continuing field experimentation, and training professionals to manage reorientation efforts.

166 **PN-AAK-290**

MF $5.40/PC $53.82

Women in development: 1980 report to the Committee on Foreign Relations, United States Senate and the Committee on Foreign Affairs, United States House of Representatives

U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Women in Development
1980, 246p. + appendices : En

Recent progress in establishing women in development (WID) objectives has scarcely fostered equal progress in implementing actual WID projects according to this 1980 update of A.I.D.'s WID activities. After providing background information on the U.N. Decade for Women and the results of the Copenhagen Mid-Decade Conference on WID, the report details A.I.D.'s women-specific, women-component, and health/nutrition/population projects. The trend in women-specific projects has been discouraging (spending increased only from $6 million in FY79 to $8 million in FY82), especially since these projects represent highly concentrated efforts to upgrade the position of women in the developing world. Prospects for women-component projects (still designed with a special concern for enhancing women's status and income-earning ability) appear more promising, with spending growing from $7-22 million by FY82. While any growth in WID activities is encouraging, the report points out that WID projects actually accounted for only 2% of A.I.D.'s total FY80 disbursements and that the Agency's efforts to close the income/status gap between men and women have been miniscule. While the report credits the Africa and Latin America/Caribbean Bureaus for employing efficient devices to fund smaller women-specific programs, it concludes that overall, WID funding and implementation are still primarily on an ad hoc basis in most A.I.D. Missions.

The report recommends that: women-specific projects be aimed at including women in the development process (especially through women's organizations and host country women's bureaus) and at gathering more sex-disaggregated data on women in developing countries; women's concerns be given greater emphasis in large agriculture and rural development projects, especially in work-load reduction, income generation and family health; WID training be provided to all A.I.D. and cooperating personnel and information on replicable WID projects be exchanged; small amounts of funds be made readily available to grass roots levels when special WID opportunities are identified; the goals of the Copenhagen Conference guide the design of WID programs; and cooperation on WID activities among donors to the Organization for Economic Cooperation and Development's Development Assistance Committee be continued.

167 **PN-AAK-474**

MF $2.16/PC $14.69

Women and development in Lesotho

Gay, Judith S.
U.S. Agency for International Development. Bureau for Africa. Lesotho (Sponsor)
Feb 1982, 84p. + 6 appendices : En
930-000-C-00-1006-00

High migration rates of male workers to South Africa have helped make Lesotho a uniquely "Women in Development Society" according to this overview of women's status and role in Lesotho.

An initial chapter describes Basotho rural women in terms of traditional and changing family structures; socialization and education; and the household and market economies. The expanding role of Basotho women is discussed next, including village-and national-level women's groups; women in the civil service, in development projects, and in the private and parastatal sectors; and training opportunities for women. A brief final chapter questions whether Basotho women are decision-makers and are conservative or innovative.

The study shows that Basotho women outnumber the men in residence by about 25% and have the primary responsibility

for household management, agriculture, and the maintenance of rural life. Of women over age 15, 85.7% have received 4 or more years of schooling, compared to only 43.1% of the men, with education levels exceeding those for men in every age group. Although most land is owned by men, 55% of the farms are under female stewardship. Women also play an important role at all levels of government and comprise 45.8% of all employees in manufacturing, commerce, and tourism. Despite all this, the 1976 census showed that women represented only 15% (32,274) of Lesotho's wage laborers, leading to the exceptionally low income level which is the main restraint on women's ability to make decisions and effect change.

The author advises donors to: become knowledgeable about Basotho women and avoid imposing on them western or even other Third World stereotypes; use sexually disaggregated data; include women in planning, implementation, and evaluation teams; monitor all projects for their impact on women; assist women seeking opportunites beyond traditional female activities; be sensitive to, but not deterred by, the political implications of women's activities; and finally, be sure that projects benefit women at all socioeconomic levels.

Included are numerous tables, a 9-page partially annotated bibliography (1963–81), research suggestions, and a chart of women's organizations in Lesotho.

168 **PN-AAK-793**

MF $1.08/PC $7.15

Recommendations for expansion of employment opportunities for women in the Dominican Republic

Youssef, Nadia H.; Daubón, Ramón; Hetler, Carol
International Center for Research on Women
U.S. Agency for International Development. Bureau for Latin America and the Caribbean. Dominican Republic (Sponsor)
15 Mar 1981, 38p. + 2 appendices : En
936531900
AID/DSAN-C-0269

In designing a project to advise and train poor urban women in the Dominican Republic (DR), a survey of women and their employment in the DR was conducted. This report presents a discussion of the survey, an outline of the DR's current employment structure with reference to women in the urban labor market, and recommendations for expanding meaningful employment of women.

Policy-oriented information was gathered on the female labor force, the present and potential demand for women's skills, and on the availability of skills training. The authors describe the design and methodology employed in the survey and note the need for technical assistance to complete statistical analysis of the data. Questions for future consideration are raised regarding the project's human development training component, the restructuring of skills training programs, job placement, sectoral focus, the project's long-term role, and participant follow-up.

While employment in the formal sector of the economy should be expanded, current training and employment strategies should also emphasize the potential role of the informal market as a means of integrating women into the DR economy and into the A.I.D. program. It is specifically recommended that: (1) women's vocational training be better linked to productive employment opportunities; (2) informal education programs be developed for rural females; (3) small businesswomen be afforded greater access to marketing and accounting training and to credit; (4) new industrial/occupational sectors be created for women; (5) labor intensive industry and business be offered financial incentives to employ more women; (6) development of crops handled by women be encouraged and integrated rural development emphasizing women supported; and (7) rural women be assisted in gaining nonfarm employment by reorienting home activities to the marketplace, providing managerial and credit assistance to aid moves into agribusiness administration, and offering entrepreneurial skills training.

Appended are policy recommendations for improving women's access to credit and examples of successful women's programs in India and El Salvador.

169 **PN-AAK-283**

MF $1.08/PC $2.73

Women's involvement in high risk arable agriculture: the Botswana case

Fortmann, Louise
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Women in Development (Sponsor)
(Ford Foundation Workshop on Women in Agriculture in Eastern and Southern Africa, Nairobi, KE, 9–11 Apr 1980)
Apr 1980, 27p. + attachment : En

Although arable agriculture in Botswana is a subsistence activity with a high degree of risk, women farmers face a unique set of problems in addition to those faced by men. This paper briefly summarizes research findings on Botswana women's role in agriculture and discusses related policy issues.

Past research has consistently identified women's limited access to draft animals and labor as major problems. Over half of Botswana women own no cattle; most others own fewer than do men. Women without animals consequently lack draft power, plow later, are forced to hire expensive tractor services, have smaller acreages, produce less, and have less "savings on the hoof". Female-headed households also face a qualitative and quantitative labor constraint. The vast majority of women feel plowing is suitable only for men. This attitude and women's numerous household duties explain the fact that women spend less than half the time that men do plowing. Although 50% of female-headed households require outside help in plowing (compared to 32% of male-headed households), hired labor is generally inferior and untrustworthy.

After presenting detailed evidence from the 1979 Eastern Communal Region Water Points Survey which reinforces these findings, the author questions whether the Government of Botswana should assist female and other marginal farmers from within the agricultural sector or aid their exit from this sector. Arguing that the development of rural or urban cash employment as an alternative to subsistence farming is currently infeasible, she recommends using the proceeds of the Jwaneng Diamond Mine to establish a subsidized tractor service, subsidize wages for farm labor, and develop a crop insurance program. Other suggestions include developing farming packages which conserve the use of labor and draft animals; undertaking a system of farmer-directed research; and providing water to allow women to devote more time to farming. A 40-item bibliography (1969–80) is appended.

170 PN-AAJ-908

MF $3.24/PC $36.53

Village women—their changing lives and fertility: studies in Kenya, Mexico, and the Philippines

Reining, Priscilla; Cárnara, Fernando; et al.
American Association for the Advancement of Science
U.S. Agency for International Development. Bureau for Development Support. Office of Population (Sponsor)
Rockefeller Foundation (Sponsor)
AAAS publication, no.77-6, 1977, x, 273p. : En
AID/CM/phs-C-73-25

To discover how changes in women's status might influence family size, the lives of individual women in five villages in Kenya, Mexico, and the Philippines were studied. Techniques of the study, the results of which are here presented, included life histories, census and genealogical surveys, participant observations, and social character analyses; data were processed with the DEMOG computer program.

In Kenya, the histories of women in the Kikuyu village of Kiaguri were studied at 20-year intervals from 1896 to 1976. Research in Mexico focused on the villages, agriculturally rich and poor, respectively, of Santa Maria and Tierra Alta. Cotawan, a Muslim village, and Niwang, a Christian settlement, both located on Mindanao, were sites of studies in the Philippines. The women studied included those who had no children, those who had many, and those who had an average number.

Significant results of the study are as follows. Relative income influences the status of women; women who contribute to the family income enjoy higher status than those who do not, although village cultures keep women subordinate to their husbands. Monetary demands of sending children to school are a more influential fertility depressant than the mother's length of education. Childless women in all the villages suffer a loss of status and self-esteem, although only in Kenya does a large family increase the mother's status. A mother's self-confidence and hope in the future influence her family size: more prosperous women in Kenya social and economic reasons for having many children; mothers who are less prosperous but "upwardly mobile" limit their families in order to educate their children; and mothers resigned to poverty and oppression find no incentive for limiting their families.

These responses suggest that different types of family planning programs are needed to reach different groups. For example, the 'resigned'group would require greater social and economic opportunities and changed cultural values. Contraceptive availability without motivation has little impact.

Appended are sections on demographic methodology and the theory of social character and a list of 44 references (1947-77).

171 PN-AAK-822

MF $1.08/PC $1.95

Women's labor force participation and earnings determinants in a developing country

Behrman, Jere R.; Wolfe, Barbara L.
University of Pennsylvania. Department of Economics and Population Studies Center
University of Wisconsin. Department of Economics and Preventive Medicine. Institute for Research on Poverty
Centro de Investigaciones Sociales Nicaraguense (Sponsor)
Banco Central de Nicaragua (Sponsor)
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Women in Development (Sponsor)
Jul 1981, 15p. : En
Revision of paper presented at International Economic Association Sixth World Congress, Mexico City, Mexico, August, 1980
930000995
AID/otr-C-1571

Despite recent attention to the importance of human capital investments and of the role of women in development, many dimensions of the labor market returns of female human capital remain empirically unexplored. This paper, one of a series of studies on women's socioeconomic and demographic roles in Nicaragua, presents the findings of a 1977-78 labor force participation survey of 4,000 Nicaraguan women.

Analysis indicates strong regional (particularly urban-rural) differences in overall female labor force participation. These differences imply that disaggregated estimates are needed; that returns to human capital are higher in modern urban areas; that differences in experience and, to a lesser extent, in schooling and migratory status are important in explaining regional earnings differentials; and that wage differences create long-run incentives for female migration. Intra-regional differences are found in urban but not in rural areas. In urban areas, skilled women are more likely to be employed in the formal sector, new immigrants in the domestic sector, and non-migrants in the informal sector.

Although standard models assume the presence of small children increases the opportunity cost of women's working, the Nicaraguan data show this cost to be small, confined to the central metropolis, and even there, to be limited to the domestic and formal sectors.

The effect of schooling and work experience was found to be even greater than as reflected in earnings. In fact, the data disagreed with World Bank studies and showed increasing returns to education. Results support the long-standing contention that investments in migration, nutrition, and, to a lesser degree, in health increase female labor productivity. While the data showed significant differences between the labor force participation and wages of men and women, their cause is unclear. These differences do not, however, imply substantially lower marginal returns to human capital for women than for men. A statistical table and a list of 11 references (1954-81) are appended.

GENERAL DEVELOPMENT

172 **PN-AAK-282**

MF $1.08/PC $4.29

Access of rural girls to primary education in the Third World: state of art, obstacles, and policy recommendations

Safilios-Rothschild, Constantina
Oct 1979, 31p. : Bibliography, p.28-31, En
930010000
OTR-0100-0-00-1061-00

Although primary education is a prerequisite for higher education and thus for upward social mobility, in most developing countries rural girls'access to primary schools lags far behind that of rural boys and urban girls. Against a statistical picture of women's literacy and access to education, this report examines the importance to girls of an elementary education, describes the determinants of rural female education, and presents policy recommendations.

An elementary education is crucial to rural girls because it allows further education and training; increases their ability to actively participate in rural development; enhances the education and literacy of future generations; improves the nutritional status of families; increases receptivity to family planning; and leads to greater farm production.

Impeding rural girls'completion of elementary school are: competing household duties and production activities; parents' limited resources and negative view of educating girls; shortages of schools and female teachers; sex-segregated schools; and marriage, pregnancy, and poor health. Factors favoring rural girls'primary schooling are: no brothers in the family; visible handicaps; high socioeconomic status; the presence of female role models; and a societal view that literacy and education enhance marriageability.

Recommendations for improving the educational opportunities of all low-income rural children are to: (1) combine compulsory primary education with self-help projects to build and maintain schools; (2) provide free educational materials, school feedings, and basic health education; (3) develop programs to decrease the excessive household workload of rural women and their children; (4) adapt school calendars to cropping patterns; and (5) train local assistant teachers.

Recommendations directed specifically toward the needs of rural girls are to: (1) train more female primary school teachers and paraprofessionls; (2) build and staff girls'schools where the sexes are segregated; (3) tie teachers'promotions to their success in educating girls; (4) require equal access to agricultural training programs; (5) make texts less sexist and more relevant; and (6) initiate literacy programs for mothers. A 60-item reference list (1963-79) is provided.

173 **PN-AAK-591**

MF $4.32/PC $47.06

Struggle and development among self employed women: a report on the Self Employed Women's Association, Ahmedabad, India

Sebstad, Jennefer
U.S. Agency for International Development. Bureau for Science and Technology. Office of Urban Development (Sponsor)
Mar 1982, iv, 340p. + attachment : References, En
OTR-1406-C-00-1004-00

The Self-Employed Women's Association (SEWA) of Ahmedabad, India - a trade union established in 1972 by a group of women service workers, home-based producers, vendors, and casual laborers - has had amazing success in bettering its members'lives.

This indepth study describes SEWA's birth as part of India's large Textile Labor Association (TLA), its evolution over time, and its efforts to address members'problems and needs. Emphasis is on showing why certain organizational efforts succeeded while others did not. The study also discusses SEWA's effects on members, their families, and their businesses; on the development of leadership; and on policy. Finally, it analyzes SEWA's usefulness as a model for organizing self-employed workers.

More than 5,000 poor women in Ahmedabad and outlying areas have been involved in SEWA activities. SEWA's goals have been economic regeneration and social uplift - gaining recognition for women's work, raising members'income, and increasing member's control over their income and property. The union organizes struggles for higher pay and better working conditions and defends members against harassment by police and exploitation by middlemen. It also promotes developmental activities, such as a women's bank, skills training, social security plans, and production and marketing cooperatives.

SEWA has affected its members in numerous ways. For many, incomes have stabilized and increased. Poor women have a place to turn for help and an opportunity to come together with others and see their problems in relation to the community. Women leaders have emerged and policymakers have begun to recognize the needs of self-employed workers.

The author concludes that SEWA's experience demonstrates: (1) the inadequacy of conventional trade union strategies for helping the self-employed; (2) the central role that banking can play in organizing self-employed workers; (3) the need to keep union and developmental activities separate within the organizational structure; and (4) the limitations of working through an established, male-dominated organization, as demonstrated by SEWA's disaffiliation in 1981 from the TLA.

Appendices provide case studies of SEWA's efforts to organize workers, an account of its split with the TLA, and sample SEWA documents.

174 **PN-AAK-830**

MF $1.08/PC $5.59

Socioeconomic characteristics of women in a developing country and the degree of urbanization

Wolfe, Barbara L.; Behrman, Jere R.; et al.
University of Wisconsin-Madison
University of Pennsylvania
Nicaragua. Centro de Investigaciones Sociales Nicaraguenese
Nicaragua. Banco Central de Nicaragua
Discussion papers, no.655-81, Sep 1980, 53p. : Bibliography, p.48-53, En
AID/otr-c-1571

Arguing that the body of information on women's role in development consists of only general information on selected socioeconomic variables and extensive data on small, possibly unrepresentative groups, the authors of this report undertook a detailed survey in 1976-77 of the socioeconomic status of 4,104 Nicaraguan women aged 15-45. Emphasis was placed

on differences among women's socioeconomic status in central metropolises, other urban areas, and in rural regions and on the associations among various background, human capital, and socioeconomic characteristics.

After presenting statistical data from the survey, the authors discuss their findings on the following topics: (1) childhood and adolescent background, schooling, and migration; (2) age of first cohabitation, current marital status, and characteristics of male companions; (3) economic activity and income; (4) health and nutrition; and (5) fertility and contraceptive use.

Based on their findings, the authors draw several conclusions. First, socioeconomic welfare and the correlation among the various socioeconomic characteristics are higher in urban areas – women in urban areas tend to be better fed and educated, although suffering somewhat poorer health. Certain background variables, especially mother's schooling, are correlated with several measures of socioeconomic status. There have also been systematic shifts over time, as illustrated by significant correlations between women's ages and their cohabitation, schooling, and contraception. Further, women's schooling is strongly associated with numerous measures of their socioeconomic status, but is negatively related to migration. There is little association between health and other socioeconomic variables. Finally, although knowledge of contraception is widespread, contraceptive use reflects differing norms associated with age, schooling, urbanization, and labor force participation. A list of 45 references (1960–80) is appended.

Although primary education is a prerequisite for higher education and thus for social mobility, rural girls' access to primary schools lags far behind that of boys. These girls attending an AID-built school in Anton, Cocie Province, Panama are some of the lucky ones. (See Item 172)

GNP ECONOMICS

175 **PN-AAK-512**

MF $1.08/PC $11.83

Government policy and food imports: the case of wheat in Egypt

Scobie, Grant M.
International Food Policy Research Institute
Research report, no. 29, Dec 1981, 88p. : Bibliography p.81–88, En

The determination of many national and international food policies requires knowledge about the responses of imports to varying circumstances. This report describes an econometric model, based on conditions observed in Egypt, of the determinants of food imports in developing countries.

First, the author explores trends in global wheat trade and traces Egyptian wheat policy since 1800, emphasizing the post-war era. Using data for the period 1949–79, the author develops an econometric model, recognizing that decisions about the level of wheat imports are part of a balance of payments mechanism; that wheat imports reflect domestic pricing policies; and that cotton is important as a competitor for productive resources and as a source of foreign exchange. Mathematical equations are generated to model the balance of payments adjustment block, the wheat import block, and the cotton import block.

The study shows that Egypt's capacity to import – a function of both wheat and cotton pricing policies – is a principal determinant of domestic wheat policies and influences both the level and composition of imports. Since wheat imports are highly unresponsive to changes in foreign exchange earnings, any compensatory financing will have little effect on wheat imports and will likely be used to stabilize the level of nonfood imports. A rise in the world price of wheat leads to higher wheat prices for both producers and consumers, dampening demand and stimulating production. Simultaneously, shipments of aid wheat fall and expenditures for imported wheat rise. Thus, despite a modest rise in domestic output, much of the adjustment is taken up by reduced consumption and cuts in other imports.

Given these price interactions, it can be inferred that if Egypt would reduce pricing protection and restrict subsidies, both demand for and importation of wheat would fall, food imports would be less of a destabilizing force, and economic activity in the non-farm sector would be stimulated.

The report includes 21 tables and nine diagrams. Appended are a list of 146 references (1938–81) and reports on the private and social demand for wheat, import demand models incorporating government policy measures, and the bias inherent in determining import response to changes in the national balance-of-payments.

176 **PN-AAK-133**

MF $1.08/PC $6.63

Production credit and fertilizer consumption: a review of literature

Sen, B.
U.S. Agency for International Development. Bureau for Asia. India
Sep 1980, 43p. + annexes : En

In the wake of an Indian Government proposal that India's agricultural finance system be reshaped by merging existing government lending institutions into a National Agricultural and Rural Development Bank, this report reviews the relevant literature generated by the Indian Government since 1976 in order to determine the current system's adequacy in supplying short-term agricultural production credit.

The author begins with an overview of the instutional agricultural production credit system in terms of long-term credit, centered around the Agricultural Refinance and Development Corporation, and short-and medium-term credit, provided by the three-tiered system of cooperatives (co-ops) as well as commercial banks, Regional Rural Banks, and Farmers Service Societies. Described are the institutions'memberships, organizations, and operational procedures.

Next explored is the apparently impressive performance of the short-term institutional credit system. However, the co-op system is faulted regarding its small and geographically concentrated membership and bureaucratic procedures. These and other points are elaborated upon in a review of several micro-level studies. Also analyzed are various innovations in the credit system (e.g., area and group financing, establishment of specialized agencies to direct credit to small cultivators, and strengthening of central co-ops).

Given this background, the author analyzes the relationship between credit and fertilizer consumption and finds some support of the government's premise that lack of credit is the primary constraint to fertilizer consumption. However, the author stresses that the demand for fertilizer is ultimately connected to the applicability and use of new agricultural technology (especially irrigation), noting that in areas where such technology is unsuited greater access to credit may lead to overfinancing and increased loan default.

In conclusion, the author judges the agricultural production credit system to have performed reasonably well, with supply of credit progressively increasing and matching seasonal demand. Appended are data on credit and fertilizer use and diagrams of the Indian credit system.

177 **PN-AAH-780**

MF $1.08/PC $10.14

Income levels, income distribution, and levels of living in rural Honduras; a summary and evaluation of quantitative qualitative data

Torres, J. F.
1979, 78p. : EN
General Working Document No. 1

Perennial political instability and the lack of suitable farmland have made Honduras the poorest country in Central America. With the aid of numerous graphs, charts, and tables, this report quantitatively surveys the national income and income policy, the distribution of rural income, and the quality of life among rural Hondurans.

Among 29 Latin American and Caribbean countries, Honduras ranks second from last in per capita income, estimated by A.I.D. to be $122.30 in 1978, in part because of reliance on agriculture; 68.8% of the country's 3,039,000 citizens are engaged in farming. Regarding the distribution of income, the most recent national income survey revealed that the poorest 50% of the population received 13% of total income, the next 30% received 24%, the next 15% received 30%, and the richest 5% enjoyed 33% of national income. Income in the rural sector, however, is less concentrated than in the nation as a whole. As in all societies, the distribution of wealth (i.e., land and farm capital in the rural context) is more concentrated than is income. Land reform has been seldom attempted and less frequently successful in Honduras.

Subsequent examination of other indicators of rural conditions in Honduras – literacy, housing quality, infant mortality, nutrition, and education – reveal trends similar to above. On the Physical Quality of Life Index, based on an average of life expectancy, infant mortality, and literacy index ratings, Honduras ranks 17th out of 20 Latin American countries, above only Bolivia and Haiti. Supporting and detailing these findings are case studies of San Lorenzo, La Zona Sur, Ajuterique and Lejamani, Yarumela, and Monjaras.

It is recommended that future A.I.D. research in the Honduran rural sector be directed toward helping the landless campesinos and toward creating income producing opportunities. Appended is a list of 47 references in Spanish and English (1950–79).

178 **PN-AAH-713**

MF $2.16/PC $13.65

Annotated bibliography of income, income distribution, and levels of living in rural Ecuador

Luzuriaga, Carlos C.; Zuvekas, Clarence Jr.
U.S. Agency for International Development. Bureau for Latin America and the Caribbean. Office of Development Resources. Rural Development Division
Dec 1979, 97p. : En General working document no.1

Students of Ecuador, Latin America, and rural economics will be pleased to find this annotated bibliography which includes 695 works written between 1950 and 1979 on the topics of income, income distribution, and levels of living in rural Ecuador.

The bibliography is loosely styled according to the twelfth edition of the University of Chicago's *Manual of Style*. For some books and technical reports, pagination is indicated; library locations with call letters are given when available. Also provided are a list of acronyms and abbreviations, an index of provinces, and a subject index. Annotations are presented in English.

179 **PN-AAH-714**

MF $2.16/PC $14.95

Characteristics of income distribution in Eastern Paraguay

Oberbeck, Charles D.
1979, 115p. : En
General Working Document No.2
LAC/DR/RD

The Paraguayan Government's principal means for redistributing income is to encourage migration out of older areas around Asuncion into less developed regions in the east. In light of this policy, this report examines the distribution of income and productive resources as well as the standard of living in rural Eastern Paraguay.

The author first presents aggregate data – drawn largely from the 1976 Small Farmer Survey and the 1978 Survey of Rural Women – on income, living standards, education, nutrition, and small farm characteristics (e.g., size, tenure, and land use). The surveys show that 80% of the rural population in Eastern Paraguay have per capita income under $300 (including 90% of farmers owning less than 5 ha) and 50–60% have per capita income under $150; 4% have electricity and only 1% access to a public water system. About 20% are illiterate and only 4% have any secondary education; Guarani is generally spoken in the home and is characteristic of the poor. On the other hand, nutrition is adequate and, along with health, is improving.

Next, Eastern Paraguay's five regions – the Minifundia region, Eje Norte, the area of Neo-colonization, the Ganadero (Livestock) region, and Itapua – are described in terms of changes and trends in population distribution, agricultural and livestock production, the distribution of land and income, and the characteristics of minifundia farms. Data show that Itapu has the most even distribution of land and income and Eje Norte the most skewed, while the Neo-Colonization region is undergoing the greatest change.

The author offers seven case studies which amplify the above findings and indicate that, although land redistribution redistributes income in the short run, it reduces total income and is also unlikely to be successful unless small farmers are given access to secure land titles, capital, tools, and credit.

Finally, the author notes that colonization may redistribute poverty rather than income by transferring the minifundia system to new areas; that farmers may suffer more sociological disruption than economic gain in the new areas; and that the Paraguayan Government's aim may be more to redistribute population than income. A 17-item bibliography (1972–79) is included.

180 **PN-AAK-671**

MF $1.08/PC $7.15

Demand and supply of funds among agricultural households

Iqbal, Farrukh
Rand Corp.
Rand Note, no.N-1631-AID, May 1981, xi, 48p. : En
930008800
AID/OTR-G-1822

To overcome the theoretical and empirical shortfalls of previous studies of the demand for agricutural credit in developing countries, this report uses data from a 1970/71 survey of 3,000 farm households in India to test a life-cycle model of farm borrowing which: (1) defines the demand for credit to include not only the amount borrowed by farmers, but also farmer lending and other financial management activities; (2) examines the interaction between agricultural innovation (AI) and the demand for credit through two equations, one for the effect of AI on farmer demand for funds, the other for the relation of AI to interest rates (IR) and thus to the supply of funds; and (3) formulates the supply side of the market by modeling the IR as being jointly determined with the amount borrowed and by devising an imputation procedure for cases in which no external borrowing and thus no IR rate is reported.

Results show that: (1) large farms tend to reduce their borrowings while small farms tend to increase theirs, implying that agrarian reform will increase aggregate borrowing; (2) the labor and capital markets are linked; (3) factor-market interactions are empirically significant and need not be predicated on landlord-tenant relationships; (4) the capital market is affected by the rate of AI on both the demand and the supply side – a higher rate of AI (as indicated here by research) increases the demand for funds and reduces the nominal IR; and (5) lenders seem to consider beneficiaries of AI as less risky, while borrowers appear to consider the income-enhancing aspects of AI more important than any risks involved. With the caveat

that formal lending does not follow the profit–maximizing principles of moneylenders, IR regressions indicate that the nominal IR responds to variables that act as measures of the risk and opportunity cost of lending. On the demand side, the cost of funds is significant in determining how much is borrowed. For all households taken together, as well as for those with large holdings alone, the borrowing response is elastic, suggesting that the IR remains an empirically important variable in the rural funds market and could be used to alter the level of credit use. Appendices include a description of the working of the model.

181 **PN–AAK–278**

MF $1.08/PC $6.63

Supply responses of cotton farmers in Ghana: case study of northwestern Ghana

Ohene–Darko, Regina; Anim–Appiah, John
Virginia State University. Bureau of Economic Research and Development
Monograph series, v.7(2), Jul 1979, vi, 42p. : En
Grant nos. AID/DSAN–XII–G–0185, AID/DSAN–G–0612
931013911
AID/csd–3415

Domestic cotton production in Ghana is meeting only 20% of demand. This report describes a socioeconomic survey of farmers in the Wa area of northwestern Ghana and applies survey data to an economic model of factors affecting farmers' decisions to grow cotton.

Against overviews of the history, importance, and problems of cotton production in Ghana, the authors present the findings of their survey of Ghana's foremost cotton growing area. Credit is the major bottleneck. Although Ghana's Cotton Development Board (CDB) provides free seeds, fertilizer, and insecticides, credit is needed for land preparation, weeding, harvesting, and hiring labor. Thus, up to 85% of farmers rely on personal savings to finance their farm operations; the remainder borrow from friends, family, and moneylenders. Risk aversion is the most salient characteristic of farmers'decisionmaking. Their desire for security leads them to diversify production and ration capital. The authors recommend that the CDB integrate credit and marketing services and expand extension efforts. Because of endemic farm labor shortages, rural development programs and wage policies should be reviewed.

Of the variables employed in the authors'supply–response model, the prices of cotton and of guinea corn (a competing commodity) and a trend variable representing changes in extension services, technology, and other influences had the greatest effects on changes in cotton acreage and output. Thus, increasing cotton prices relative to those of competing commodities will elicit greater cotton production, other factors being unchanged. The CDB's guaranteed minimum cotton price is a step in the right direction but would be more effective if periodically adjusted relative to the prices of competing commodities. The significance of the trend variable shows that government efforts to increase cotton production by providing free inputs have been very successful and should be intensified and expanded.

Because commercial cotton production was only revived in Ghana in 1968, time series data used to test the model were limited and it is possible that not all significant variables were identified. A similar study should be made at a future date. Included in the report are a map, 11 tables, and an 11–item bibliography (1928–77).

182 **PN–AAK–788**

MF $1.08/PC $8.97

Annals of the Nineteenth Inter–American Savings and Loan Conference

Inter–American Savings and Loan Union
Instituto Colombiano de Ahorro y Vivienda
U.S. Agency for International Development. Bureau for Science and Technology. Office of Housing (Sponsor)
National Savings and Loan League
U.S. League of Savings Associations
Inter–American Savings and Loan Bank
(Inter–American Savings and Loan Conference, 19th, Cartagena, CO, 4–7 May 1981)
1981, 72p. : En
Also available in Spanish, PN–AAK–789
912158900
AID/OTR–CA–1823

Inflation and recession have forced the savings and loan (S&L) industry to find new ways to finance housing for the burgeoning urban population in developing countries. This report presents the proceedings of the 19th Inter–American Savings and Loan Conference, held May 4–7, 1981 in Cartagena, Columbia. More than 360 officials from 16 Latin American countries, the United States, Japan, and West Germany attended.

After a series of preliminary meetings the opening assembly was addressed by the Chairman of the Conference and five other participants. Themes addressed included the crisis facing S&Ls'as a result of inflation, the history of S&Ls', the relationship between savings and development, the proper role for governments in shaping S&L finance, and the current posture of U.S. S&L's.

Seven plenary sessions were held. The first included an overview of the S&L industry's performance during 1979–80, the institutional changes which have occurred, and the role of the Inter–American Union. This was followed by a presentation on the experience of the Columbian S&L system which included a discussion of the monetary control mechanism instituted by Columbia. The second plenary session was devoted to a documented analysis of savings and housing finance in Japan. The topic of the third session was thrift and housing finance in the United States, while the fourth focused on savings and housing finance in Spain and included the presentation of a film prepared by the Central Mortgage Bank of Columbia. The fifth session was dedicated to a discussion of West Germany's saving and housing finance industry; the sixth examined A.I.D.'s involvement in international housing finance; and the last session considered the reports of the working committees consideration of contemporary problems and perspectives on S&Ls', relationships between S&Ls'and the building industry, implications of the diversification of S&Ls', and the relationship between governments and S&Ls'. A closing session provided an overview of the important topics covered in the conference.

Also included are reports from conference committees and a list of conference participants.

183 **PN-AAJ-710**

MF $1.08/PC $3.25

Annotated bibliography of income distribution in Paraguay

Oberbeck, Charles D.
U.S. Agency for International Development. Bureau for Latin America and the Caribbean. Rural Development Division
Jul 1979, 22p. : En General working document no.1
53-319R-9-90

This annotated bibiliography provides students of Paraguay a brief review of information available in either the United States or Paraguay on income distribution and the socioeconomic characteristics of low income groups in Paraguay. Most of the works cited were published between 1974 and 1979. Annotations include assessments of the reliability of data.

The works are ordered alphabetically by title in Part I and indexed by author in Part II. Included with each of the 69 entries are the document's title, author, publisher, place and date of publication, and pagination, and when available the library where the document may be found.

184 **PN-AAK-376**

MF $2.16/PC $13.26

Econometric analysis of supply responsiveness in traditional agriculture: millet, sorghum and rice farms in Mali

Sako, Bafotigui; Cotterill, Ronald W.
Michigan State University. Department of Agricultural Economics
African rural economy program working paper, no.36, Jun 1981, viii, 85p. + attachment : Bibliography, p.83-85, En
625092600
AID/AFR-C-1267

The Government of Mali's twin goals of reestablishing the country's position as a net grain exporter and maintaining reasonable domestic grain prices may be incompatible. This paper analyzes data for the period 1960-79 in order to examine Malian farmers'supply responsiveness and the welfare effects of government grain pricing policies.

After describing the Malian agricultural sector and reviewing the grain policies of Mali's National Grain Agency (OPAM), the authors detail several econometric models of millet, sorghum, and rice production and sales to OPAM. The results of all equations included in the models are presented at length and indicate that Malian farmers respond to price in a fashion predicted by neoclassical economic theory. Specifically, the production and sale to OPAM of millet, sorghum, and rice are all positively responsive to government-set grain prices. The impact of OPAM's policy of subsidizing producer and consumer grain prices has been to transfer wealth from producers to consumers and from the government to grain importers, to withdraw resources from cereal production, and to worsen the balance of payments.

While not providing definitive proof, the study does indicate that it is possible to increase crop production by raising farm-level prices. It is thus recommended that OPAM: reduce farmers'risk by setting prices before farmers plant rather than at harvest time; increase the availability of transportation, credit, fertilizer, and technical knowledge; and eliminate import subsidies and raise urban wages in order to maintain city dwellers'purchasing power. Future research is suggested on consumer demand for grain and the price elasticities of demand and on the relation between production of grain and of cash crops (i.e., groundnuts, cotton, sugarcane, and wheat).

185 **PN-AAK-751**

MF $2.16/PC $17.42

Income inequality and the definition of income: the case of Malaysia

Kusnic, Michael W.; DaVanzo, Julie
Rand Corp.
U.S. Agency for International Development. Bureau for Program and Policy Coordination (Sponsor)
Rand report, no.R-2416-AID, Jun 1980, xvi, 135p. : En
AID/OTR-C-1432

The assumption that income inequality decreases as a country develops may be an illusion, a result of income measures that favor formal market activities. This report examines income distribution in Malaysia using four progressively broader definitions of income: (1) market income, the sum of all formal market transactions; (2) total observable income, which includes in-kind and cottage industry income; (3) total actual income I, which includes certain housework; and (4) total actual income II, encompassing all market and household income. Data were garnered from a 1976 Malaysian Family Life Survey of over 1,000 households in Peninsular Malaysia.

Using these definitions, the authors discuss the conceptual foundations of income measurement; outline income components and composites; report gross results from the entire sample; detail ethnic and urban-rural income differences; and use regression analysis to show the contributions of various household characteristics to income variations.

Analysis of income distribution in Malaysia shows that narrow income measures overstate inequality. Estimates of income levels, differentials, and inequality may vary significantly depending on whether: (1) income is broadly or narrowly defined; (2) means or medians are used to describe the central tendency of the distribution; (3) income is adjusted for household composition or size; (4) work hours are standardized to account for variable leisure consumption; and (5) the effect of demographic influences are statistically controlled.

Medians are always smaller and vary less than means. Adjusting for household size and compostion reduces the difference between Chinese and Malay incomes. Standardizing work hours increases income for some groups and reduces it for others. Life-cycle variation is not a determinant of income inequality. Although mean income differences among ethnic and geographic subgroups are large, 80-90% of income inequality is due to differences within, not among, subgroups.

The text is amply highlighted with data, diagrams, and graphs. Appended are a 44-item bibliography (1950-79) and information on Malaysian income taxes; wage and rent regressions; the value of housework; and the Gini ratio, the Thiel index, and correlation coefficients.

GNP ECONOMICS

186 **PN-AAK-098**
MF $1.08/PC $4.81

Uses of economic models in analysis of the cattle sector

Porter, Richard C.
University of Michigan. Center for Research on Economic Development
Feb 1979, 23p. : En
Livestock production and marketing in the Entente States of West Africa: Working paper, no.6
625090600
AID/AFR-C-1169

Since cattle are capital in economic theory, the key question facing a rancher or society is when to convert this capital into a consumer good – i.e., when to slaughter. This report explores the use of a variety of economic models to analyze the West African livestock sector.

After highlighting key factors which must be considered in any economic model of cattle production, the author summarizes eight economic models. The first four deal with the individual farm. (1) Benefit-cost analysis converts all benefits and costs to their present value and may be either private (the view of the rancher) or social (the view of society). (2) In a farm simulation model, one develops a set of descriptive equations, estimates all parameters, and uses computer experiments to get an idea of how various farm decisions affect the farm goal. (3) Farm-level linear programming entails optimizing a linear objective function subject to a number of linear equality and inequality constraints and is designed to reveal the optimal set of farm activities. (4) Models that optimize under uncertainty are useful for cattle problems where the natural grazing potential is subject to probabilistic change and the herd size or feed purchases can be selected with a degree of freedom.

Three models deal with the entire cattle sector. (5) Dynamic sector simulations require specifying a time period and a set of variables, conducting a survey to discover base year estimates and possible trends, and identifying the process of determination for each variable to be simulated. (6) Sectoral linear programming models, applicable if cattle production activities are roughly described by constant input-output relationships and linear constraints, essentially state a linear objective which is to be maximized subject to a number of linear relationships between variables and several linear constraints. (7) Sectoral econometric estimation is of limited applicability due to vast data requirements.

Finally, (8) linear programming is applicable to the cattle transport problem since many critical relationships are linear or proportional and others are subject to constraint.

187 **PN-AAK-025**
MF $1.08/PC $12.74

Food flows and simulations: rural Sierra Leone

Smith, Victor E.; Strauss, John; et al.
Michigan State University. Department of Agricultural Economics
MSU rural development series: working paper, no.19, 1981, xi, 90p. + attachment : En Econometrics workshop paper no.8102
931131500
AID/DSAN-C-0008

Although nutritional status inevitably reflects the impact of a country's development policies, little is known of the effects of economic policy on rural food consumption and nutrient intake at the household level. This report estimates per capita food consumption in rural Sierra Leone; uses a food accounting matrix to display rural food flows; and simulates the effects of food price changes on food production, consumption, and flows.

Estimates of rural per capita food consumption are based on household surveys in eight ecological zones; the estimation technique is presented in detail. The authors employ a food accounting matrix to concisely represent production, marketing, and consumption of food within the rural sector and the surplus for outside sale. Next, the intra-regional flow of food and calories for five groups of food among three income groups are given. After converting food data from natural to weighted kilograms, the authors conduct a systems estimation.

Given these systems estimation results, the authors simulate changes in production, consumption, and marketed surplus in response to price changes using 1974–75 prices as a baseline. After raising several policy questions, they present the results of six simulations and conclude that: (1) the effects of government policies are more complicated for rural than for urban families; (2) policy effects differ among commodities, regions, ethnic and income groups, and among those who do or do not grow rice; (3) a rise in market-determined farm wages increases the caloric and protein content of rural diets at the expense of marketable surplus; (4) fishing is the best minor activity for households – lower fish prices, if they result from competition, increase the protein content but reduce the energy content of rural diets; and (5) increases in the producer price of rice raise marketable surplus significantly with little effect on energy content in the average household's diet but with a marked increase in the calories available to lower income groups.

Included are 20 statistical tables, a food accounting matrix, and a 14-item reference list (1970–81).

188 **PN-AAK-548**
MF $1.08/PC $11.70

Supply and demand of millet and sorghum in Senegal

Niane, Amadou D.
Michigan State University. Department of Agricultural Economics
U.S. Agency for International Development. Bureau for Development Support. Office of Agriculture (Sponsor)
African rural economy program: working paper, no.32, Sep 1980, vi, 77p. + attachment : References, p.76–77, En
625092600
AID/afr-C-1267

Senegal inherited an export-oriented agricultural sector and a dependency on imported foodstuffs from the colonial era. This report investigates the supply of and demand for millet and sorghum in order to determine how Senegal can achieve food self-sufficiency.

Against background descriptions of the international and historical context of grain shortages and of the production and marketing of millet and sorghum in Senegal, the author indicates that study of these crops is relevant since most Senegalese are rural and are heavy consumers of millet and sorghum and because the Senegalese Government is committed to producing an instant millet and a millet/wheat bread and appears to be serious about food crop self-sufficiency as a result of the 1972–73 Sahelian drought.

The author develops an econometric model of the supply of and demand for millet and sorghum. Analysis shows that supply is positively related to the previous year's prices for millet and sorghum and negatively related to the past year's prices for groundnuts and rice. Demand appears positively related to the price for millet and sorghum as well as for imported rice; the relationship to income is unclear. Forecasting each determinant of supply and demand separately, the author predicts Senegal will be self-sufficient in millet and sorghum by 1985. However, this forecast does not take into account the availability of land, capital, labor, and the level of yields; assumes unchanging consumer preferences; and is based on incomplete data.

The author thus recommends that the Senegalese Government: (I) increase the producer prices for millet and sorghum and for rice; (2) consider establishing a millet and sorghum buffer stock; (3) encourage higher millet and sorghum yields; (4) tax imported rice; and (5) reduce the cost of milling millet and sorghum. The author also suggests studying the interaction of the markets for groundnuts, millet, sorghum, cotton and maize to determine if price variability of a given import affects domestic production of or demand for that crop.

Appended are discussions of rice and groundnuts in Senegal, the data employed by the author, and a list of 26 references (1962–79).

Sorghum plays an important role in the diets and economies of many African nations.

189 *** PN-AAK-931**

MF $2.16/PC $13.65

Food consumption behavior in three villages of Northern Nigeria

Smith, Victor E.; Whelan, William; Schmidt, Peter
Michigan State University. Department of Agricultural Economics
Michigan State University. Department of Economics
U.S. Agency for International Development. Bureau for Science and Technology (Sponsor)
MSU rural development series working paper, no.22, 1982, x, 92p. : References, p.91–92, En
931131500
AID/DSAN-C-008
** Available from MSU*

Although semi-subsistence households which produce most of the food they consume are relatively untouched by market forces, it is nonetheless important to know how and the extent to which these forces affect household food consumption. This report examines this situation, using data collected from households in Kano State, Nigeria and an econometric model developed on the basis of similar work in Sierra Leone.

Specifically, the authors present: (1) data on household food consumption patterns; (2) regressions relating consumption of sorghum, millet, maize, rice, cowpea, palm oil, nono (soured skimmed milk), and tomato to prices, expenditures, household characteristics, and market dependence; and (3) the resulting price and expenditure elasticities.

The average household annually consumed over 900 kg of sorghum and 100 kg of millet, plus a variety of other foods. Sorghum constituted a large part of total food expenditures and for over half the sample was an inferior good, i.e., as income increased, sorghum was replaced by cowpeas, palm oil, and maize. Sorghum was also a Giffen good; at a given expenditure level, households facing higher sorghum prices consumed more sorghum. The psoobile loss of caloric intake associated with switching from sorghum to other foods warrants consideration in determining further product promotion.

Importantly, the study found that households did respond to price and market incentives. Own-price elasticities were negative and expenditure elasticities positive for cowpeas, palm oil, and maize; the reverse was true for sorghum. There were also several large cross-price elasticities.

Cited as data limitations were small sample size; unavailability of data on consumption of groundnuts, onions, and foods purchased by females from their own earnings; the presence of endogeneity and multicollinearity among the data; and neglect of possible variables (e.g., access to transportation, land-labor ratios, inventory building).

Policy recommendations include improving family income by increasing cowpea and maize yields; improving transportation and marketing of imported foods (e.g., palm oil); and improving farm prices and export outlets for groundnuts, cowpeas, and especially for sorghum. The need for population control is also indicated.

AGRICULTURE

190 **PN-AAJ-613**

MF $3.24/PC $33.67

AID experience in agricultural research: a review of project evaluations

Crawford, Paul R.; Barclay, A.H. Jr.
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation (S)
Development Alternatives, Inc.
AID program evaluation discussion paper, no.13, May 1982, xiv, (260p.) : En
AID/SOD/PDC-0227

To provide background information for future A.I.D. agricultural research (AR) policy, this paper summarizes A.I.D.'s past and present AR activity and identifies major issues affecting AR projects.

First, major trends in AR over the past 10–15 years are reviewed: the development of new technologies adapted to both adverse and optimal conditions; and greater emphasis on onfarm research, communication between researchers and farmers, support for national AR systems in developing countries, and longer time frame requirements.

A review of A.I.D.'s AR experience reveals a changing pattern. In the 1950's, the belief that adequate technologies already existed made AR a low A.I.D. priority, while congressional restrictions and limited in-house expertise inhibited AR activity in the 1960's. The 1970's New Directions strategies emphasized other development initiatives. From 1978 to 1981, however, a new awareness of the lack of appropriate technology needed for food production increases and the success of the green revolution led A.I.D. to increase funding for AR by almost 70% to $143 million, with most of the funds going for mission projects.

Next, 131 evaluations of 48 A.I.D. AR projects are reviewed. Standard evaluations were found to focus on inputs and outputs; to provide neither an adequate picture of project performance nor the data needed to compare projects; and to not fully treat problems entailed in doing AR in developing countries, the need for more off-station AR and dissemination of findings. Only the four Impact Evaluations included in the sample measured project effect on beneficiaries. The documents did, however, reveal several recurring issues in AR projects. For the 39 regional and mission projects reviewed, these focused on problems in conducting AR and involving farmers in it, AR quality and priorities, construction delays and the time allotted to AR, and inadequacies in inputs and A.I.D. supervision. Issues in the nine centrally funded projects reviewed concerned linkages with host country institutions, performance of long-term staff, project scope and funding, and AR quality.

The study indicated the need for more than the standard evaluations of A.I.D. AR projects. Fourteen appendices include a 246-item bibliography (1963–81) of documents examined for this report.

191 **PN-AAJ-178**

MF $1.08/PC $7.28

Guatemala: development of the Institute of Agricultural Science and Technology (ICTA) and its impact on agricultural research and farm productivity

McDermott, J. K.; Bathrick, David
U.S. Agency for International Development. Bureau for Program and Policy Coordination
AID project impact evaluation report, no.30, Feb 1982, xiii, 14p. + 5 appendices : En
520023200

In 1975 A.I.D. initiated a project to increase the production and nutritive quality of basic crops in Guatemala and to develop the capability of the Institute for Agricultural Science and Technology (ICTA) to generate and promote the use of improved small farm technology. This report describes the project's setting and activities, outlines its impact, and summarizes its lessons.

Under the ICTA system, new farm-tested seed varieties and cultural practices acceptable to small farmers were developed for maize, beans, and sorghum and led to increased yields and development of a thriving private seed industry. In addition, ICTA staff increased both quantitatively and qualitatively (although rigid government salary schedules have led to a high attrition rate among the 10 Guatemalans who received advanced degrees, threatening ICTA's future progress); benefited from expatriate help in its research work and organizational growth; and received dramatic increases in financial support from the government. ICTA has come to represent a new and innovative model for agricultural research and is now working to share its approach with DIGESA, the Ministry of Agriculture's extension service.

Project experience taught: the benefit of an unconventional approach to generating acceptable small farmer technologies; the importance of sustained USAID/G involvement and of investing simultaneously in human, institutional, and technological resources; A.I.D.'s potential for developing agricultural institutions, its comparative advantage in institution-building projects, and the need in such projects to provide for an institution's support after the project ceases; the productivity of ICTA's linkages to international and U.S. agricultural research centers; the importance of coordinating technology and sociology in small farmer research projects; and the need for special financial incentives to retain ICTA's advanced degree scientists, special feedback information systems to test technology results, and flexibility in project implementation.

Appendices treat the evaluation methodology, ICTA's approach to technology development and farmer acceptance of it, the role of improved seed, and ICTA's institutional development.

192 **PN-AAJ-606**

MF $2.16/PC $14.69

Korean agricultural research: the integration of research and extension

Steinberg, David I.; Jackson, Robert I.; et al.
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation
AID project impact evaluation report, no. 27, Jan 1982, ix, 23p. + 5 appendices : En
489070500

In the context of a Government of Korea (GOK) strategy to improve rural life, A.I.D. funded a 1974–80 project to strengthen the GOK's agricultural research (AR) service. The impact of that project is here reported.

Results in the three project areas were mixed. Training was universally regarded as the most successful component, with the provision of equipment (especially a computer and library materials) of notable, but decidedly secondary importance. Short-term foreign help was of greater importance than resident help, which was of marginal utility.

The project paper was simplistic and somewhat misleading, underestimating current experimental yields and calling for breakthroughs that had already occurred, e.g., development of high-yield varieties (HYV) that helped make Korea self-sufficient in rice by 1975. Concentration on rice led to a deemphasis on other important crops. Thus, while project yield increases may be achieved by their 1984 target date, overall national targets will not be met. In fact, despite yield increases in some crops, hectarage in others have been falling – due to a rigid command structure which prevented the GOK's well-organized extension service from taking precautions, especially regarding new races of blast fungal disease and cold-sensitive varieties, the factors causing, respectively, the 1979 and 1980 crop failures.

In sum, the project, while appropriate at the time, was not innovative; the future of AR in Korea will depend on the GOK's resources and political will. Other lessons learned are that: overstress on achieving targets and too strong a command structure can lead to undue focus on short-term results; an AR program must be continuous and integrate AR, extension, training, agricultural education, and farmer incentives; P.L. 480 can retard AR by deferring improved prices; HYV adoption can have both positive and negative economic effects; technical help should be reviewed prior to a project; ongoing contracts with international AR centers are essential; and the causes of the agricultural successes in Sino-centric societies should be studied.

Appendices include six individual reports and a 42-item bibliography (1958–81).

193 **PN-AAK-129**

MF $2.16/PC $13.91

Assessment of West African agricultural development

Blair, William D.; Dorman, John; et al.
U.S. Agency for International Development. Bureau for Africa. Regional Economic Development Services Office. West Africa
Dec 1981, 101p. : En

Despite the high level of economic assistance provided West Africa over the past 20 years, the region has failed to halt or reverse the trend of declining food output per capita. This report assesses the region's farm sector, highlights key food production issues, and make suggestions for improving the effectiveness of agricultural development programs.

Against an overview of the agricultural sector, the authors review A.I.D.'s strategy of assisting West African governments to identify projects, constraints, and goals and the components of A.I.D.'s program. The authors proceed to describe the factors associated with low agricultural output: food import projections; urbanization and income growth; low investment in research, training, and extension; low land and labor productivity; ecological degradation; and prohibitive transportation costs.

Next, the authors focus on the key issues bearing on food production in West Africa: the 1.4% annual decline in per capita food output; insufficient research; the costs of pursuing food self-sufficieny; the limited availability of irrigation; government suspicions of private agri-business; absorptive capacity and the need to cover recurrent costs; government subsidies; the role of cash crop production; the present and potential importance of livestock raising and fisheries; the food security of rural households; the impact of population growth; the employment role of rural nonfarm enterprises; the inadequacy of the West African diet; the supply and cost of energy; the necessity of appropriate technology; the declining terms of trade facing oil importing countries; foreign exchange constraints; and the nascency of regional institutions.

In conclusion, the authors recommend a redirected regional agricultural development strategy which should: (1) identify the causes of declining food production; (2) reassess national and donor programs; (3) increase national agricultural development budgets; (4) emphasize substitution of food imports, especially cereals; and (5) target applied agricultural research. Appended are data on population, GNP, total and per capita food output, and production of selected food crops.

194 **PN-AAK-813**

MF $4.32/PC $45.50

Proceedings of workshop on small farmers development and credit policy

Ohio State University. Department of Agricultural Economics and Rural Sociology
Nepal. Ministry of Home Panchayat
Agricultural Development Bank. Agricultural Credit Training Institute
(Small Farmers Development and Credit Policy, Kathmandu, NP, 7–11 Apr 1980)
Jun 1981, xvi, 320p. : En
931116900
AID/TA-BMA-7

In 1975, the Government of Nepal initiated a Small Farmer Development Programme (SFDP) to provide appropriate technology and especially credit to the small farmers who comprise two-thirds of all Nepalese farmers and an estimated 36% of whom live below the subsistence level. In April, 1980, a workshop, the proceedings of which are presented here, was held in Kathmandu, Nepal to explore ways to improve the SFDP and to implement it within an integrated rural development (IRD) framework. A total of 18 papers were presented.

Three initial papers treat, respectively, the history of programs, culminating in the SFDP, which sought to benefit small farmers through the group approach; the PLORD concept, which uses participation by farmers in local organizations as a means of rural development, and the exemplification of the concept in several countries, including Nepal; and the experience gained from the SFDP regarding group lending. A paper on the relation of the SFDP to donor-funded IRD projects is followed by papers on strengthening the SFDP receiving mechanism by organizing small famer groups; the impact of the SFDP's credit program; the benefits of Bangladesh's Grameen Bank Project, which makes loans to small groups; and the potential of group lending for overcoming rural financial market barriers and reaching low-income households.

Two papers are presented in the SFDP itself, the first outlining its history and accomplishments, the second its problems and prospects. These are followed by a paper on increas-

ing interest rates and mobilizing savings as a way of solving the woes of rural financial markets; two papers describing, respectively, the promising first year findings of an AID–funded experimental rural finance project in Bangladesh and the project's village agent model; and a paper on steps taken to mobilize rural savings in Nepal. Papers on producing and circulating cereals in a dryland tract of South India's Coimbatore District, on the importance of informal financial markets in designing rural credit programs, and on the extension of formal credit for farm and non–farm enterprises in Thailand conclude the volume.

Appended are the workshop's schedule and management and a list of workshop participants.

195 **PN–AAK–006**

MF $1.08/PC $7.93

Trends in RTG agricultural policies

Suphaphiphat, Phiphit
Thai University Research Association
U.S. Agency for International Development. Bureau for Asia. Thailand (Sponsor)
Thai University research association report, no.2, Nov 1979, 57p. : En

The expansion of land under cultivation over the past 20 years in Thailand has allowed Thai farmers to achieve satisfactory growth in agricultural production but has yielded little improvement in farmers'incomes. Thus, future increases in both farm output and farmers'incomes are predicated upon raising productivity through application of new and greater quantities of inputs. The prices of both agricultural inputs and output will play a crucial role in such developments. In light of this relationship, this report analyzes Royal Thai Government (RTG) policies relating to agricultural pricing and provision of key inputs to farmers.

Regarding inputs, the author reviews RTG policies bearing on the availability of chemical fertilizers, improved seed, irrigation and other sources of water, farm labor, agricultural machinery (especially tractors and water pumps), pesticides, and credit. The author provides the startling fact that only 10% of Thai farmers have access to credit. RTG pricing policies for rice, sugar, and rubber are briefly investigated.

The author concludes that RTG input and output pricing policies have contributed little to raising agricultural production and have discriminated against the small farmer. In particular, these policies have raised the price of fertilizer and lowered that of rice, thereby discouraging farmers from growing more rice. Further, supplies of water, seed, and credit have not kept pace with farmers growing demand and farmers have not been trained in the efficient and widespread use of fertilizer, pesticides, and farm machinery. The author recommends that RTG policies be redirected towards the objectives of raising farm income, providing incentives to farmers, and reducing income disparity within the farm sector.

Appended are a 40–item bibliography (1966–79) and statistical data on the price and use of fertilizer, seed requirements and production, irrigated area, and the importation and use of pesticides.

196 **PN–AAK–777**

MF $1.08/PC $1.95

Philippine agricultural sector in 2000 A.D.: result from the MAAGAP national model

Kunkel, David E.; Rodreguez, Gil A. Jr.; Gonzales, Leonardo A.
U.S. Department of Agriculture. Foreign Demand and Competition Division
Philippines. Ministry of Agriculture. Bureau of Agricultural Economics
U.S. Agency for International Development. Bureau for Asia. Philippines (Sponsor)
19 Mar 1979, 12p. : En

Model Analysis of Agricultural Adjustments in the Philippines (MAAGAP) is a mathematical model developed for policy and planning analysis of the Philippine agricultural sector. This paper reports on the use of MMAGAP in projecting agricultural sector status in the year 2000 under three pricing scenarios – low (I), medium (II), and high (III) – for coconut and sugar exports.

Results show that Scenario III would have the greatest impact on farm income, employment, export, and general use of farm inputs from 1976 to 2000. In Scenario I (considered unlikely in light of the recent international sugar agreement), farm income would decline slightly until 1982, then increase steadily until the year 2000. Scenario II shows farm income increasing steadily at a 3.8% annual rate. As expected, Scenario III showed substantial increases in farm income in all periods, ending with a 4.75% annual growth rate. A growing agricultural sector will require large increases in non–traditional inputs such as fertilizers, chemical feedstuffs, and tractor services, with only a moderate increase in animal and human labor inputs.

Projections of the supply–demand balance for major crops shows rice production sufficient to meet future demand without notable changes in real prices under Scenario II, but slowed growth in palay output under Scenario III. For corn, production would increase only modestly under Scenarios I and II, suggesting the need for a major technological breakthrough or development of appropriate substitutes. For the two export crops studied, sugar and coconuts, production growth rates declined under Scenarios II and III; for both products, domestic demand will affect export availabilities by the year 2000. For livestock, production increases to meet the large projected increase in demand occurs only under Scenario III, especially by the year 2000.

Besides the limitations inherent in equilibrium models, MAAGAP covers only part of the agricultural sector and must be expanded to include other export crops in order to reflect the foreign trade component; there is also a need to cover energy and other imported inputs more explicitly. While useful for predicting gross changes, MAAGAP cannot be used for fine policy tuning or for short–term analysis. Descriptions of the study's methodology and assumptions are included.

197 **PN-AAK-338**

MF $2.16/PC $17.55

Directory of small farms technical assistance in the United States

Baker, Heather Tischbein; Blobaum, Roger; et al.
National Rural Center
Mar 1981, vii, 128p. : En
936530800
AID/DSAN-C-0244

The strategy of increasing agricultural production in developing countries through use of improved seed and sophisticated techniques has neither increased incomes nor improved nutrition among the rural poor; it has often worsened their plight. The combination of this failure with escalating energy costs, growing food scarcity, and recent global economic stagnation points to the need to devise a farming systems approach to rural development. As a partial answer to this need, this directory identifies American organizations and projects with expertise appropriate to the needs of limited-resource farmers in the developing world.

The authors briefly trace the path leading to re-evaluation of the Green Revolution and describe the charactersistics of farming systems research, namely: (1) a view of the farm as a production unit and of the farm household as a consumption unit; (2) recognition of the interdependence of the human and natural environments; (3) setting of priorities which reflect the holistic perspective of the farm household and its total environment; and (4) research on farm subsystems individually and as they relate to each other and to the whole farming system.

The 96 entries in the directory include land grant and other institutions of higher learning, federal and state government agencies, and private organizations. Selection was based on responses to a questionnaire (a copy of which is appended), with the project's or institution's orientation to small farmers being the primary concern. Entries are ordered geographically by state and alphabetically within each state. For each project or institution the following information is provided: address, phone number, and the name of a contact person; an overview of the types and substance of activities; source of funding; and (sometimes) description of facilities and staff. A subject index is included.

198 **PN-AAK-114**

MF $1.08/PC $10.27

Perishable postharvest losses in selected Eastern Caribbean countries: causes and recommendations

Leeper, D.; Schermerhorn, R.; Jackson, D.
University of Idaho. Postharvest Institute for Perishables
U.S. Agency for International Development. Bureau for Latin America and the Caribbean. Barbados (Sponsor)
GTS report, no.81-02, Oct 1981, 77p. : En
931132300
AID/DSAN-CA-0265

Postharvest food loss, intertwined with the overall marketing and distribution systems, is a serious problem in the eastern Caribbean. This report, based on visits to St. Vincent, St. Lucia, Dominica, and Barbados, explores the determinants of crop loss in the context of the larger marketing and distribution systems and identifies interventions with potentially broad economic impact.

While the authors state that precise figures for losses are neither possible nor presently necessary, estimates range from 10% for some durable crops to 60% for more perishable crops. The major cause of crop loss is overproduction which leads to periodic gluts. Overproduction results primarily from ignorance of market demand due to the absence of agricultural and market information and an inefficient marketing system. Other causes of crop loss include the fact that premium prices are not paid for quality products; the unavailability of appropriate and economical technology for reducing on-farm and postharvest losses; the limited use of packing materials designed to minimize loss; unreliable inter-island shipping; inadequate or nonexistant storage and handling facilities; rough and multiple crop handling; and non-use of crops not sold for human consumption.

The authors thus recommend testing three measures which rely on available technology. (1) Current local and regional agricultural market and price data must be regularly collected and analyzed to allow farmers to make informed planting decisions. (2) To maintain crop quality, farmers must be trained in and provided the means for timely and proper harvesting and handling of their crop; simple structures should be built to guard the harvest from the sun; standardized, loss-reducing packaging must be used; and inter-island transport should be regularized. (3) Finally, crops not fit for human consumption should be used for animal feed or fertilizer. Detailed schedules and workplans for implementing these recommendations are included.

Appended are a table of optimum conditions for storage of selected crops, a partial listing of contacts, a 14-item list (1975-81) of sources cited, and maps and schematics of the marketing systems on the four islands.

199 **PN-AAK-437**

MF $2.16/PC $13.26

Farm and village production systems in the semi-arid tropics of West Africa: an interpretative review of research

Norman, David W.; Newman, Mark D.; Ouedraogo, Ismael
International Crops Research Institute for the Semi-Arid Tropics
ICRISAT research bulletin, v.1(4), Oct 1981, vi, 94p. : En

The semi-arid tropics of West Africa are an area in transition. Population density is growing, contact with the world economy is increasing, and traditional institutions are being eroded. This report, using a farming systems framework to review information on the region's rainfed agriculture from 1960 to 1980, analyzes the socioeconomic constraints to farm production and develops guidelines relevant to new crop technologies.

The authors begin by describing the research and development institutions which develop agricultural policy and the cooperatives which implement it. They then highlight the changes in traditional village norms, structures, and beliefs arising from more frequent contact with the the outside world. Provided next are detailed explorations of: the stocks and flows of the land, labor, and capital inputs to production; the operation of the resulting crop, livestock, and off-farm enterprises; and the relationship between these inputs and processes. The authors emphasize that the ongoing socioeconomic transition is characterized by a growing heterogeneity in the human and technical environments which – although frequently overlooked

in static studies of farming systems – is resulting in an increasingly unequal distribution of wealth.

Arguing that these inequalities must be explicitly addressed in designing strategies to improve farming systems, the authors suggest the use of farmer–based, bottom–up research approaches combined with the fielding of interdisciplinary research teams. Such an approach should be applied both to methodological issues (e.g., developing more efficient methods for analyzing the relationship between technical, economic, and noneconomic variables); and to issues related to the design of relevant farm technologies (e.g., risk aversion, the seasonality of labor, cash levels, nutrition, the differing efficiency of large and small farmers, and the role of cooperatives, credit programs, and other institutions). A list of 265 references in English and French (1941–79) is appended.

200 **PN–AAK–475**

MF $1.08/PC $4.55

Farming systems approach: relevancy for the small farmer

Norman, David W.
Michigan State University. Department of Agricultural Economics
U.S. Agency for International Development. Bureau for Development Support. Office of Rural Development and Development Administration (Sponsor)
MSU rural development paper, no.5, 1980, vi, 26p. : En
931119000
AID/ta–BMA–4

Farming systems research (FSR) is a "bottom–up" or farm–level approach to the development of small farmer technologies. This paper defines the basic characteristics of FSR, gives examples of successful FSR projects, and discusses problems in implementing FSR.

Conventional agricultural technology development tries to modify technical farming elements but ignores human factors. FSR, on the other hand, recognizes and focuses on the interrelationships between technical and human elements in a farming system. Its primary aim is to increase productivity in a way that is acceptable to the farming family. FSR gives the small farmer, often for the first time, a voice in tailoring research priorities. Farmers and multidisciplinary teams work together to design, modify, and improve farming systems in a local area.

Although agricultural scientists for years have disdained mixed cropping, an FSR project in northern Nigeria showed that mixed cropping was an efficient strategy for farmers facing land or labor constraints or uncertain weather. In northern Nigeria, a FSR cotton project succeeded after farmers rejected a university–designed cotton planting technology package because its labor demands were incompatible with their farming systems. An FSR project in Southeast Asia led to a dramatic increase in cropping intensity in only 4 years while in Guatemala an FSR–revised planting system increased farmers'income by 33%.

However, FSR is still in a developmental stage and faces numerous problems, including the short supply of researchers capable of understanding and working with small farmers in developing countries; the lack of a standard methodology; and the time demands and expense of its area–specific approach. To overcome these problems, FSR should: expand its systems approach to include marketing and off–farm enterprises; strengthen links to extension agencies in order to reduce time lags between recommendation and adoption of solutions; and develop more widely applicable technology packages. Also, if a working environment more favorable to FSR is to be created, agricultural institutions and scientists will have to take a more holistic approach and be more willing to interact with farmers and extension workers. A list of 28 references (1972–79) is provided.

201 **PN–AAK–275**

MF $1.08/PC $3.38

Indicators of food and agriculture in AID assisted countries

U.S. Agency for International Development. Bureau for Science and Technology. Office of Development Information and Utilization
Statistical profile series, Jun 1981, 25p. : En

Intended as a handy reference manual for A.I.D. personnel, this report draws on data sources from major international organizations such as the World Bank, the U.N. Food and Agriculture Organization, and the International Monetary Fund, to present a statistical profile of agricultural development in AID–assisted countries.

A total of 28 indicators in nine classes are provided. (1) Agricultural Production indicators include average annual growth rate of total production and annual production as a percentage of total domestic production. (2) Agricultural and Food Production is indicated by total and per capita indices. (3) For Cereal Crops, indicators are given for up to three main crops, cereal area harvested as a percentage of arable land, and cereal yields. (4) Food Supply indices present per capita daily calorie and protein supply and cereal consumption and calorie consumption as a percentage of requirements. (5) Agricultural and Food Trade is indicated by major agricultural imports and exports. (6) For Agricultural and Food Trade, indices are provided for imports and exports of both agricultural and food products as percentages of total merchandise trade. (7) Land Use and Distribution (I) is indicated by population density on agricultural land, average agricultural land per agricultural worker, economic land in crops, and percentage of cropped land irrigated. (8) Land Use and Distribution (II) is indicated by fertilizer consumption, tractor density, percentage of land held by largest 10% of holdings, percentage of holdings under 5 ha, and percentage of holdings consisting of three or more parcels. (9) Finally, Agricultural Labor indices are provided for the absolute size of the farm labor force and for its percentage of the total labor force and for its average annual growth rate.

Sources of the information and definitions of the indices are provided.

202 **PN–AAK–360**

MF $1.08/PC $6.89

Starting a farm management and farm record program in Tunisia

Litwiller, William F.; Guellouz, Mustapha; Stiles, Richard
U.S. Agency for International Development. Bureau for Africa. Tunisia (Sponsor)
Aug 1981, 15p. + attachment : En

Modern farm planning and management methods are new and poorly understood by most small farmers in Tunisia. This report describes an extension farm management program designed to address this problem.

The program, based on a view of the farm as a technically well-managed and economically sound unit, was administered by the Economics Section of Tunisia's National Office of Livestock and Pastures (OEP), recieved technical assistance from A.I.D., and targeted farmers with less than 20 ha who raise cattle but cultivate little forage.

In its first year, the program was limited to three farms. Extension staff were trained and a farmer questionnaire and record book developed. Agents first solicited answers to the questionnaire regarding farm characteristics and farmer preferences and intentions and then helped devise individualized farming plans. During the year, farmers recorded receipts, expenses, family use of farm products, yields, milk production, animal births and deaths, beginning and end of year inventories, and depreciation; the agent provided a written analysis of the farm business.

The program was extended to 54 farms in 1980–81, but many farmers quit because they disliked recordkeeping and had mistakenly expected the program to provide forage seeds and other materials. Nonetheless, the program had a marked impact – both bersim and milk production were far above average, per capita income of participating farmers was slightly above the national average, and the most successful farmers in the program earned twice the national average.

Contributing to the program's success were early identification of farm management problems; farmers'confidence in agents; the development of training materials and technical recommendations for forage production and livestock care; training regional agents in farm management principles; and a slow and careful start. To ensure future program success, the authors recommend expanding the Economic Section; continuing staff training and farmer follow-up; elevating the program to the level of a Farm Management Project; enlisting the support of the National Farmers Union; and increasing the use of Peace Corps volunteers. Attached are sample Farm Record books.

203 **PN-AAJ-883**

MF $1.08/PC $13.52

ICARDA annual report 1980–81

International Center for Agricultural Research in the Dry Areas
1981, viii, 51p. : En

The goal of the International Center for Agricultural Research in the Dry Areas (ICARDA) is to develop improved farming systems to better meet the agricultural needs of limited rainfall areas of the world. Despite the financial strain posed by inflation, a worldwide recession, shrinking donor capacities, and an increase to 13 in the number of Centers to be supported, ICARDA made significant advances in 1980–81 which are described in this document.

Under the Farming System Program, the Soil Water and Nutrients team used the neutron-scattering (neutron probe) technique to study the factors influencing water penetration into and storage in the soil and water use by crops, and also made progress in identifying crop nutrient deficiencies on drier sites. A capacity to assess food quality in terms relevant to crop improvement programs was established.

In the Cereals Improvement Program, research emphasized improvement of barley, durum wheat, breadwheat, and triticale; cereal pathology and agronomy investigations; and a cooperative winter cereals demonstration program in Jordan.

Research progressed both on-and off-site under the Food Legumes Program. Emphases were on improving faba beans, lentils, and chickpeas. In terms of the former two crops, germplasm banks were established; regarding chickpeas, trials were conducted for selected strains resistant to *Ascochyta* blight, a fungus which inhibits the potentially beneficial practice of planting chickpeas at the beginning of winter rains. Work continued on the Nile Valley project.

The Forage Improvement Program focused on germplasm collection, multiplication, and appraisal; forage and pasture plant selection and breeding; forage and pasture agronomy experiments; and animal husbandry studies.

Finally, in the Training and Communications Program, over 160 scientists from 15 nations were trained and numerous reports were published, including the first English-language reference work on lentils.

204 **PN-AAK-126**

MF $4.32/PC $47.06

Analysis of selected agricultural parastatals in the Ivory Coast

Hermann, Eric R.
Tufts University. Fletcher School of Law and Diplomacy
U.S. Agency for International Development. Bureau for Africa. Regional Economic Development Services Office. West Africa (Sponsor)
Jun 1981, xiii, 350p. : Bibliography, p.334–350, En
AID/REDSO/WA-79-177

Because the Ivory Coast has relied heavily on parastatals (quasi-state corporations) in successfully expanding its agricultural sector, it provides an illuminating subject for this study of the economic efficiency of agricultural parastatals. After background sections on parastatal theory and on the government's dominant role in the Ivory Coast's agricultural development, the author presents case studies of the cotton, oil palm, coffee, and cocoa parastatals and suggests ways to improve their efficiency.

The author studies both allocative efficiency which examines the price incentives affecting parastatals'use of inputs and choice of outputs and the impact of parastatal activity on national resource allocation; and operational or X-efficiency in the use of resources, the latter type of efficiency from an institutional viewpoint.

Notable problems found using allocative efficiency were that parastatals face government-set artificial prices and exchange rates and distorted incentives which encourage investment in economically unfeasible, capital-intensive farming schemes. Despite these distortions, the author finds that parastatals have generally allocated their resources well and inefficiencies are tolerable. X-efficiency, however, was found to suffer due to conflicting social welfare and financial objectives; control by the government in terms of changing policies, unreliable funding, organizational restructuring, and interference in daily decisionmaking; and unreliability of the public sector for agricultural research and development and for international marketing.

Recommendations are that parastatals produce high-stake crops (e.g., those subject to price fluctuation) only if production is low-risk and parastatals have control over inputs; and create either multiple administrative units or technical packages to cope with geographical, human, and administrative diversity or confine their activities to one subsector; and use incentives to enroll smallholders in agricultural programs.

The author concludes that while parastatals remain a viable path to rural development, West African governments must design them to suit their tasks and recognize the key role

played by the private sector in efficient parastatal operation. Appended are a 24-item annotated bibliography (1967–79) and a 180-item bibliography (1945–80).

205 **PN-AAL-207**

MF $2.16/PC $20.80

Agricultural sector assessment report for Sierra Leone

Consortium for International Development
New Mexico State University
U.S. Agency for International Development. Bureau for Africa. Sierra Leone (Sponsor)
Jun 1982, xii, 147p. : References, p.141–147, En
AID/SOD/PDC-0217

Although agriculture is Sierra Leone's key industry, agricultural development is constrained by a number of pervasive social and economic factors. This report assesses the agricultural sector and recommends measures to overcome these constraints.

The authors first review the physical and social environments of farming in Sierra Leone; data are provided on climate, soil, vegetation, fauna, demographics, land tenure and labor practices, nutrition and health, and rural credit. Agriculture's economic role is then examined and relevant government agricultural institutions are discussed. The rice, cash crop, forestry, fishery, and livestock sub-sectors are described and assessed and national and sub-sector agricultural goals are presented, with attention given to the private and social profitability of various subsectors.

The primary constraints to agricultural development include: a low level of government investment and price incentives for agriculture; an ineffective infrastructure for delivering capital inputs and credit to farmers and for marketing farm products; a monopsonistic buying structure for cash crops which extracts large amounts of tax revenue without corresponding investment in research, extension, and development; and the lack of applied research in agriculture and an ineffective extension service. Current agricultural development policy focuses on specific, donor-funded Integrated Agricultural Development Projects which have had mixed success rates; more of these projects are planned, but they are projected to service only 20% of farmers.

The Government of Sierra Leone should give top priority to a program of agricultural data collection, processing, and dissemination to support research and policy-making and to a program of applied technical and economic research on rice, complementary crops, and cash crops. Government should also: make greater investments in agriculture; improve its ability to tax non-agricultural sources; eliminate capital input subsidies; foster a system of effective credit and capital input delivery; promote farmers'associations; increase the official farmgate price of rice and ensure that producers receive it; and strive to gain farmers'trust. Specific recommendations regarding rice, cash crops, crop research, extension and institutions, primary product processing and food storage, fisheries, and livestock are also presented. A 101-item bibliography (1964–80) is appended.

206 **PN-AAK-815**

MF $1.08/PC $8.97

Agricultural marketing systems: a conceptual framework

Narendran, Vasantha
U.S. Agency for International Development. Bureau for Development Support. Office of Rural Development (Sponsor)
Oct 1979, 67p. : References, p.63–67, En

To help policy and program officials identify marketing problems which constrain the small farm sector in developing countries, this report reviews pertinent literature and develops and applies a model for understanding the intricate linkages between agriculture and marketing.

The analytical framework employed views the market as an articulator of the integrated economy, consisting of multiple levels and sectors which complement one another while contributing to the division of labor necessary for exchange to take place. In this view, the market functions as an integrator of the entire economic process.

Within this framework, the author reviews a variety of studies on such topics as: the locational approach, which focuses on spatial inter-relationships between markets and market evolution; studies on market periodicity; marketing chains and commodity flows; food systems and sub-systems; market typology; itinerant market traders; pricing and marketplace trade; and individual commodities.

Areas identified for future research include: how changes in marketing institutions might improve socioeconomic conditions in rural areas; the effect of marketing systems on income distribution; the flow of food, other consumer goods, and agricultural inputs within rural areas through a hierarchical set of trading arrangements; the relation between nutrition and marketing services and their combined effect on the welfare of consumers and producers; and how small-scale food retailing i both rural and urban areas can be improved through managerial and technological innovations.

Objectives for future market development research are identified as: achieving an abundant and reliable supply of nutritious food at economical prices; facilitating a balanced production of foods and services that reflects consumer preference and production costs; increasing resource productivity in food production and distribution; stimulating productive and renumerative employment opportunities, increasing farmer income, and ensuring the development of equitable and competitive exchange relationships in agricultural markets; and discouraging the uneconomic uses and spoilation of natural resources and the environment. Appended are 51 references (1940–1979).

207 **PD-AAJ-068**

MF $2.16/PC $21.45

Agricultural sector analysis, Yemen Arab Republic

Wyckoff, J.B.; McCullough, James M.; Sharafuddin, Hassan
Consortium for International Development
Oct 1981, v.p. : En
298003500
AID/NE-C-1613

Investigation of Yemen's agricultural development during the country's First Five Year Development Program (1975–80) shows that economic forces played a more crucial role than did

government planning. This agricultural sector assessment analyzes Yemen's agricultural development during 1975–80 and identifies constraints to achieving the agricultural development goals set forth in the Second Five Year Program.

The authors first discuss the overall Yemeni economy in terms of growth, investment, government revenues and expenditures, international trade, the balance of payments, the financial sector, and the monetary system. While GDP grew 142% from 1975 to 1980, growth in the agricultural sector was nil. As a result, agriculture's portion of GDP fell from 40% to 29%.

Next, the authors detail the agricultural sector in terms of inputs, capital investment, credit, supporting institutions, production, marketing, and consumption. The greatest gains were witnessed in the production of fruits, vegetables, poultry, and eggs. While overall cereal production grew, production of millet and sorghum – the least profitable use of farm labor – fell as farmers grew more profitable grains. Efforts to develop the traditional cash crops of cotton and coffee were dismal failures. The combined effect of the above trends, however, has been favorable to farmers.

Arguing that an understanding of the Yemeni farmer has been lacking and is critical to understanding and forecasting agricultural sector performance, the authors provide a sociocultural analysis of kinship, religion, the role of women, leadership, mobility, and time allocation in Yemeni society. Identified as additional constraints confronting the agricultural sector are: (1) poor extension services due to a lack of trained personnel and weak and immature public institutions; (2) limited water and soil resources; (3) inadequate government budgetary support of farming; (4) rising farm labor wages; and (5) male–oriented development projects which ignore women's central role in farming. Lastly, strategies and recommendations are outlined for the Second Five Year Program. Areas for action emphasized by 68 potential projects included irrigation, livestock, and crop production.

208 **PN–AAK–592**

MF $3.24/PC $28.86

Soybean seed quality and stand establishment; proceedings

Sinclair, J.B.; Jackobs, J.A.
University of Illinois at Urbana–Champaign. College of Agriculture. International Soybean Program
(Conference on Soybean Seed Quality and Stand Establishment, Colombo, LK, 25–31 Jan 1981)
INTSOY series, no.22, 1982, xiii, 206p. : En
Grant DAN–1406–G–00–1015–00
931056000
AID/TA–C–1294

Soybean research has shown that both physical and biological factors are responsible for reduced seed quality and vigor, that stand establishment depends on seed quality, and that seed quality is directly influenced by weather conditions during seed maturation and harvest and by subsequent storage conditions. Because knowledge of these facts remains largely fragmented and is not being communicated to farmers, the International Soybean Program (INTSOY) hosted an international conference in Sri Lanka for research scientists and extensionists to correlate current knowledge on soybean seed quality and stand establishment, discuss ways to communicate this knowledge to farmers, and determine future research needs.

The conference proceedings presented in this volume include: (1) 19 invited papers and abstracts of 13 volunteered papers on soybean seed maturation, genetic differences in seeds, the effect of weather, harvesting and planting procedures, and the role of insects and pathogens; (2) 11 country reports from various Asian nations; and (3) reports from three working committees on soybean production, crop protection, and storage and mechanization.

In the plenary sessions, the speakers voiced a number of proposals on what emerged as a major concern among the delegates – the importance of seed quality in expanding soybean production in tropical and semi–tropical areas. Pointed out in particular was the complexity of soybean seed production in the tropics and semi–tropics due to the high humidity and temperature levels that prevail throughout the year. Other themes sounded were the necessity for good seed to make soybean an economical crop and the nutritional importance of soybeans.

All information presented during the conference related to seed production, technology, and storage and to seed certification in tropical and semi–tropical developing countries. Such information is directly related not only to INTSOY goals, but to complementary efforts of other international donors such as the Food and Agriculture Organization's ongoing Regional Field Food Crops project in North Africa and the Middle East.

209 **PN–AAK–771**

MF $1.08/PC $4.03

Landforms in the rice–growing areas of the Cagayan River basin

Bruce, R. C.; Morris, R. A.
International Rice Research Institute
IRRI research paper series, no.65, Aug 1981, 28p. : En

Because land forms and soil units develop by parallel processes, identification of the former can serve to predict the qualities of the latter. This paper reports on a project to devise and test, in the Cagayan River Basin in the Philippines, a procedure for rapid land description beneficial to agriculturalists.

Against a background discussion of the foundations of land classification, various geomorphic–pedogenic studies, and of different land classification systems, the authors describe the evolution of landforms, the stratigraphy, and the climate of the study area. They adopted a hierarchical four–level classification system consisting of: (1) four land systems (alluvial, plain, hill, and mountain); (2) nine land sub–systems; (3) 30 landform units; and (4) 75 homogeneous land surface units.

All Basin land was mapped to the subsystem level, but only land in the alluvial system, where rice production is concentrated, was mapped at the landform unit level. Patterns within the 150,000 ha study area were identified from topographic maps, stereograms, and LANDSAT imagery. The three highest levels were characterized in terms of surface features, land use, vegetative cover, water availability, flooding hazards, and suitability for rice cultivation. Next, to obtain a limited but objective evaluation of the correspondence between landform and soils, soil profile data were gathered from 26 sites (40cm of surface) along seven short transects. Subsequent cluster analysis of the profiles and review of the resulting pattern of fusion supported the presence of a correlation between landform units and soil properties.

Although the hierarchical system was applied satisfactorily in Cagayan, the procedures by which the system was formu-

lated must be tested in other regions, both in the 2–300,000 ha range and in areas in excess of 1,000,000 ha. Also, additional studies are needed to determine the degree of correspondence between land forms and soil characteristics and between these soil properties and crop adaption.

The report includes numerous tables, graphs, and photographs and a list of 35 references (1951–80).

210 **PN–AAJ–881**

MF $1.08/PC $.52

Plant yield and nitrogen content of a digitgrass in response to azospirillum innoculation

Schauk, S.C.; Weier, K.L.; MacRae, I.C.
Applied and environmental microbiology, v.41(2), Feb 1981, p.342–345 : En
931100401
AID/TA–C–1376

Although the beneficial effects of the symbiotic nitrogen (N)–fixing relationship between rhizobia and legumes are well known, a detailed analysis of root growth, acetylene–reducing activity, and dry matter yield under simulated tropical conditions could provide new information on grass response to *Azospirillum* inoculation. This paper briefly summarizes an experiment conducted in Australia in 1978 to compare the yields of digitgrass, *Digitaria*, on two Australian soils (a vertisol with pH 6.8 and 0.299% N and a sandy yellow podzol with pH 6.2 and 0.042% N).

Comparisons were made between plants inoculated with live and autoclave suspensions of A. brasilense from Australia and Brazil on days 10 and 35. Statistical analysis of results showed that inoculation increased dry matter forage yields 23% on the podzol and 8.5% in the clay. The inoculated plants had roots which were 20% heavier and more filamentous on both soils. The higher–yielding plants had lower N content in their tops and stubble; root N content was unaffected.

All acetylene reduction results were lower than data for other forage grasses tested under similar conditions, indicating that only small amounts of ethylene were evolved after 24–hr incubations in 10% acetylene. A background of acetylene reduction in all cores was observed.

Use of the flourescent–antibody technique and reisolations established the presence of *Azospirillum*. However, since acetylene reduction assays were low, the authors conclude that *A. brasilense* inoculation significantly stimulated growth of digitgrass but did not appreciably enhance N–fixation. A list of 21 references (1965–80) is appended.

211 **PN–AAJ–949**

MF $1.08/PC $1.30

Nodulation, nitrogen fixation, leaf area, and sugars content in Lablab Purpureus as affected by sulfur nitrition

Zaroug, M.G.; Munns, D.N.
University of Hawaii. College of Tropical Agriculture
Plant and soil, v.53, 1979, p.319–328 : En
931061300
AID/TA–C–1207

Although studies have shown sulfur (S) to influence nodulation and nitrogen (N) metabolism in legumes, no investigation has been done with legumes to simultaneously relate the effects of S nutrition on leaf area, sugar content, nodulation, nodule activity, and N gain. This report presents the results of such a study conducted using *Lablab purpureus*.

Two greenhouse experiments were conducted. The first entailed application of 12 treatments – using six S levels and 2 N levels – to perlite–sand cultures and to a moderately S–deficient soil. The second involved 8 applications – using four levels of S and two levels of molybdenum (Mo) – applied to a moderately acid, mildly S–deficient, grayish–brown loam soil with coarse rock fragments. In both experiments, commercially obtained *L. purpureus* seeds were sterilized and planted. After 6 weeks plants were harvested and reduction activity, nodulation, leaf area (only in the first experiment), and content of S, N, and soluble sugar were measured.

The first experiment showed that S treatments had an insignificant effect on nodulation; leaf area and sugar and N content all increased with low to moderate S applications. In the second experiment, it was found that S and Mo treatments increased nodulation and acetylene reduction activity slightly and had no effect on dry matter and N yield; S increased sugar content at both levels of Mo application.

The authors note that the beneficial effects of S on nodulation and nodule activity, possibly by improving sugar supply and N metabolism, agree with results of other researchers. A discussion of the above two experiments in light of past research is provided.

212 **PN–AAK–775**

MF $1.08/PC $1.43

Biological nitrogen fixation by epiphytic microorganisms in rice fields

Kulasooriya, S. A.; Roger, P. A.
International Rice Research Institute
IRRI research paper series, no.47, Feb 1980, 12p. : En

Research, results of which are here presented, was conducted on biological nitrogen fixation (BNF) by epiphytic microorganisms, especially blue green algae (BGA) in wetland and deepwater rice fields. Methods used included microscopic examinations, algal and bacterial counts, and measurements of acetylene–reducing activity (ARA).

Both ARA and microbial colonization were found to be much higher on outer than on inner sheaths of shallow wetland rice, irrespective of the type of microorganism, possibly indicating that outer sheaths contain partially decomposing material. Deepwater rice revealed the presence of BGA, especially of nitrogen–fixing types, on the surface of exposed and inner roots, on culm, and both outside and inside the leaf sheaths. Epiphytic BNF in shallow wetland rice was mainly due to a visible growth of *Gloeotrichia*, which was predominant during the early stages of plant growth. Deepwater rice, however, showed no macroscopic epiphytism by *Gloeotrichia*, and both microscopic examinations and counts indicated no changes of the epiphytic algae along the cultivation cycle.

While results could not fully explain the relationships between the algal epiphytes and the hosts, certain inferences were drawn: (1) *Gloeotrichia* seems to grow preferentially on rough surfaces; (2) in the case of microscopic epiphytism, most of the isolated epiphytic strains grew appressed to the surface of the culture vessels and rarely formed floating colonies; (3) the presence of BGA inside the leaf sheaths of deepwater rice was a unique finding of the study and has been confirmed by research conducted in Thailand; (4) the nitrogen input by

organisms epiphytic on shallow wetland rice can be evaluated to 2–3 kg of N per ha per crop, mainly due to BGA; (6) epiphytic algae are protected from conditions which destroy nitrogen-fixing algal blooms and thus provide an inoculum which makes bloom regeneration possible; and (7) epiphytism and endophytism are probably related to a mechanical effect.

It is concluded that epiphytic BGA makes little contribution to nitrogen input in shallow wetland rice fields (while playing an important role in inoculum conservation), but produces a substantial nitrogen input in deepwater rice.

213 **PN-AAK-809**

MF $2.16/PC $14.30

Biology, identification and control of root-knot nematodes (Meloidogyne species)

Taylor, A. L.; Sasser, J. N.
North Carolina State University. Department of Plant Pathology
1978, vii, 111p. : En
931061400
AID/ta-C-1234

Contributing to the goals of the International Meloidogyne Project, this report assesses the relative importance of various *Meloidogyne* species (root-knot nematodes) and provides information on their identification, morphology, variability, cytogenetics, geographic distribution, effects on host plants, and control.

The report presents: (1) a description of the classification, taxonomy, and worldwide distribution of the *Meloidogyne* species; (2) a summary of the organism's life cycle (as affected by time, temperature, and moisture), morphology, reproduction, anatomy, and its relationship to the host plant; (3) a review of the organism's histology and pathogenesis, with emphasis on giant cells and gall formation; (4) the physical and physiological effects of *Meloidogyne* infection on plant growth and the affected plant's subsequent predisposition toward fungal and bacterial infection; (5) the physiological differences among various *Meloidogyne* species; (6) the ecology of the *Meloidogyne* species; (7) methods of breeding plant cultivars for resistance to *Meloidogyne* species; (8) identification and description of *Meloidogyne* species in both warm and cold climates; (9) integrated control measures (e.g., crop rotation), biological control, quarantine, and use of electricity; and (10) the application, economics, and effects of using nematicides.

The report includes numerous photographs and diagrams. Appended are a 231-item bibliography (1878–1977) and short descriptions of the North Carolina Differential Host Test for identifying *Meloidogyne*, obtaining eggs, and testing plants.

214 **PN-AAK-848**

MF $1.08/PC $1.82

Morphological comparison of second-stage juveniles of six populations of Meloidogyne hapla by SEM

Eisenback, J. D.; Hirschmann, Hedwig
North Carolina State University
U.S. Agency for International Development
University of California, Davis. Division of Nematology.
Society of Nematologists
Journal of nematology, v.2(1), Jan 1979, p.5–16 : En
931052500
AID/ta-C-1234

Studies of several populations of *Meloidogyne hapla*, a species of nematode that appears to be made up of two distinct cytological races, have emphasized the need for detailed morphological examination. While previous morphological studies of this genus have been done almost exclusively with the light microscope, the study reported here used the scanning electron microscope (SEM) to compare the external morphology of second-stage juveniles of the two races of *M. hapla* and of one population each of *M. arenaria, M. incognita*, and *M. javanica*.

Race A of *M. hapla includes three populations that have haploid chromosome numbers of 15, 16, and 17 and reproduce by facultative meiotic parthenogenesis; race B consists of three populations with somatic chromosome numbers of 45, 45, and 48 and reproduces exclusively by mitotic parthenogenesis. The species M. arenaria, M. incognita*, and *M. javanica* have 54, 41–43, and 44 chromosomes, respectively, and reproduce by mitotic parthenogenesis.

Observations were made of head structures, lateral fields, excretory pores, anal openings, and tails. Head morphology, including shape and proportion of labial disc and lips, expression of labial and cephalic sensilla, and markings on the head region, was distinctly different for each species. Race A *M. hapla* populations were distinct from each other in head morphology, but showed much intrapopulation variation. Race B populations were very similar to one another in head morphology and were different from those of Race A. Each population of Race B could be distinguished from those of Race A by an elevated labial disc.

The structure of the lateral field of the four populations studied was very similar and of no value in identfication. Other anatomic characteristics (tail shape, tail terminus, and structure of the excretory pore and anal opening) were of little taxonomic value, since they varied greatly among individuals.

Similar SEM studies have been done with six populations of *Heterodera avenae* Wollenweber. The article's authors compare the two genera, *Heterodera* and *Meloidogyne*, morphologically. Photographs of the faces, approximate lateral views, anterior side views, and excretory pores of the four populations studied are included.

AGRICULTURE

215 **PN-AAK-849**

MF $1.08/PC $1.56

Meloidogyne megatyla n. sp., a root-knot nematode from Loblolly Pine

Baldwin, J.G.; Sasser, J. N.
North Caroline State University. Division of Nematology.
Society of Nematologists
U.S. Agency for International Development
University of California, Davis
Journal of nematology, v.2(1), Jan 1979, p.47-56 : En
931052500
AID/ta-C-1234

A new species of nematode – *Meloidogyne megatyla* – has been collected from roots of a loblolly pine (*Pinus taeda*) in North Carolina. This nematode differs from other *Meloidogyne* species primarily in respect to its host response, its perineal pattern, and the large stylet knobs of second stage juveniles and males. This article reports the measurements and characteristics of this new species, known commonly as the "pine root-knot nematode," and compares it to other species of *Meloidogyne*.

Morphological and morphometric study of *M. megatyla* specimens from stock cultures reveals that stylet knobs of *M. megatyla* are distinctively high in proportion to width, giving an especially massive appearance to the knobs of larvae and males. Mean larval length is 416 millimicrons and stylet length is 14.6 millimicrons. The perineal pattern is composed of smooth striae, with a high arch, and is often somewhat rectangular.

Galling was slight; rarely were more than 50 eggs produced per egg mass. Reproduction under greenhouse conditions was slow; a single generation may take more than 10 weeks. *Meloidogyne* species of long-lived hosts, such as pine, might be less subject to selection pressures for short generations and production of a large number of eggs than are other species.

M. megatyla did not reproduce on any of the various hosts commonly used to distinguish *Meloidogyne* species (corn, cotton, peanuts, pepper, strawberry, sweet potato, watermelon, tomato, or tobacco). It is not yet known whether conifers other than *P. taeda* are susceptible, but an undescribed *Meloidogyne* population collected from *P. ponderosa* in New Mexico appears to have a host-parasite relationship similar to that of *M. megatyla*.

Possibly, *Meloidogyne* species of long-lived hosts are more specialized and have narrower host ranges than do species that are adapted to seasonally changing flora. The new nematode's geographic range is not known; nematodes with similarly proportioned stylet knobs have been found on *P. taeda in Florida*.

Drawings of M. megatyla females, males, second-stage juveniles, and eggs are included, along with photographs of female perineal patterns.

216 **PN-AAL-204**

MF $5.40/PC $60.32

International Rice Research Institute; annual report for 1980

International Rice Research Institute
1981, xii, 466p. : Bibliography, p.452-459, En

Over the past few years, research conducted by the International Rice Research Institute (IRRI) has resulted in the release of several outstanding varieties of rice, some of which have allowed the traditionally disadvantaged rainfed rice farmer to double and even triple production. In addition, IRRI researchers have developed new cropping patterns, improved tissue and cell culture techniques, identified more efficient uses for nitrogen fertilizers, and continued screening of the world's germplasm collection.

This 19th Annual IRRI Report presents summaries and supporting data on research conducted in 1980. The first section describes work accomplished by IRRI's Genetic Evaluation and Utilization (GEU) Program. The specific program areas discussed are: the Genetic Resources Program (germplasm collection and storage); rice agronomic characteristics; grain quality; disease resistance; insect resistance; nutrient control; drought resistance; adverse soil tolerance; deepwater and flood tolerance; the International Rice Testing Program; the Integrated GEU Program (germplasm exchange and breeding); and computerized data management. Next, research on the control and management of various diseases, insects, and weeds is summarized.

Subsequent sections describe research conducted on: irrigation and water management; soil and crop management, including research into soil characterization, biological nitrogen fixation, soil fertility, fertilizer management, and rice culture; the environment and its influence on different rice varieties; constraints on rice yield; the consequences of new technology; and machine development and testing. IRRI's cropping system program is discussed in regard to environmental characteristics, the design and testing of cropping patterns, component technology development and management, and preproduction evaluation. Activities and findings of the Asian Cropping Systems Network are described.

Information is also provided on IRRI's 1980 training programs, international projects and activities, information resources, experimental farm and service laboratories, publications and seminars, finances, and staff changes. A table summarizing crop weather elements for 1980 and 1959-80 concludes the volume.

217 **PN-AAJ-874**

MF $4.32/PC $43.16

Proceedings of the international workshop on groundnuts

Gibbons, R.W.; Mertin, J.V.
International Crops Research Institute for the Semi-Arid Tropics
(International Workshop on Groundnuts, Patancheru, IN, 13-17 Oct 1980)
1980, vii, 325p. : En

Although the cultivated groundnut, *Arachis hypogaea L.*, is an important food and cash crop for subsistence farmers in the poorest countries of the semiarid tropics, little research on this crop has been conducted in either developed or developing countries. As part of its ongoing effort to breed hardier, higher-yielding groundnut varieties, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) sponsored an international workshop on groundnuts from October l3 to l7, l980 in Patancheru, India. This report presents the proceedings of that workshop in nine sections corresponding to the nine workshop sessions.

The topics covered in the 39 principal papers include: (1) a general overview of ICRISAT and its international cooperative and groundnut programs; (2) research organization and development; (3) the genetics and breeding of groundnuts; (4)

cytogenics and utilization of wild species of groundnuts; (5) groundnut nutrition and agronomy; (6) groundnut entomology; (7) groundnut pathology; (8) groundnut research in 17 countries in Asia, Australia, Africa, and South America; and (9) plenary session discussions on the state-of-the-art in groundnut research. For each session the relevant discussions are summarized.

A list of papers appearing in the poster sessions or distributed during the workshops and a list of participants are appended.

218 **PN-AAK-817**

MF $2.16/PC $7.80

Biology and breeding for resistance to arthropods and pathogens in agricultural plants

Harris, M.K.
Texas A&M University. Texas Agricultural Experiment Station
University of California, Berkeley
U.S. Agency for International Development. Bureau for Development Support. Office of Agriculture (Sponsor)
(International Short Course in Host Plant Resistance, College Station, TX, US, 22 Jul–4 Aug 1979)
1979, p.124–223 : En
931115600; 9310930000
AID/TA-C-1195; AID/DSAN-G-0017

Breeding for resistance to major pests, coupled with biological control, offers developing countries and small farmers the most promising way to achieve the doubling of crop productivity that will be needed in the next 25 years to meet the food needs of an expanding world population. In this paper, five reports on issues related to sorghum culture are reprinted from the proceedings of a 1979 international workshop on host plant resistance co-sponsored by A.I.D. and held at Texas A&M University.

A paper on the biology of sorghum describes the plant's advantages (heat and drought tolerance, rapid later stage growth) and shortcomings (not adaptable to cool weather, slow initial growth) in disease resistance.

A second paper describes sorghum breeding, including cytoplasmic genetic male sterility, random-mating populations and germplasm storage, and the development of A-and R-lines. The "Sorghum Conversion Project" which changes tall, late, or non-flowering plants into short, early forms by substituting eight genes, is described. This program has created new sources of disease and insect resistance, improved plant and kernel characteristics, and reduced genetic vulnerability.

Topics in a paper on breeding for sorghum disease resistance, including inheritance of resistance, pathogen specificity, availability of sources of resistance, and screening procedures, are grouped under each of 14 sorghum diseases. Key procedures are outlined for a productive disease-resistant breeding program.

In the fourth paper, sorghum lines and breeding methods (pedigree and population breeding) for arthropod resistance are identified for combating such insects as greenbug, midge, and shoot fly.

The final paper reviews research on pest management and host plant resistance in U.S. sorghum, including a tabulation of common insect and spider mite pests and of insect resistant sorghum varieties. Multistatic approaches are stressed, with special emphasis on the use of plant resistance, and resistance screening techniques are described. References total 140 items(1922–78).

219 **PN-AAK-773**

MF $1.08/PC $2.08

High-temperature stress in rice

Yoshida, S.; Satake, T.; Mackill, D. S.
International Rice Research Institute
IRRI research paper series, no.67, Oct 1981, 16p. : En

Heat-induced rice sterility is likely to become a problem in Southeast Asia as increased irrigation allows more rice to be grown in the dry season. This paper examines the occurrence and causes of high-temperature injuries at different stages of rice growth and in different varieties of rice and investigates genetic tolerance to heat-induced sterility.

Exposure to temperatures higher than 35C during the vegetative stage can reduce plant height, tiller number, and dry weight and can cause white leaf tip, chlorotic bands and blotches, and white bands and specks. The rice plant is most sensitive to high temperatures at flowering; the second most sensitive stage is 9 days before flowering. Exposure more than 15 days before or 3 days after flowering does not affect spikelet sterility. Exposure at the reproductive stage can cause white spikelets, white panicles, and reduced spikelet numbers. High temperature on the flowering day (anthesis) causes sterility, but high temperature (except 41C or higher) for 5 consecutive days before or after flowering does not disturb fertilization of spikelets provided the temperature at anthesis is not too high. High temperatures during ripening can reduce grain filling.

It appears that sterility under high temperature is caused by disturbed pollen shedding and impaired pollen germination, and not by an inactivated pistil. Early morning anthesis (when temperatures are lower) is one way to avoid sterility. The flowers of *Oryza glaberrima* open 3 hours earlier than those of IR36, a characteristic which can be incorporated into *O. sativa*.

There are clear varietal differences in high temperature-induced spikelet sterility. Tolerant varieties (e.g., Agbede, Dular, N22) are 84–90% fertile following exposure to a temperature of 35C, while susceptible varieties (e.g., Basmati 370, Pelita 1/1) are less than 10% fertile. Although rice varieties grown in heat-prone areas must be early maturing, it is not difficult to find varieties that are both heat-tolerant and early maturing. Heat tolerance has a fairly high heritability and most genetic variation is additive.

Finally, a comparison of phytotron and field experiments confirmed that the phytotron can be used to screen heat tolerance. A 29-item list of references (1956–81) is provided.

220 **PN-AAK-342**

MF $4.32/PC $43.42

Improvement of pearl millet; third annual report

Vanderlip, RichardL.
Kansas State University. Department of Agronomy
U.S. Agency for International Development. Bureau for Development Support. Office of Agriculture (Sponsor)
1980, 334p. : En
931104000
AID/TA-C-1458

From 1977 to 1980, Kansas State University implemented an AID-funded research program to improve pearl millet (PM)

for use in the famine prone semiarid tropics. This report details results of that research.

An initial summary section itemizes 51 research reports (abstracts are given for 33) generated throughout the project in accordance with its four objectives: (1) to breed widely adapted high–yield varieties, synthetic varieties, and hybrid lines; (2) to determine factors related to and genetic variations in seed and seedling vigor, water use, drought resistance, and resistance to herbicides; (3) to determine PM nutritional quality and digestibility; and (4) to determine storage stability of PM grain and meal and factors leading to meal rancidity.

Presentation of actual research products constitutes the bulk of the report. In breeding research, which has been in progress since 1971, it appears that PM yield potentials will approach and possibly equal that of sorghum of similiar maturity, and that crude protein contents – which currently can be maintained at relatively high levels while yield levels increase – will exceed those of sorghum. As in previous years, the highest yielding PM hybrids were comparable to hybrid grain sorghum of similar maturity. Results of crop management research confirmed previous studies which showed increases in seed protein when nitrogen fertilizer was applied and that PM of short to intermediate height with a minimum reduction in number of mature tillers and maximum soil–water depletion under stress would be most drought–resistant. Nutrition research included two studies of PM emylases; development of a preliminary PM roti method for use in India; and several PM/sorghum studies, e.g., decortication of PM and grain sorghum in a laboratory abrasive mill, effects of PM and sorghum diets on growth rates and cholesterol levels of guinea pigs, the hardness of PM and grain sorghum, grits from grain sorghum milled on roller mills, and a review of the literature on PM and sorghum. Two brief storage studies conclude the presentation.

Included are brief descriptions of other project activities, a list of project personnel, a financial statement, and 32 pages of literature cited (1928–81).

221 **PN–AAK–930**

MF $1.08/PC $.91

Influence of available nitrate levels on nitrogen fixation in three cultivars of cowpea

Miller, J.C. Jr.; Scott, J.S.; et al.
U.S. Department of Agriculture (Sponsor)
Agronomy Journal, v.74, Feb 1982, p.14–18 : En
PASA AG/TAB 610–9–76
USDA subgrant 701–15–59

Increased cowpea yields might be achieved by increasing nitrogen (N) assimilation through greater symbiotic fixation, but the identification of high–fixing genotypes requires an effective screening technique. In order to establish parameters for screening cowpea genotypes, this study reports on experiments to determine the optimal level of supplemental N for maximum N2 fixation in cowpeas grown under greenhouse and field conditions, and the relative contributions of several variables to nitrogenase activity.

In the greenhouse, a split plot design with three blocks was used with main plots consisting of four levels of nitrate treatment and three sub–plots consisting of genotype/cultivars known to have high or low N fixation potential – Chinese Red (low), Knuckle Purple Hull (high), and California Blackeye (high). The variables measured included nitrogenase activity, nodule weight and number, and dry weight of plant tops. The seeds were inoculated, grown for six weeks, and tested for N fixation by acteylene–ethylene assay.

The field study used four blocks with sub–plots consisting of the same cultivars used in the greenhouse experiment. In addition to the variables measured in the companion experiment, shoot protein and soil nitrate levels were measured. Seeds were treated with a commercial, mixed strain, granular cowpea *Rhizobium* inoculant and planted in 100 cm rows. Nitrogen fixation activity was determined at 7 weeks, the mid–pod fill growth stage.

The experiments showed that nitrogenase activity decreased with increasing rates of N application. Path analysis indicated that nitrate effects on N2 activity were primarily on nodule mass, with nodule growth rather than nodule initiation being inhibited. Nodule number did not reliably predict fixation potential and was negatively correlated to nitrogenase activity. Nodule weight was the main parameter contributing to N2 fixation. Clearly, no advantage was indicated in applying nitrate to promote maximum genotypic differences for N2 fixation. Moreover, these results contradict earlier reports that low levels of supplemental N might enhance N2 fixation. The paper is highlighted by graphs and tables of data.

222 **PN–AAK–808**

MF $1.08/PC $11.31

Vesicular–arbuscular mycorrhiza research for tropical agriculture

Mosse, Barbara
University of Hawaii. Hawaii Institute of Tropical Agriculture and Human Resources
Research bulletin, no.194, Aug 1981, 82p. : En
931012900
CSD–ta–2833;DSAN–G–01

Vesicular–arbuscular (VA) mycorrhiza – a specialized type of root hair which results from the colonization of fine absorbing roots by soil fungi of the *Endogonaceae* family – have particular importance to tropical agriculture because of their ability to markedly improve soil aggregation and to absorb phosphorus (P), often the most limiting nutrient in tropical soils. This state–of–the–art report (1930–78) outlines the relation of VA mycorrhiza to agriculture and ecology, notes research trends, and considers the application of research on VA mycorrhiza to tropical soils and conditions.

The authors first present an overview of the VA mycorrhizal system, including the structure of arbuscles, vesicles, and external mycelium and the classification and distribution of the fungi. Next explored is the manner in which VA mycorrhiza promote plant uptake of P and the resulting effect on plant growth. Methods for inoculating nonsterile soils are presented. Also outlined are the other functions of VA mycorrhiza, i.e., the promotion of plant uptake of zinc, sulfur, and nitrogen and the beneficial effects on soil aggregation.

Emphasizing the importance in the natural ecosystem of VA mycorrhiza, the authors investigate the possible applications of mycorrhizal research to crop production in the tropics, particularly in the areas of improving utilization of applied fertilizer, improving nodulation and nitrogen fixation by grain and forage legumes, reestablishing infection in sterilized soils, and controlling erosion. Constraints to large–scale inoculation are discussed.

Finally, the authors recommend that future research center on: field experimentation on P uptake; developing a workable method for estimating the numbers and efficiency of en-

dophytes at particular sites; the effects of VA mycorrhiza on uptake of sodium, chlorine, aluminum, and manganese and the effect of these ions on VA endophytes; and hormone production by endophytes. Appendices include a 348-item bibliography (1926–81) and lists of important growth responses to VA mycorrhiza inoculation by crop and of other important subtropical and tropical VA mycorrhiza hosts.

223 **PN-AAL-226**

MF $1.08/PC $1.95

Growing season analyses for rainfed wetland fields

Zandstra, H.G.; Samarita, D.E.; Pontipedra, A.N.
International Rice Research Institute
IRRI Research Paper Series, no. 73, Mar 1982, 14p. : En

Cropping systems for rainfed wetland rice areas must fit field water conditions sufficiently to ensure that the same cropping patterns can be used from year to year. This report analyzes variations in the wetland rice growing season caused by different percolation and seepage rates and by spillway heights. The extent to which farmers can modify the duration of important periods of the growing season was also evaluated.

The authors applied the PADIWATER field-water balance simulation model to 25 years of rainfall data from two areas of the Philippines in order to determine the probability of the top 300 mm of soil being flooded, wet, moist, or dry. These results were then used to estimate the average date of seven important growing season events which in turn determine the lengths of the premonsoon-dryland, wetland-rice, and postmonsoon-dryland growing seasons and the associated cropping patterns.

The study showed that variations in field water status as well as in rainfall regimes and land type can alter the duration of the above growing seasons by 30–45 days. These variations, in turn, modify the cropping patterns best suited to these fields. Thus, optimal cropping patterns for a given rainfall regime can range from a rice-dryland crop pattern to a rice-rice-dryland crop pattern.

The authors also found that by shifting from a transplanted to a dryseeded first rice crop, the total rice growing season can be extended 15–83 days; typically, the increase is from 20–45 days. In addition, soil water status at planting time is critically important when establishing dryland crops after wetland rice. Finally, field drainage and increased spillway heights can increase the probability that field water status will more accurately suit cropping patterns.

224 *** PN-AAK-954**

MF $4.32/PC $41.21

International soybean variety experiment; sixth report of results, 1978

Judy, W.H.; Jackobs, J.A.; Engelbrecht-Wiggans, E.A.
University of Illinois at Urbana-Champaign. College of Agriculture
U.S. Agency for International Development. Bureau for Science and Technology. Office of Agriculture (Sponsor)
INTSOY series, no.21, Nov 1981, x, 305p. : En
931056011
AID/TA-C-1294; AID/CM/ta-g-73-49
** Single copies may be obtained from INTSOY, University of Illinois*

The first International Soybean Variety Evaluation Experiment (ISVEX) was organized in 1973 to evaluate soybean cultivars for environmental adaptability and to provide countries with improved cultivars for direct production or for use in breeding programs. This volume reports the results of the sixth ISVEX, primarily through the 153 statistical tables which comprise the bulk of the document.

During the sixth ISVEX, conducted 2/78–3/79, a large number of cultivars with a diverse genetic composition were evaluated under a wide range of environmental conditions at 185 sites in 76 countries. Seeds and materials were prepared and shipped with instructions for management and data collection to cooperating scientists who in turn provided land, labor, and fertilizer. The 36 cultivars, including 16 cultivars from previous ISVEX trials, were selected for agronomic performance, maturity group classification (O–IX), seed availability, uniform seed quality, and adaptability to program design. Experiment sites were divided into environmental zones defined according to latitude and altitude.

Cooperators collected data on: yield days to flower and to maturity, nodule number and weight, plant height at maturity, lodging and shattering scores, plants harvested, pods per plant, seed weight and quality, and protein and oil contents of the beans. Data were then analyzed, using standard statistical techniques.

The sixth ISVEX found that yields ranged from 1320–3035 kg/ha, indicating that varieties should be selected on the basis of local trials. The intervals between planting and flowering and between flowering and maturity were significantly correlated. The number of pods per plant was relatively stable, while seed weight was quite variable. In addition, seed quality was not good. Lastly, the range in protein and oil content was small.

225 **PN-AAK-952**

MF $3.24/PC $25.74

Irrigated soybean production in arid and semi-arid regions; proceedings of a conference held in Cairo, Egypt

Judy, W.H.; Jackobs, J.A.
University of Illinois. College of Agriculture. International Soybean Program
U.S. Agency for International Development. Bureau for Science and Technology. Office of Agriculture (Sponsor)
United Nations. Food and Agriculture Organization (Sponsor)
Egypt. Ministry of Agriculture (Sponsor)
Menoufeia University (Sponsor)
(Irrigated Soybean Production in Arid and Semi-Arid Regions, Cairo, EG, 31 Aug-6 Sep 1979)
INTSOY series, no.20, 1981, ix, 194p. : En
931056011; 931115500
AID/ta-c-1294; DSAN-G-0139

Soybeans have proven to be an excellent food and feed source, and the area in soybeans under flood and furrow irrigation has been increasing in arid and semi-arid regions. However, research information on this important topic is fragmentary and scattered. This report presents the proceedings of a 1979 international conference held to compile research results on irrigated soybean production in arid and semi-arid regions.

The volume includes a total of 35 papers: (1) 24 conference papers on such topics as cultivar development, nitrogen fixation, weed control, pests, drought resistance, and yield in relation to irrigated production of soybeans in arid environ-

ments; (2) 7 country reports on soybean production in Bangladesh, Colombia, Egypt, Ethiopia, Sri Lanka, Sudan, and Turkey; and (3) 4 papers on constraints to effective irrigated soybean production.

Highlighted during the conference were the importance of and interrelationship among biological, marketing, and development (i.e., institutional and policy) factors in the successful introduction and establishment of a new crop such as soybeans. Recommended were greater adaptive research efforts and stronger efforts to communicate research results to farmers and marketers. A total of 472 references (1931–1979) are included, inter alia, among the papers; a list of conference participants is provided.

226 **PN-AAK-772**

MF $1.08/PC $1.43

Soil fertility, tillage, and mulching effects on rainfed maize grown after rice

Syarifuddin, A.; Zandstra, H.G.
International Rice Research Institute
IRRI research paper series, no.66, Sep 1981, 10p. : References, p.10, En

Although puddling is the preferred soil management technique in growing wetland rice, this practice can leave the soil hard and drained of phosphate. This paper reports two studies to determine soil-water status and chemical soil properties resulting from three soil management methods and their effects on rainfed maize grown after wetland rice with different tillage methods. Maize response to fertilizer management and mulching was also studied. Experiments were performed on Lipa clay loam with a shallow water table.

In the first experiment, nonfertilized and fertilized maize was grown after puddled flooded, nonpuddled nonflooded, and nonpuddled flooded rice. Tillage included no tillage, row tillage, and complete tillage. Nutrient availability in soils was higher after puddled flooded rice than after nonpuddled flooded rice, but the high moisture content and compact soil after puddled flooded rice resulted in poorer maize establishment, growth, and yield. Tillage improved soil aeration, but reduced nutrient availability. Maize yields from plots not tilled after rice harvest were not significantly less than those from tilled plots. Maize responded less to fertilizer applied after puddled flooded than after nonpuddled flooded rice.

In the second experiment, the soil in a dried puddled flooded rice field was intensively tilled to a depth of 20 cm. Mulched and unmulched maize was grown at four fertilizer rates, with the fertilizer placed at depths of either 5 or 20 cms. Fertilization and mulching significantly affected lodging, root and top growth, and grain yield. Application of nitrogen and phosphorus greatly increased maize dry matter and grain yield. Deeper fertilizer placement caused roots to grow deeper and to absorb more nutrients and moisture. Mulching reduced top soil moisture loss and resulted in better fertilizer availability and maize yield. Maize plots that received deep-placed 120–26–25 fertilizer and mulch yielded 3,150 kg grain/ha. Seven references (1966–77) are provided.

227 **PN-AAJ-873**

MF $1.08/PC $7.93

Fertilizer use in semi-arid tropical India: the case of high-yielding varieties of sorghum and pearl millet

Jha, D.; Raheja, S.K.; et al.
International Crops Research Institute for the Semi-Arid Tropics
Economic program progress report, no.22, Jun 1981, 47p. + attachments : En
698039330
AID-698-0393-3-T

Although fertilizer use in the semiarid tropics of India has traditionally been reserved for high value crops (e.g., wheat and rice) or for commercial crops (e.g., cotton and tobacco), farmers are increasingly applying fertilizer to recently introduced high yielding varieties (HYV's) of sorghum and pearl millet. This report, using data collected from 88 Indian districts from 1969–70 to 1973–74, determines the extent and level of fertilizer use on HYV sorghum and millet; compares fertilizer use on these crops with that on irrigated wheat and rice; and examines the trends in and determinants of fertilizer use.

Although varying by district, fertilizer use is fairly high and is extensive on irrigated land, especially for sorghum. Based on this finding, the authors conclude that the spread of HYV sorghum and millet and increased fertilization are positively related.

Regarding fertilizer use, the modal classes for application per ha of nitrogen, phosphorus, and potash were: 41–60 kg, 31–40 kg, and 11–20 kg for irrigated sorghum; 41–60 kg, 21–30 kg and under 10 kg for irrigated millet; 21–40 kg, 21–30 kg, and 11–20 kg for unirrigated sorghum; and 21–40 kg, under 20 kg, and under 10 kg for unirrigated millet.

Although farmers in the semiarid tropics still prefer rice and wheat to HYV sorghum and millet, the HYV grains are preferred over unirrigated food crops. Analysis of trends in fertilizer use revealed no pattern. Farmers'use of fertilizer is, however, affected by soil type and texture, seasonal rainfall, irrigation, fertilizer price, and the availability of credit.

The authors recommend that: development of regionally adapted fertilizer-responsive sorghum and millet varieties receive priority; improvements in retail trade be made to promote fertilizer use; and the extension system be made far more flexible to take maximum advantage of random seasonal conditions which play a crucial role in agriculture in the semiarid tropics. A 21-item reference list (1965–80) is appended.

228 **PN-AAK-476**

MF $1.08/PC $.91

Survival of rhizobium in acid soils

Lowendorf, Henry S.; Baya, Ana Maria; Alexander, Martin
Cornell University. Department of Agronomy. Laboratory of Soil Microbiology
Applied and environmental microbiology, v.42(6), Dec 1981, p. 951–957 : En
931012700
AID/DSAN-G-0090

Although the symbiotic relationship between legumes, a major protein source for both humans and domestic animals, and *Rhizobium* is the most widely managed agricultural system for biological nitrogen (N) fixation, many species of *Rhizobium* are unable to survive in the acid soils found in a large portion of

the world's potentially arable lands. This paper describes an experiment to compare the survival of *R. Meliloti*, *R. phaseoli*, and a strain of cowpea rhizobia in acid (pH 4.4) and limed soils (pH 6.9), both sterile and nonsterile.

The results showed striking differences among the three strains. (1) The number of *R. phaseoli* surviving in sterile soils progressively fell as pH declined. The fact that *R. phaseoli* was able to grow at pH 4.4 but exhibited increasingly poor survival in sterile soils of decreasing pH above 4.4 indicates that abiotic factors other than soil acidity limited survival. Although declining at a different rate, the survival of *R. phaseoli* populations at comparable pH on nonfertile soils was consistently lower, perhaps because of attacks by protozoan.

(2) The two R. meliloti strains survived equally well on sterile limed soils, but in nonsterile soils both survived more poorly in the more acid soils, suggesting that biotic factors inhibited growth in acid soils. The presence of alfalfa increased population density of both strains in the limed soil and in acid soil delayed elimination of the more acid tolerant strain.

The cowpea strain was not only insensitive to changes in soil pH, but also maintained a relatively stable and large population on the nonsterile soils.

The authors conclude that these findings support previous findings that *Rhizobium* populations are influenced in complicated and different ways by soil and plants. More must be learned about the interaction of these factors if the successful prediction of the persistence of rhizobia in natural ecosystems is to be achieved. A list of 25 references (1918–80) is included.

229 **PN-AAK-134**

MF $1.08/PC $3.90

Some aspects of fertilizer use by small farmers: a review

Sen, B.
U.S. Agency for International Development. Bureau for Asia. India
Aug 1981, 28p. : En

Critics have charged that fertilizer assistance programs unduly benefit large farmers at the expense of small farmers and that proponents of such programs sidestep the issue of equitable fertilizer distribution. This report reviews the findings of two surveys in India, the National Sample Survey and a National Council of Applied Economic Research survey, to analyze the directional tendencies underlying fertilizer distribution.

Despite some dissimilarities in their findings, the two studies show basically the same patterns of fertilizer distribution and reveal the inadequacy of the "large versus small farm" framework of past studies. These findings are as follows: (1) Marginal farmers form the largest group of fertilizer users, with small farmers next in line; taken together, the two groups constitute about 65% of fertilizer users. Large farmers constitute about 4% of users. (2) Marginal farmers use fertilizer most intensively, that is, apply the largest quantity of fertilizer per unit of land. The rate of fertilizer use is next highest among small farmers and is lowest among large farmers. (3) The share of marginal farmers in total fertilizer consumption is lowest, while that of small farmers is the second lowest. Taken individually, the shares of small and marginal farmers are smaller than that of large farmers; taken together, the share of the two groups is larger than that of large farmers. (4) Medium farmers consume the largest proportion of fertilizer; together with semi-medium farmers, they consume over 50% of the fertilizer supply (although this is due to the greater area fertilized by the operators of such holdings rather than to a higher fertilizer use rate).

The author points out that small farmers may, as development literature suggests, use fertilizer intensively in order to maximize output and income from their tiny holdings; in any case, the ability of these farmers to secure adequate fertilizer indicates the absence of major social and institutional barriers to their access to fertilizer markets. In light of these findings, the purpose of the Government of India's (GOI) fertilizer policy, to maintain an adequate fertilizer supply, is appropriate; the recent GOI decision to subsidize fertilizer transport costs should be viewed in this perspective.

230 **PN-AAK-778**

MF $1.08/PC $4.29

Soil management planning process

Sanchez, P. A.; Nicholaides, J.J. III
International Rice Research Institute
(Report on the soils constraints conference, Los Banos, PH, 4–8 Jun 1979)
Soil management planning process assessment report, no.18, Jun 1979, 33 p. : En

If worldwide per capita food production is to remain at present levels, food production must increase by 60% in the next 20 years, indicating the need to open up new farmlands and to keep them productive. This document reports on a conference held at the International Rice Research Institute in the Philippines to identify the main soil constraints facing tropical agriculture and the mechanisms needed to alleviate them.

During the conference, attended by 70 tropical soil scientists from 31 countries, 21 papers were presented on soil taxonomy and the Fertility Capability Classification System (FCC); soil constraints in relation to major farming systems in tropical Africa, humid tropical Asia, tropical America, and the semiarid tropics; chemical soil constraints (soil acidity, salinity, nitrogen, phosphorus, potassium, sulfur, and micronutrients); soil physical properties (drought, erosion, and impediments to land preparation, seedling emergence, and root growth); and extrapolation of soil research results.

Detailed research priorities were then identified for three agroclimatic regions – the humid tropics (both udic and ustic), tropical wetlands, and semi-arid tropics. Recommended mechanisms include chemical treatment of soil; development of appropriate cultivars; studies on drought, flooding, drainage, and erosion; use of mixed cropping; and soil classification. The FCC system, which is particularly helpful in fertilizer recommendations, is considered important in all three areas. Also, greater attention should be paid to surface layers.

The need for an international body to coordinate soils research was also recognized and its possible organization outlined, including a documentation center with abstracting, translation, and distribution services; data banks; and training and workshop programs.

AGRICULTURE

231 **PN-AAJ-610**

MF $2.16/PC $23.53

Sudan: the Rahad irrigation project

Benedict, Peter; Ahmed, Ahmed Humeida; et al.
U.S. Agency for International Development. Bureau for Program and Policy Support. Office of Evaluation
AID project impact evaluation report, no.31, Mar 1982, vii, 19p. + attachments : En
650010000

Although the Rahad Irrigation Project in Sudan, partly AID-funded and nearly complete, has been operating for only four seasons, it faces problems which threaten its viability. This report assesses these problems, the project's impact, and the lessons learned.

Designed to maximize use of government investments in Nile water management, to upgrade the living standards of 100,000 herders and farmers, and to produce cotton and groundnuts for export, the project is pursuing full mechanization and 100% intensive rotation of crops. Production is supervised by the Rahad Corporation which controls pricing, marketing, and most decision-making.

The Corporation has not coped well with several problems – managing a mechanized operation, erroneously perceived labor shortages, and tenant dissatisfaction. Faced with little incentive to grow cotton, farmers have produced less and are working as day laborers and raising livestock, sorghum, and groundnuts. Mechanization has further reduced project-generated income and threatens to displace labor. In addition, limitations on local currency have resulted in the inadequate and unequal provision of educational, health, and other promised services.

Among the lessons taught by the project are that: a policy of 100% mechanization needs more analysis; farmers must be given a role in the decision-making process and be allowed choices; harvest-time labor shortages must be viewed in relation to prevailing wage rates; environmental analyses must be conducted and used in designing and implementing irrigation projects; programs to control water-borne diseases should be designed and funded in irrigation projects; and crop protection techniques should be reviewed prior to project implementation and coordinated with public health officials.

Appended are photographs; a list of contacts; a 56-item bibliography (1968-81); and reports on: the institutional and social effects of controlled resettlement, micro-level management of technical resources, economic analysis of agricultural enterprises, labor/tenant relations, and Sudan's environment and natural resources.

232 **PN-AAJ-437**

MF $2.16/PC $13.39

Technical guide to water management on small farms

Southwest Research Institute
U.S. Agency for International Development. Bureau for Development Support. Office of Development Information and Utilization (Sponsor)
n.d., iii, 91p. : Bibliography, p.83-91, En
Also available in French, PN-AAJ-438, and Spanish, PN-AAJ-439
931109300
AID/ta-C-1479

In recent years, supplemental irrigation systems have been used to boost production in rain-scarce agricultural areas. This report offers a guide to some technologies developed under A.I.D. auspices to help small farmers maximize the use of scarce water resources. The subject of rainfed agriculture is expressly stated as beyond the scope of the guide.

Individual chapters, illustrated with photographs and drawings, are devoted to: (1) crop water requirements; (2) land grading for water control; (3) irrigation methods; (4) water quality and crop production; (5) drainage; (6) water measurement and distribution systems; (7) watercourse management; and (8) irrigation water supply.

Efficient irrigation starts by knowing how much water a certain crop will use and how much water should be applied at each irrigation. Unfortunately, the amount of water actually reaching crops is only a fraction of the water originally delivered to a system. The reasons are many: evaporation losses, seepage, poorly designed and maintained ditches and fields, and useless vegetation growing in or along systems. For example, the surface of irrigated fields must be even and flat so that water will be equally distributed. The planting of annual crops the first year in newly graded fields is encouraged. Farmers must also choose methods of irrigation – surface, oversurface, or subsurface – that will: maintain a continuous supply of readily available moisture and a healthy soil environment for root systems; function properly under given soil and land conditions; and provide a satisfactory net return to the farmer. Three common irrigation problems are salinity, alkalinity, and waterlogging. Water, however pure, contains dissolved salts, and long-term application can result in significant salt accumulation in the soil. The preferred cure is to apply 10% more water than plants need, causing salts to be leached below the root zone. Excess water applications, however, can cause waterlogging, requiring construction of a drainage network. When measurements of water flow reveal large water losses, intensive rehabilitation must begin.

Appendices include a glossary list of terms, a selected 33-item annotated bibliography of AID-sponsored research (1972-82), and a 12-item reference list (1953-77).

233 **PN-AAK-258**

MF $2.16/PC $15.86

Investments in large scale infrastructure: irrigation and river management in the Sahel

Stryker, J. Dirck; Gotsch, Carl H.; et al.
Tufts University. Fletcher School of Law and Diplomacy
Stanford University. Food Research Institute
Jan 1981, iii, 117p. : En
625092900
AID/afr-c-1130

To determine whether large-scale irrigation infrastructure projects (IIP) in the Sahel are consistent with the Congressional mandate that A.I.D. projects benefit the poor majority, this report reviews existing IIP's and the Sahel's current irrigation needs in light of the mandate's legislative history.

The U.S. Congress, it is argued, is willing in principle to finance large-scale IIP's in the Sahel if it can be shown that no better alternatives exist and that the majority of benefits would accrue to small producers with secure land tenure. IIP's in the Sahel and worldwide, as well as the two largest IIP's in sub-Saharan Africa, in Sudan and Mali, are reviewed to develop a typology of IIP's aiding the poor. Results show that large-scale IIP's are likely to be costly and of scant benefit to the poor if

carried out using capital–intensive construction and cultivation techniques (CCT), but that technically and economically viable alternatives exist which would substantially benefit the poor without being socially disruptive. The system envisioned would involve total water control and at least two crops per year, both labor–intensive and mechanized CCT's, traditionally based farmer organizations, and both commercial and food crop production.

A review of current irrigation systems and needs for river flow regulation in each Sahelian country and major river basin indicates that the potential for expanding rainfed agriculture and small–scale irrigation – development of which must begin now – is best in Chad, Mali, and Upper Volta and poorest in Mauritania and Niger, with the Gambia and Senegal holding intermediate positions.

It is recommended that A.I.D. help develop the prototype IIP sketched above; promote agricultural development and irrigation in higher rainfall areas of the Sahel and facilitate immigration from those areas to areas with lower rainfall; promote research on marketing for irrigated cash and food crops and the potential of cash crops for sustaining river basin development programs; train specialists for major river basin development; incorporate primary and secondary cost and benefit analyses into IIP's; and promote the use of a quantified, multi–objective, systems approach to river basin planning. Appendices detail the two surveys mentioned above.

234 **PN–AAK–951**

MF $2.16/PC $22.10

Irrigation development options and investment strategies for the 1980's

Keller, Jack; Clyma, Wayne; et al.
Consortium for International Development (Sponsor)
Utah State University. Department of Agricultural and Irrigation Engineering
U.S. Agency for International Development. Bureau for Asia. India (Sponsor)
WMS report, no.6, Jul 1981, xviii, 55p. + 5 annexes : En
931000700
AIC/DSAN–C–0058

To help A.I.D. focus and prioritize its irrigation efforts in India, this report reviews current A.I.D. irrigation projects (IP) in the country and presents irrigation development options and investment strategies for the 1980's.

After background sections on irrigation in India and the USAID/I irrigation program, the authors review the technical and organizational aspects of 14 A.I.D. IP's and training programs in the states of Gujarat, Maharashtra, and Rajasthan. Most projects visited were inefficient or unreliable in distributing water to and within fields and lacked effective management between the plants and the water supply, leading to much underutilization (and waste of money) and inequity in benefit distribution. A review of the operations of the Command Area Development Authorities (CADA), the agency overseeing IP's, reveals poor overall control and coordination. To help redress these problems, a new management model for CADA, stressing policy management, is presented. Strategies suggested to improve IP's regard the distribution of irrigation water and the equity of this distibution and include a wide range of technical and management training options.

As guidelines for future A.I.D. irrigation investment policy, it is recommended that USAID/I: expand its technical staff and reduce farmer management unit size in medium IP's; set up a model management system in a medium IP; continue assessing the actual performance of IP's; and evaluate support to credit agencies in terms of specific objectives. A.I.D. should: develop a program to train Indian personnel in conducting diagnostic pre–investment surveys; encourage irrigation system technical innovations; develop power sources for quick and cost–effective tubewells; assist the Government of India in studying the nature and concentration of irrigation power needs; investigate remedies for waterlogged and saline areas; provide technical help in assessing and correcting siltation problems; support attractive minor IP's; and develop appropriate training programs in order to broaden water management expertise.

Appended are reports on water resource development, irrigation yield optimization, a canal supply rotational system, and on meetings between irrigation experts and Indian government officials.

235 **PN–AAK–927**

MF $1.08/PC $2.86

Strategy guide for water management on small farms

Mason, Herbert M.
Southwest Research Institute
U.S. Agency for International Development. Bureau for Development Support. Office of Development Information and Utilization (Sponsor)
15p. : En
Also available in French, PN–AAK–928, and Spanish, PN–AAK–929
Related reports: PN–AAJ–360, PN–AAJ–361, PN–AAJ–362, PN–AAJ–363
931109300
AID/ta–C–1479

After 15 years of water management laboratory and field studies, AID has concluded that small farmers can dramatically increase farm productivity with efficient water management and irrigation, and that proper water management can be fostered through a direct technology transfer to small farmers. This report briefly describes a water management strategy guide prepared by A.I.D. on the basis of these conclusions.

The authors deal with separate but interrelated aspects of on–farm water management: crop water requirements, land grading for water control, irrigation methods, water quality and soil characteristics, farm drainage, water measurement and distribution structures, watercourse management, water supply for irrigation, and the technology transfer process.

The authors note that A.I.D. stresses farmer participation in its technological transfer process. The program planning process depends on an interdisciplinary approach which first attempts to objectively identify a problem, be it physical, economic, or institutional. Next, an investigation is made of practical technologies for solving the problem, and possible solutions are systematically assessed. Finally, techniques for an on–farm improvement program are tested and applied, and personnel are trained to work with the farmers.

The most critical components of the technological transfer process have been found to be farmer participation and close cooperation among all the disciplines represented on the multidisciplinary team – commonly, agricultural engineering, agronomy, economics, and sociology.

AGRICULTURE

236 **PN-AAJ-608**

MF $1.08/PC $9.49

Sederhana: Indonesia small-scale irrigation

Holloran, Susan; Corey, Gilbert L.; Mahoney, Timothy
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation
AID project impact evaluation report, no.29, Feb 1982, xi, 12p. + 4 annexes : En
497024200

A.I.D.'s Sederhana project was designed to increase Indonesian rice production by rehabilitating or constructing small, technically simple irrigation systems. An A.I.D. team visited 29 subprojects (SP) to prepare this review of Sederhana's impact.

The project proved difficult to administer. Only 52 of 600 SP's completed or underway by June, 1980 had been reimbursed by A.I.D. due to start-up problems, design and construction faults that required work to be redone, and to the Fixed Amount Reimbursement method which allowed payment only after technical certification of completed construction. Nonetheless, the project led to substantial increases in rice production on Java and Sulawesi, confirming the assumption that farmers could make immediate use of additional water. In Sumatra, however, the production impact was not encouraging, due to adverse environmental conditions and farmer resistance to growing labor-intensive, non-cash crops. In most SP's, increased production benefited both landowners and permanent tenants, but sometimes affected sharecroppers and landless laborers adversely, as landowning families filled many of the jobs created by the increasingly profitable Sederhana system.

Key problem areas were a trade-off between SP quantity and quality due to a highly centralized implementation process, which should be altered to increase participation from the provinces and especially from farmers (whose participation, especially in geographically scattered projects such as Sederhana, is essential); lack of coordination between implementing agencies, a factor essential to the success of any project; and the lack of technical assistance which early on led to costly errors and the failure to build an experienced cadre in government agencies – technical assistance should be increased as the project moves to marginal areas, with a focus on improving local construction and management skills. The project also demonstrated the need for baseline data to assess a project's progress and the fact that programs such as Sederhana, while they can substantially benefit the rural poor, cannot result in the redistribution of wealth.

Appendices include an analysis of the project's irrigation and water management systems and a September, 1979 A.I.D. audit of the project.

237 **PN-AAJ-617**

MF $2.16/PC $14.82

On-farm water management project in Pakistan

Painter, James E.; Malone, Sandra; et al.
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation
AID project impact evaluation report, no.35, Jun 1982, viii, 30p. + appendices : Bibliography, REF-1-2, En
391041300

Watercourse improvements conducted under A.I.D.'s On-Farm Water Management Project in Pakistan have enabled farmers to increase their crop yields and incomes. This report analyzes the setting, history, and impact of the project.

While water user associations were not effectively established, farmer awareness of the importance of mutual cooperation grew, informal mechanisms have been quite successful in maintaining watercourses, and demand for watercourse improvements has risen. However, the project failed to increase district government awareness of the need for on-farm water management and failed to institutionalize a mechanism through which that need can continue to be met. Moreover, the project design did not address regional differences, baseline data collection and project monitoring were inadequate, and the cost of watercourse improvements exceeded original estimates. Planned precision-leveling of fields to improve water use was not as successful as envisioned due to farmer reluctance to participate and the Pakistani Government's decision to deemphasize leveling. Nor was extension training of farmers adequately implemented, due partly to competition with an existing extension service as well as to A.I.D.'s use of the fixed amount reimbursement mechanism.

Project experience also showed that: (1) costs could have been reduced and benefits spread wider if farmers had been asked to contribute, as they were willing to do; (2) flexible project design is needed to adapt to local needs; (3) in a cultural setting where community cooperation is not traditional, formal structures must be built to ensure system maintenance; (4) concentrated land ownership can cause small farmers to realize little increase in water; and (5) more attention should be given to planning extension functions, training implementors and extensionists, collecting baseline data, and developing local governmental commitment.

Appendices provide sample data; the evaluation methodology; a case study of the project's impact in Sind; and papers on the implications of on-farm water management, the project's economic impact, the socioeconomic impacts of increased income, and the role of honor, power, and rivalry in Pakistani villages.

238 **PN-AAK-881**

MF $1.08/PC $12.61

Keeping cattle and the cost of water in Eastern Botswana

Bailey, Charles
Cornell University
Botswana. Ministry of Agriculture (Sponsor)
Dec 1980, v, 84p. + 4 annexes : En
AID/DSAN-C-0060

In Botswana's eastern communal area, choosing the best available water supply does not necessarily mean that cattle will get enough water to optimize production. So concludes this analysis, based on the 1979-80 Water Points Survey of 12 communities in this region, of farmers'water use strategies.

In Part I, the author examines farmers'views of water use. In the short run, farmers can either move their cattle, construct new water points, or change water points. In practice, farmers usually alternate among 2-3 of the approximately 54 water points within their range. Since there is seldom a continuous and freely available supply, farmers must balance the relative reliability (both present and future), cost, and convenience of water sources. Such decisions constitute a large fraction of the herd management effort.

Part II of the study focuses on patterns of water point use over time. Usage is described in terms of changes in the

number or types of operating water points, changes in distance to water, changes in distribution of cattle among water points, and changes in cattle's daily water demand. Private open wells, rivers, private seep wells, and private boreholes are most used; government owned and managed boreholes attracted the largest herds; communally managed water points served the smallest.

Part III deals with the costs of constructing new water points, especially dams, hafir–dams, boreholes, and open wells. Boreholes were found to be the most expensive and hafir–dams the least.

In conclusion, the author recommends that the first goal of water resources development be stabilization of the water supply in a given locality over the course of the year. The second goal should be to increase overall supply in order to raise per capita consumption of existing stock and to meet anticipated growth in stock size.

Nine figures and 28 tables of data are included in the report. Appended are definitions of water point types, derivation of livestock and water measure per water point and of small dam costs, and a list of water use fees.

239 **PN–AAK–882**

MF $1.08/PC $3.77

Rating cattle for physical condition

Wellington, George
Cornell University
Botswana. Ministry of Agriculture
Water points survey publication, no.6, Mar 1981, 29p. : En
AID/DSAN–C–0060

This amply illustrated instructional booklet explains a 7–point scale for rating the physical condition of cattle. Ratings are based on an animal's finish (degree of fatness) and fleshing (degree of natural flesh and muscle) and use the common names of the body parts of cattle. The system is particularly useful for relating cattle's observed condition to the past availability of feed, grazing, and water. It does not, however, reflect how close a cow or bullock is to the ideal type for a particular breed.

Scores No. 7 and No. 1 represent, respectively, the best and worst physical conditions of cattle, and as absolutes are seldom found. Cattle that are rated No. 7 are both fat and full–muscled, indicating that they have been fed highly concentrated diets for long periods. No. 6 cattle are well–covered with fat, but have slightly less muscle. The amount of fat and muscling decreases progressively in cattle rated No. 5 through No. 1. Score No. 1 occurs when cattle are extremely thin as a result of being seriously deprived of feed and water for a long period of time and possibly infested with parasites. Scores No. 2, 3, and 4 cover the practical working range of the scale and are likely to be seen among cattle during years of average rainfall.

Seventeen full–page, black and white photographs of cattle rated No. 7 through No. 1 are provided, as are sketches (side and rear views) of cattle rated No. 1, No. 4, and No. 7 and a sketch identifying a steer's body parts.

240 **PN–AAK–371**

MF $6.48/PC $67.60

Labor and land use on mixed farms in the pastoral zone of Niger

Eddy, Edward Danforth III
University of Michigan. Center for Research on Economic Development
1979, xxviii, 493p. : En
625090600
AID/AFR–C–1169

The spread of grain cultivation along the southern Sahara has increased fears of desertification and given impetus to a cattle stratification strategy which may be a key to Sahelian development. This study, based on input–output data obtained from 45 Haussa and Tuareg mixed–farm households in 1976–77, analyzes alternatives for increasing cattle production and decreasing grain production in Niger's pastoral zone.

Against an overview of production systems and of the infrastructure in the study area, the author outlines his survey methodology. He then successively discusses: (1) labor patterns and availability; (2) labor's role as an input to grain and livestock production; (3) land use and management and the role of land as an input to production; (4) the availability of water; (5) types of livestock (goats, camels, cattle, sheep, horses, donkeys, and poultry) and livestock management; (6) the markets for grain, livestock, and livestock products; (7) grain output and consumption; and (8) production of livestock and consumption of livestock products. The author then develops a basic form management model which allows for selection among millet, sorghum, goat, and cattle production subject to land and labor constraints.

Using this model, the author finds that although livestock production generates significant foreign exchange and may maximize farmers'social welfare and although continued grain production will steadily deteriorate land resources, extensive grain production is still in the individual farmer's best interest. It is thus unlikely that marginal changes in technologies and prices alone will have much effect. The author instead recommends structural reforms: adopting policies to increase the profitability of cattle production; enforcing a system of land management which limits without precluding grain cultivation; extending property rights to livestock producers; adopting labor–saving grain production technology; and establishing complementary goat production programs to enable poor households to reach a position where they can assume the risks of cattle production.

The report includes 46 graphs and tables. Appended are a 31–item bibliography (1950–79), supplementary questionnaires, market schedules, a coding manual, and data on the people of and production in the study area.

AGRICULTURE

241 **PN-AAK-101**

MF $2.16/PC $15.47

West Africa pastoral production systems

Swift, Jeremy
University of Michigan. Center for Research on Economic Development
U.S. Agency for International Development. Bureau for Africa. Office of Development Resources (Sponsor)
Feb 1979, 117p. : En
Livestock production and marketing in the Entente States of West Africa: Working paper, no.3
625090600
AID/AFR-C-1169

An adequate typology of West African pastoralism is lacking. This paper presents and utilizes such a typology to describe the main pastoral production systems of dry West Africa.

Unlike previous classifications based on the degree or pattern of movemement among pastoralists, the author's typology is based on four variables – environment, sociocultural tradition, source of livelihood, and the degree to which production is marketed. Using this system, the author finds that the pastoralism practiced by the Moors, Twareg, Tubu, and Fulani in West Africa falls into four main categories – Saharan and north Sahelian camel economies, Sahelian multi-species pastoral economies, Sahelian and north Sudanic cattle economies, and Sudanic agro-pastoral economies.

The author proceeds to detail the contributions to production of land, technology, herd characteristics, and labor. In West Africa, the availability of forage increases from north to south and varies seasonally with rainfall. Where agriculture is possible, livestock also feed on crop residues. Access to pasture land depends on the sociocultural organization of the particular ethnic group. Pastoral technology encompasses knowledge of the environment, domestication of livestock, control of reproduction, and herd splitting. The ownership, control, composition, and other characteristics of herds are examined. Labor's role is analyzed in terms of the origin and size of the labor force and the labor needed to supervise, water, and milk the herd. Based on data from Twareg and Fulani herds in Niger and Mali, the author estimates the output of meat, milk, skins, manure, animal traction, and transport and the productivity of land and labor.

The author concludes that although pastoral production is risky and has a low output per land area, it affords a higher income and greater output per unit of labor than agriculture. The success of development programs will be enhanced by recognizing that West African pastoralists have the expertise, social organization, and economic rationale to efficiently produce livestock. A 91-item bibliography (1950-79) is appended.

242 **PN-AAK-406**

MF $2.16/PC $20.02

Tables of food composition for Indonesia; nutritional data = Tabel-tabel dari bahan makanan ternak untuk Indonesia; data ilmu makanan untuk Indonesia

Hartadi, Hari; Reksohadiprodjo, Soedomo; et al.
Utah State University. International Feedstuffs Institute
Gadjah Mada University (Sponsor)
Rockefeller Foundation (Sponsor)
Nov 1980, 155p. : En, In
Related report, Middle East: PN-AAK-022
931005000
AID/TA-C-1159

While significant information exists on feedstuffs used in Indonesia, it is scattered among many publications, making retrieval and correlation difficult. The purpose of this publication is to present a single source of nutrition information on the composition of Indonesian feeds and mineral supplements and on the mineral, vitamin, and amino acid content of selected feeds. While the availability of nutrition data on Indonesian feed is limited, the document does serve as a basis for describing feeds and identifying future research needs.

The authors utilize the International Feed Vocabulary (IFV) which identifies a feed using six categories of descriptors: (1) the scientific and common name of the parent plant; (2) the part of the plant fed to animals; (3) processes and treatments used to prepare the plant for use as feed; (4) stage of maturity when the plant has optimal nutritive value; (5) the cutting from which the plant was obtained; and (6) the official quality grade of the harvested plant.

The feeds are then grouped into eight classes based on physical and chemical characteristics and their use in formulating diets, and are assigned an International Feed Number and Name (local Indonesian feed names are included for ease of identification). Data are expressed in the metric system and are on an as fed and dry basis. Estimates are calculated from regression equations. Where Indonesian data are unavailable, data are provided from other tropical countries; data from the United States and Canada are included for comparison in some cases. The document cautions that individual analyses for a given feed may vary widely from averages in the tables due to the influences of crop, variety, climate, soil, and length of storage. Also, the procedures for summarizing data on digestible and metabolizable energy, net energy, total digestable nutrients and protein, and vitamin A standards are provided.

Appended are an 18-item list of references (1957-80) and glossaries of nutrition and feed terms, parts and processes regarding parent plant material, stages of plant maturity, and common Indonesian and English feednames and their scientific names.

243 **PN-AAK-470**

MF $1.08/PC $3.12

Aquaculture development in Ecuador

Phelps, Ronald P.
Auburn University. International Center for Aquaculture
11 Aug 1981, i, 25 p. : En
931131400
AID/DSAN-C-0053

Aquaculture has a demonstrated potential in Ecuador but future development requires greater investment in infrastructure and additional donor assistance. This report assesses the state of aquacultural development in Ecuador and offers recommendations to host govenment agencies and to USAID/Ecuador.

The author begins by describing the programs and evaluating the capabilities of aquaculture-related government agencies (Departamento de Piscicultura, Instituto Nacional de Pesca, Subcomision Ecuatoriano-Peruana, and Ministrio de Agricultura) and universities (Escula Superior Politencia del Litoral, Universidades de Guayaquil and de Loja, and Universidad Technica de Machala).

Observations and comments are offered regarding particular areas of aquaculture. Coastal shrimp culture, rapidly growing to cover 30,000 ha and generate $34 million in exports in 1980, is generally extensive rather than intensive and has led to exploitation of mangrove areas. National inventories of existing shrimp ponds, salitrales (saline soils), and mangrove areas; efforts to preserve post-larvae shrimp in the wild; and a shrimp culture research station are needed. Chame, a hardy fish popular in the Province of Manabi, and other varieties of native fish, e.g., Dama and Tilapia, should be investigated as candidates for intensive cultivation. Both cage culture and integrated rice-fish culture should also be explored. Fish management in the Proyecto de Babhoyo in the Rio Guayas drainage system, and in a water storage project near Jipijapa in Manabi must be improved.

It is recommended that the Departamento de Piscicultura take the lead in aquaculture development; reduce its regulatory responsibility; establish separate mariculture and freshwater aquaculture sections and research stations; continue to emphasize staff training; consider Peace Corps participation in its extension program; and seek donor technical assistance.

USAID/Ecuador should consider supporting warmwater aquaculture in Ecuador, especially in regard to shrimp cultivation, technician training, extension, and research station development.

244 **PN-AAK-471**

MF $2.16/PC $13.00

Environmental considerations in aquaculture

Phelps, Ronald P.
Auburn University. International Center for Aquaculture
21 Dec 1981, 101p. : En
931131400
AID/DSAN-C-0053

Because aquaculture, the controlled management of aquatic organisms in water for the benefit of man, is increasingly used as an alternative means of producing animal protein, it is important that environmental, economic, and public health concerns be considered when planning projects. This manual, prepared to assist A.I.D. staff with project development, provides a general background on the environmental aspects of aquaculture.

After a general discussion of aquaculture practices, including the use of feeds and chemicals, fertilization, production cycles, and the fishes used, environmental questions are discussed, i.e., aquaculture's effects on hydrology, soils, land use patterns, water quality, plant and animal habitats, and air quality. Next, economic and sociocultural considerations are presented with special emphasis on public health. Seperate discussions outline A.I.D.'s procedural requirements for project approval and detail the preparation of AID-mandated environmental impact statements.

The authors give particular emphasis to pond-culture fish habitat practices and see a beneficial role for aquaculture in LDC's. They note that the land needed for pond culture is often ill-suited for other uses and that it is often possible to integrate aquaculture into extant water management systems. It is necessary, however, to be aware of aquaculture's potential impact on water supplies, soils, and land use patterns and, if fish are imported, on their potential effect on indigenous varieties. Health issues are especially important and should receive the planner's careful attention. A well managed project should, however, provide badly needed income and protein, and have few harmful effects.

Appended are a glossary, a 56-item bibliography, a checklist of environmental effects, an article on brackishwater aquaculture, and a brief discussion of cage aquaculture.

245 **PN-AAK-554**

MF $2.16/PC $20.41

Management of the Upper Meta River food-fish fishery

Scully, Richard J.; Garzon F., Fernando; et al.
Auburn University. International Center for Aquaculture
INDERENA
U.S. Agency for International Development. Bureau for Technical Assistance. Office of Rural Development (Sponsor)
Upper Meta River fisheries investigations, pt1, Feb 1980, 14p. : En
pt.2: PN-AAK-556
514019100
AID/LA-C-1176

The Upper Meta River fishery is the most intensively exploited and most likely to be expanded fishery within Colombia's Orinoco system. This report, the first of a three volume study, reviews fishery management in terms of catch assessment surveys to determine fishing effort and catch per unit effort (CPE); species composition and length frequency distributions (LFD) of the commerical catch; and the efficiency of fishing gear.

CPE's in commercial areas were found to be adequate to provide fishermen with a good income, with profits highest (3.8 times greater than needed to sustain a subsistence fishery) in the upper 100 km section due to its nearness to the Villavivencio and Bogota markets. Lack of a developed marketing system in the lower tributaries limits fishing to what is required for home consumption.

Six of the 25 species in the commerical catch make up 80% of the annual harvest. Detailed analyses of LFD's for these six species during the 1977-78 fishing season are provided; their value lies in interpreting population changes over time. Species characteristics presented in-clude maximum, minimum, and average size of the catch, season of abundance, size range by sex, stomach contents, length at maturity, and length-weight and length-length conversion equations.

Gear most commonly used are single or multiple hook setlines and gill and cast nets, although the Cachamaro setline, the gear most commonly used, is also the least effective. Tables are presented showing the percent catch of each species by each gear. Almost all grill nets are of 20 cm stretched mesh, a size which selects for mature fish of most

species. Results of experiments with other types of gear are presented.

Recommendations include: allowing the use of gill nets with stretched mesh 18 cm in size, castnets of any mesh size, the harpoon and the bow and arrow, and the hand gaff; using data sheets to improve commerical catch statistics; using LFD's to determine endangerment of any species; protecting endangered species; estimating the maximum sustainable yield of fishable stocks; protecting the ecosystem from dangers posed by agricultural practices in the Piedmont, fumigation, and pesticides; and accumulating further data, including economic data. Included are several substantive appendices, and a 22-item bibliography (1974–79).

246 **PN–AAK–555**

MF $1.08/PC $4.03

Social and economic conditions among Upper Meta River fishermen

Scully, Richard J.; Garzon F., Fernando; et al.
Auburn University. International Center for Aquaculture. Agriculture Experiment Station
U.S. Agency for International Development. Bureau for Latin America and the Caribbean. Office of Development Resources (Sponsor)
Upper Meta River fisheries investigations, pt.2, Mar 1980, 27p. : En
Pt.I: PN–AAK–554 and pt.3, PN–AAK–556
514019100
AID/LA–C–1176

The artisanal fishermen of Colombia's Upper Meta River (UMR) system, despite the occasional nature of their work, earn a much higher income than do common laborers. So concludes this study which uses data from interviews conducted with sample fishermen in 1977–78 to detail their socioeconomic status, fishing actvities and equipment, the costs and benefits of fishing, and marketing practices.

At least 7,200 people, widely distributed and comprising 988 fishing economic units (FEU) and their families, depend on the UMR fishery during the low water season, and 68% of that number depend on it during the high water season. The average fisherman is about 40 years old, supports six dependents, fishes for food fish, and has been fishing 8–9 years. Few, however, depend solely on fishing for their livelihood; 74% are also farmers and 13% are cattlemen.

FEU's generally consist of a canoe, one or two fishermen (from a single household in 89% of the cases), and a small amount of passive fishing gear, usually long or single–hook lines or gill nets. Data on the various types of fishing gear employed are provided and the sizes of the various hooks are illustrated. While 82% of fishermen along the river sell fish at least occasionally (usually, what is left over from home consumption), this figure shrinks to 11% when data from the entire UMR system are considered; only 6% fish professionally. Fishing is generally profitable in all parts of the system, but especially so in the upper 100–km section where the price for fish is highest and a larger proportion of the catch is sold.

Fish are usually sold to traders who transport them to wholesale buyers in the towns. Although traders receive a 25% profit on the fish sold, overhead costs are high and trading is not profitable. While patterns in the fish buying business fluctuated during the period studied, there are signs of increasing investment in fish buying facilities.

In fine, UMR fishermen enjoy a stable and secure living while putting little effort into the fishery. Their mixed type of occupation seems to work well for those who live off the land. If it were decided that the Meta could sustain a more intense fishery, it would be better to encourage people to move there and become farmer–fishermen than to encourage existing fishermen to fish more. Descriptive characteristics of interviews are appended.

247 **PN–AAK–556**

MF $1.08/PC $6.50

Upper Meta River system ornamental fishery

Scully, Richard J.; Garzon F., Fernando; et al.
Auburn University. International Center for Aquaculture
Upper Meta River fisheries investigations, pt.3, Feb 1980, 49p. : En
Spanish edition: PN–AAK–558
514019100
AID/LA–C–1176

Concerns about possible overharvesting of ornamental fish led Colombia's Instituto Nacional de los Recursos Naturales Renovables y del Ambiente (INDERENA) to investigate the Upper Meta River fishery. Interviews with fishermen and reviews of marketing data were conducted, producing estimates of the total harvest, relative abundance of different species, locational (piedmont or savanna portion of the fishery) and seasonal (high water or low) characteristics, methods of capture, and net economic value of the catch.

Findings for the period 10/77–3/79 here presented indicate that an estimated annualized harvest of 18,223,700 ornamental fish provided an estimated minimum of 382 fishermen with a combined gross income of 16,911,032 pesos. A total of 57 species, of which only three could be considered food fish, were recorded as harvested. Eight of 52 species listed in marketing records accounted for 71% of the listed catch. Of these, four (*Apistogramma ramiresi, Cucha*, *Cardenal Tetra*, and *Neon Tetra*) showed signs of decline in annual catch over the period 1975–78; these species may have been overharvested. Considering the nearly endless number of rivers, streams, and lagoons in the Upper Meta system, however, it is likely that only a small fraction of the area is being overfished.

It is recommended that: (1) the relative density of fish in fished and unfished areas be compared in order to determine the intensity of fishing at traditional sites and the geographical extent of the resources in relation to areas being exploited; (2) laws protecting aquatic environments be strengthened, particularly those regarding stream modifications for agricultural or industrial use and those regarding buffers between waterways and agricultural lands; (3) the toxicity to aquatic organisms, residual effects, and minimum effective dosages of pesticides being used in the area be studied; (4) INDERENA and Alcopeces (a fish exporting organization) prepare a manual of preferred methods of catching, holding, and transporting fish; (5) a rigorous effort be made to ensure the validity of "salvoconducto" statistics; and (6) aquaculture schemes be developed to mass produce the most cultivable species.

Appendices list species and provide the catch calculation equation. Three references (1963–79) are cited.

248 **PN-AAL-234**
MF $1.08/PC $8.45

Annotated bibliography of slipmouths (Pisces: Leiognathidae)

Pauly, Daniel; Wade-Pauly, Sandra
International Center for Living Aquatic Resources Management
ICLARM bibliographies, no. 2, 1981, 62p. : En

Although the *Leiognathidae* family of fishes (slipmouths, silver bellies, pony fish, etc.) are particularly prominent along the shores of the tropical Indo-Pacific, they are often considered "trash fish" because they are usually small and bony and have consequently received little attention in the fish literature. Yet, leiognathids are important. They provide the bulk of food to larger, more valuable fishes; they are an important source of protein to domestic animals; they are a source of high-quality protein in the local diet in several countries; and they are of scientific interest to biologists because of their bioluminescence.

Given this divergence between the importance of leiognathids and their relative absence in the literature, this bibliography provides 941 annotated references covering all aspects of leiognathids'biology, physiology, and anatomy; their culture in fisheries; and their use as a food source. Most items are annotated; longer annotations are provided for items which have not been formally published. The literature was collected from libraries in Germany, Indonesia, Thailand, Mauritius, France, the United States, the Philippines, Great Britain, Kenya, Australia, and Italy. Subject and geographic indices are included.

249 **PN-AAL-301**
MF $1.08/PC $5.85

Catch assessment survey on the Niger River in Niger

Malvestuto, Stephen P.
Auburn University. International Center for Aquaculture
31 Aug 1982, 32p. + 3 supplements : References, p.32, En

Information on the number of fishermen, the fish catch, and the fish harvest per unit of fishing effort are needed to develop fishing regulations and management strategies and to make long-term predictions of maximum expected yields, species stocking, and fishing levels for the Niger River in Niger. This report offers a proposal for conducting a catch assessment survey (CAS) to provide such information.

After defining the need for a CAS and for other biological fish sampling on the Niger River, the authors outline the design of a preliminary CAS. The initial CAS will have two parts: an on-water survey of active fishermen to estimate fishing efforts and observe fishing methods, and a landing survey to determine the size and composition of the catch and the sizes of the harvested fish. Both initial surveys will be based on a division of the hydrologic year into four seasonal strata; the on-water survey will also entail dividing the river into four geographical segments. Peace Corps Volunteers will conduct the actual interviewing; sample questionnaires are included. After a 4-month period of preparation, the initial surveys will be conducted for one year, beginning 2/83. Based on the data collected in the first year and on four overflights of the river, the original survey designs will be modified as necessary.

After sketching a fish population sampling program which will supplement the CAS with biological data, the authors proceed to suggest the roles to be played by the various participating agencies – the Nigerien Department of Water and Forests, the FAO/Fishery Development Project, the USAID/N Project for Soil and Forest Utilization, and the U.S. Peace Corps – in conducting the CAS. The authors conclude by re-emphasizing that, while the ultimate purpose of the CAS is to acquire information for rational fishery resource management, development and enforcement of regulations and attention to all aspects of fish utilization (e.g., preservation and marketing) are also crucial.

Appended are overflight specifications, recommended USAID/N expenditures for the CAS, and a short report on community development orientation for Peace Corps fishery volunteers.

250 **PN-AAK-976**
MF $6.48/PC $67.60

Fish behavior and its use in the capture and culture of fishes

Bardach J. E.; Magnuson, J. J.; et al
International Center for Living Aquatic Resources Management
Hawaii Institute of Marine Biology (Sponsor)
(Conference on the Physiological and Behavioral Manipulation of Food Fish as Production and Management Tools, Bellagio, IT, 3-8 Nov 1977)
1980, viii, 512p. : En

Improvements in the operations of capture and culture fisheries will rely to a substantial extent on an improved understanding of fish behavior. Such was the premise of a 1977 conference on the more efficient use of energy, materials, money, and time in the capture and culture of food fishes. Proceedings of the conference are contained in this volume.

The initial chapter highlights in a nontechnical way possible uses of fish behavior in locating, attracting, repelling, breeding, rearing, feeding, and determining the response to fishing gear of fishes in the contexts of capture, culture, and ranching. Next, the editors present 17 state-of-the-art papers offered during the conference. The papers are grouped into three general areas: (1) sensory capabilities and manipulation of fish behavior; (2) controlling or predicting the reproduction and recruitment of fishes; and (3) predicting the distribution of fishes and their responses to fishing gear. Each paper is followed by a discussion of the applications of fish behavior and a list of references.

A list of participants, a general index, and a specific name index are appended.

251 **PN-AAL-118**
MF $1.08/PC $4.29

ICLARM-CLSU integrated animal-fish farming project: poultry-fish and pig-fish trials

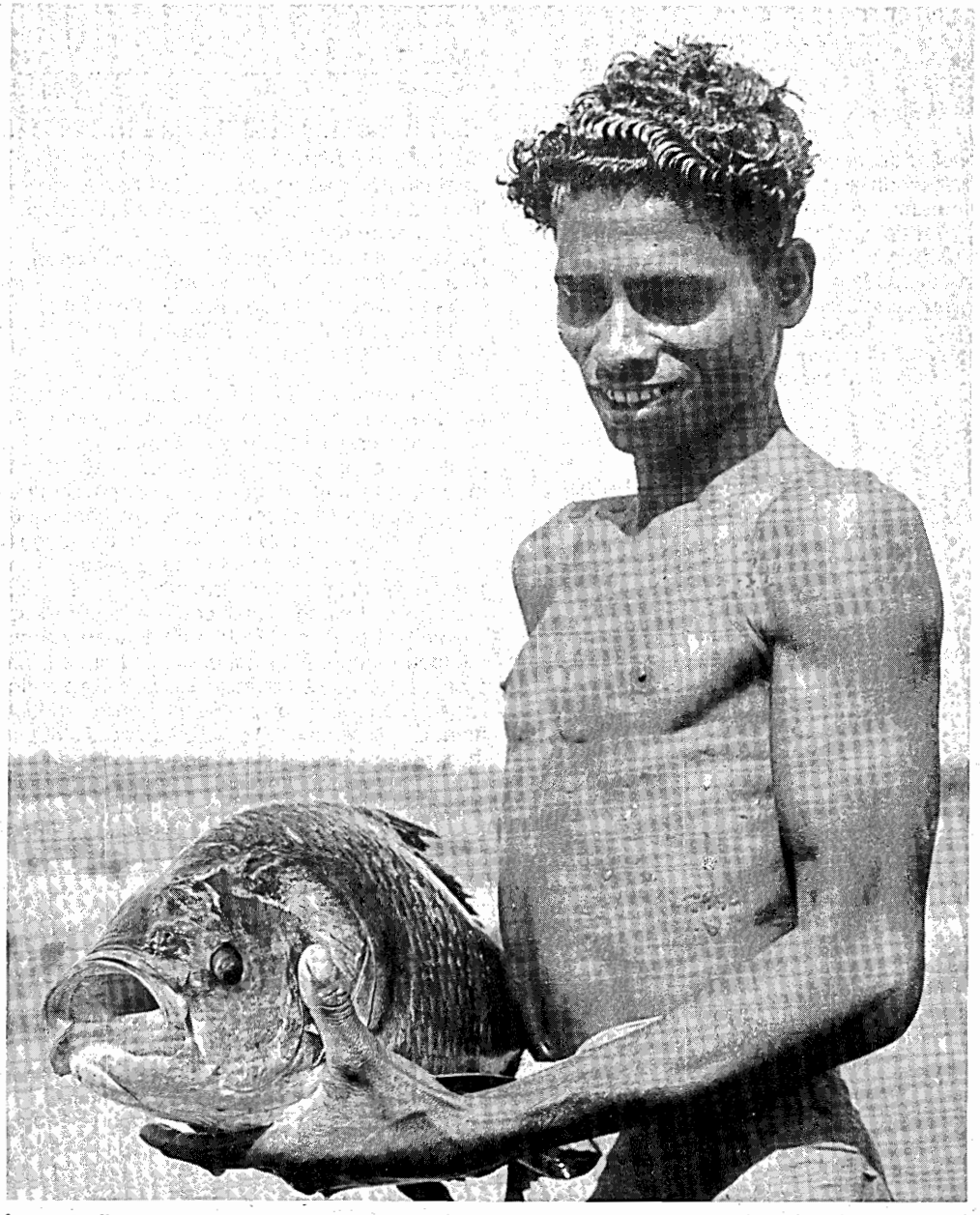
Central Luzon State University. Freshwater Aquaculture Center
International Center for Living Aquatic Resources Management
ICLARM technical reports, no.2, 1981, 29p. : En

The rising costs of high-protein fish feed and inorganic fertilizer have led to increased interest in the utilization of animal manures in aquaculture and in the traditional systems

which integrate animal husbandry with aquaculture. This report describes two experiments conducted at the Freshwater Aquaculture Center of Central Luzon State University in the Philippines which indicate that considerable fish production can be obtained when animal manures are properly applied to fish polyculture systems.

In the first experiment, 90–day production trials were conducted using 40 or 60 pigs/ha and 750 or 1250 ducks/ha of pond surface, with total fish stocking densities of 10,000 or 20,000/ha. The highest yields – 1,950 kg/ha and 1,690 kg/ha – were obtained using 60 pigs/20,000 fish and 750 ducks/20,000 fish. However, if the market price of fish is size related, maximizing yield may not maximize profits. Comparisons with control ponds receiving inorganic fertilization and measurements of water quality parameters are included.

In the second experiment, tropical freshwater fish ponds stocked with 10,000 or 20,000 fish/ha received untreated piggery wastes from 40, 60, 80, 100, 120, or 140 pigs/ha. Based on the two 90–day fish culture periods witnessed during the 180 day pig culture period, the highest net fish yield (3,549 kg/ha) was obtained with 103 pigs/ha and 20,000 fish/ha. When pigs are plentiful and/or pond area is limited, 100 pigs/ha will maximize total revenue and profit; however, when pigs are scarce, 53 pigs/ha will maximize profit for gravity water systems and 67 pigs/ha will do so for pumped water systems. It was also concluded that freshwater fish pond operations are greatly influenced by economies of scale.



Aquaculture—the controlled management of aquatic organisms for the benefit of man—is increasingly used as an alternative means of producing animal protein.

FOOD & NUTRITION

252 **PN-AAK-896**

MF $4.32/PC $39.65

Proposed agroclimatic assessment methods for early warning of drought/food shortages in South and Southeast Asia

Steyaert, Louis T.; Achutuni, V. Rao; Todorov, Atanas V.
U.S. National Oceanic and Atmospheric Administration. Environmental Data and Information Service. Center for Environmental Assessment Services
University of Missouri-Columbia. Atmospheric Science Department
U.S. Agency for International Development. Office of Foreign Disaster Assistance (Sponsor)
Jun 1981, vi, 285p. : En
PASA CC/IND-999-1-79

A.I.D.'s Early Warning Program (EWP) was developed to provide the Agency with advance knowledge of the potential for abnormal food shortages due to drought in 13 countries of South and Southeast Asia, an area historically vulnerable to climatic variations. The results of that project are presented in this report.

Discussion is given in turn to the data bases and methodology used in developing the EWP; background information on the region's climate and agriculture; and the results of climate/crop yield modeling for individual countries in the region. Finally, the proposed EWP is presented and recommendations are made for future study.

The EWP is based on ground station and satellite data, collected biweekly, on the amount of rainfall (the key meteorological determinant of crop yield in the region) as interpreted by agroclimatic indices to indicate potential crop production in relative terms and to identify the potential for abnormal food shortages.

With the help of data on local agricultural practices, historical episodic reports, meteorological data for 1950 to 1978 from over 350 stations, and experimental data, agroclimatic indices and crop calendars were developed for 107 agroclimatically homogenous regions throughout southern Asia. Documented occurrences of famine, drought, crop failure, and other events are used to establish critical thresholds for potential food shortages and to interpret the indices. Statistical crop yield models developed included individual state models for rice, wheat, and sorghum in India and for the main rice crop in Peninsular Malaysia; and national models for rice crops in Bangladesh, the yala rice crop in Sri Lanka, the main rice crop in Burma, and for maize in Thailand.

Before the EWP is made operational, the indices should be evaluated by statistical testing, refinement and calibration, routine test assessments, user feedback, and ongoing development. The EWP provides low-cost, reliable information 30-60 days before harvest and can give A.I.D. a 3-6 month lead-time for planning food assistance strategies and improve its capacity to identify disaster conditions and transfer agroclimatic technology to developing countries. Substantial data bases are provided in various appendices and supplements.

253 **PN-AAK-748**

MF $2.16/PC $21.06

Nutrition et sante chez un groupe d'eleveurs Woodaabe (Bororo) du Niger; rapport preliminaire-discussion paper (Nutrition and health among a group of Woodaabe (Bororo) pastoralists in Niger)

Loutan, L.
Niger. Ministry of Rural Development
U.S. Agency for International Development. Bureau for Africa. Niger (Sponsor)
Feb 1982, 149p. : En

A health/nutrition survey was conducted among 53 sample families of the Wodaabe tribe, nomadic cattle breeders who comprise one of the main population groups of Niger's pastoral zone, to provide baseline data on the feasibility of establishing self-help village groups in the zone. This report presents the results of that survey.

Wodaabe food habits and nutrition are based on milk products and cereals, the proportions varying with the seasons; meat is eaten only on special occasions. Some seeds, fruit, and leaves are harvested for food. Water is precious in this hot, arid country; its sources, transport, availability, and use are outlined. A nutritional study on children 0-5 years old found that they were subject to malnutrition at the end of the dry season, when adults also lost weight. Suggested ways of improving Wodaabe nutrition include increasing milk production (added feed, better animal health services, use of goats and camels); better access to cereals (more millet, sorghum, and rice, price control, storage); and greater food diversification.

A year-long health survey found that the Wodaabe are protected by their transient life from epidemics common to population centers, but that they seldom have access to health services, despite the existence of a health system infrastructure. Diseases among the Wodaabe are tabulated by native name, symptoms and cause, and treatment. Informing the Wodaabe and the health services about each other is recommended, as is increasing the allowance of vehicles and fuel to the health services. A self-help health organization already in place could be expanded to provide efficient health service at a price acceptable to the rural population.

Descriptions are included of the characteristics of the population sample in terms of family definition and size (polygamy is practiced), of vital statistics for families, and of the transient lifestyle of the Wodaabe. Appended are details of the survey methodology and questionnaire, a list of the scientific and native names of local plants, and a 47-item bibliography in French and English (1953-81).

254 **PN-AAJ-809**

MF $1.08/PC $9.36

Nutritional impact of resettlement, settlement and colonization

Partridge, William L.; Brown, Antoinette B.
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Policy Development and Program Review (Sponsor)
University of Southern California
Dec 1980, 68p. : En
AID/OTR-147-80-74

FOOD & NUTRITION

The displacement of people which occurs in many development projects frequently leads to malnutrition; the traditional solution to this problem, direct intervention, has generally had only a short-term, marginal effect. This report explores and recommends ways to sever the link between displacement and malnutrition.

In reviewing the historical causes of population displacement (e.g., war, agrarian reform, sedentarization), the authors differentiate among settlement, voluntary and spontaneous migration of individuals or families; resettlement, forced and directed relocation of communities; and colonization, privately or publicly planned and administered movement of small, selected groups as part of an area development scheme.

Proposing that malnutrition should properly be a priority concern of development planners, the authors detail the environmental and social determinants of malnutrition. The societal cost of malnutrition is seen as an extrapolation of the cost to the individual – physical and mental debilitation leading to reduced productivity.

Citing several empirical studies, the authors conclude: (1) that resettlement entails a high initial danger of malnutrition after which conditions improve for most but worsen for a small minority; (2) that settlement involves a similar initial risk but over time settlers achieve a substantial improvement over previous conditions; and (3) that colonization can greatly improve or harm nutritional status depending on how well the project is administered.

The authors recommend improving projects at six stages. In the project design, the problem must be defined, an objective set, and alternatives compared. Household socioeconomic and nutritional surveys must next be conducted. Before the move, participants should be educated regarding what to expect and what to grow. During the move, provisions should be adequate. Upon arrival at the new locale, food relief must be based on accurate measures of need, should consist of familiar foods or carefully introduced new foods, and should be monitored regarding administration and nutritional impact. Finally, periodic assessments should continue well after the displaced are established. An 84-item bibliography (1942–80) is appended.

255 **PN-AAK-823**

MF $1.08/PC $4.68

Determinants of nutrition demand: the limited relevance of income and the importance of in-kind food, refrigeration, women's education and nutritional knowledge

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Centro de Investigaciones Sociales Nicaraguense
Banco Central de Nicaragua
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Policy Development and Program Review (Sponsor)
n.d., 33p. + attachments : En
930000995
AID/otr-C-1571

Although recent analyses of the endemic malnutrition found in developing countries have stressed the role of income in determining nutritional status, this report presents a study which concludes that other factors, e.g., household size and women's education, play a more important role than does income. Data were obtained from a 1977 survey of 1,167 households in Managua, Nicaragua. Deficiencies in calories, protein, iron, and vitamin A were examined. Two models – a basic one incorporating household income and size and women's education and an extended one incorporating additional income, consumer, and background variables – were used to explain nutritional status.

While intake of protein and vitamin A were slightly above international standards, intake of iron and calories was 56% and 52% below standard, respectively. Income elasticities were quite small, indicating that income was not as critical a determinant of nutrition as previous analyses have suggested. More important were household size (larger households being better nourished), the presence of refrigeration, the receipt of nutritional food as in-kind payment for domestic work, and the cost of food. Women's efficiency in running a household was directly related to improved nutrition, as was women's schooling generally, their knowledge of health and nutrition in particular, and, strikingly, their mothers'schooling.

The authors conclude that there may be millions of households like those in Managua that are poor and undernourished but will not benefit nutritionally to any great extent from medium-term income increases. This study suggests that specific nutrition measures, such as direct food distribution (akin to food in-kind provided to domestics) and refrigeration will be far more effective in improving nutrition than efforts to increase income. Market integration and related improvements would probably also yield better nutrition. The importance of women's education for improving nutrition over both the long and the short term cannot be overstated. Finally, programs focusing on nutrition education will likely have strong short-term benefits. Appended are statistical tables containing survey data.

256 **PN-AAK-756**

MF $1.08/PC $7.02

Development and marketing of a soy-fortified bread in Korea: a case study

Nichols, John P.; Barrett, Fred F.
Texas A&M University. Texas Agricultural Market Research and Development Center
U.S. Department of Agriculture. Office of International Cooperation and Development. Nutrition and Agribusiness Group (Sponsor)
U.S. Agency for International Development. Bureau for Development Support. Office of Nutrition (Sponsor)
Research report, no.MRC80-3, Jun 1980, x, 46p. : En

While fortified bread can capture a significant market share when made from high-quality ingredients and priced competitively, such a product may not serve its intended purpose of improving the nutritional status of the at-risk population wihtout special marketing tactics. Such is the conlusion of this report on an A.I.D. project to produce and test-market soy-fortified bread (SFB) in Korea.

The soy flour fortification technology used in the project was developed by Kansas State University and involved combining 12 parts locally-produced, food grade, defatted, toasted soy flour with 100 parts wheat flour and adding a dough conditioner (sodium staeroyl-2-lactylate) and water. SFB production began with experimental, pilot-scale baking tests followed by sustained commercial scale production and test-marketing. Mid-project modification was made to use Government of

Korea–mandated medium–protein rather than high–protein soy flour.

Three taste tests showed that despite differneces in odor and texture, SFB was acceptable and sometimes favored over regular bread. Although consumer acceptance fell after the switch to inferior soy flours, broader test–marketing still found consumers were willing to buy SFB if available at the same price as regular bread. In fact, when priced equal to the cheapest competing bread product, SFB achieved a sales level warranting continued production and marketing. Surveys showed that purchasers of SFB tended to be college educated, upper class families, often with western–style kitchens, who were used to eating bread. However, the authors note that the marketing techniques employed in this project as well as the techniques needed to reach those who would most benefit from SFB are alien to many developing countries.

A 14–item list of references (1969–80) is appended.

257 **PN–AAK–779**

MF $3.24/PC $29.25

Rural food habits in six developing countries: a CARE study on environmental, social and cultural influence on food consumption patterns

Vemury, Merlyn
Cooperative for American Relief Everywhere
U.S. Agency for International Development. Bureau for Technical Assistance. Office of Nutrition (Sponsor)
Apr 1981, xxiii, 199p. : En

To generate concrete nutrition planning data, CARE conducted a study, the results of which are here summarized, of the determinants and impact of rural dietary habits on those nutritionally at risk in Peru, Columbia, Guatemala, Tunisia, Jordan, and Bangladesh.

Key social influences included those of older mothers (who lack nutrition education), husbands (who generally dictate what food is bought), and, to some extent, health personnel. Age and sex were found to be particularly influential. Adults, especially males, eat first and receive the choicest portions (especially of animal foods); priority is not accorded to pregnant and nursing women and especially not to children. Other key factors included large family size and close child spacing and the lack of family education and of basic health and sanitation services. A significant result of the latter deficiencies was the prevalence of early pregancies and early child deaths. Other social factors discussed include occupation, literacy, ethnicity, religion,and access to radio. Overall, community influences were found to outweigh the influence of the mother.

Household income, food availability and cooking, and storing methods were also key factors. Recommendations for adressing deficiencies in these areas include stressing income–generating activities (along with nutrition education); mixed diets (existing foods in the six countries were found to be nutritionally sufficient); meal planning and development of home gardens; food preservation programs encouraging the use of seasonal crops during the off season; home consumption, especially by very young children, of the animal foods usually sold to produce income; crop diversification; and proper methods of food preparation and sanitary methods of home food storage.

Dietary habits are influenced by food beliefs, e.g., the ascription to certain foods of beneficial or harmful qualities or of medicinal or prestige values. Food beliefs which positively influence diet should be incorporated in nutrition programs. Attempts should be made to alter those beliefs which restrict food for pregnant and nursing women and for infants and preschoolers. Included are a discussion of the survey's methodology and several examples of survey instruments.

258 **PN–AAK–897**

MF $4.32/PC $44.59

Early warning assessment program for drought/subsistence food shortages in the Caribbean Basin and Sub–Saharan Africa; final report on test and evaluation

Steyaert, Louis T.; Ravelo, Andres C.; Sakamoto, Clarence M.
U.S. National Oceanic and Atmospheric Administration. Environmental Data and Information Service. Center for Environmental Assessment Services
University of Missouri–Columbia. Atmospheric Science Department
U.S. Agency for International Development. Office of U.S. Foreign Disaster Assistance (Sponsor)
Dec 1980, 167p. + supplement : En
PASA CC/OFDA–999–79

Because potential drought–related food shortages can be predicted through early warning assessments based on weather, climatic, and agronomic data, A.I.D. sponsored two projects to develop an early warning program in the Caribbean Basin and Sub–Saharan Africa, respectively. This report presents the results of tests and evaluations of the assessment program.

After a brief overview of the two projects, the authors describe the preparation of weekly weather assessments and monthly crop condition/food shortage assessments. They proceed to verify the early warning assessment program's accuracy and utility during 1978–80 in the Caribbean, using historical and climatic analyses of Haiti covering a 35–year period; and in Africa, relying on documented reports from A.I.D. Missions and from the Food and Agricultural Organization.

The authors conclude that the agroclimatic assessments can provide useful information 30–60 days prior to harvest, representing a 3–6 month warning of abnormal food shortages, in any country of the Caribbean Basin or Sub–Saharan Africa. The program can potentially allow A.I.D. to achieve a cost–effective response capability in monitoring and assessing potential drought–induced disasters; increasing U.S. capacity to define disaster–prone conditions and recommend disaster avoidance measures; and in applying and transferring such information to developing countries and international organizations.

It is recommended that future changes in agricultural practices or socioeconomic conditions be incorporated into the assessment procedures; crop condition assessment be more localized; historical yield indices be expressed as raw, percentile, and percent of normal figures; and that time series plots of meteorological variables be examined throughout the crop season. It is also recommended that the yield moisture index be used as the primary indicator in the Caribbean and that the crop moisture ration be used in Africa.

Appended to the report and comprising the supplemental volume are weekly weather assessment data for the two regions, an evaluation of the 1979 growing season, and a description of an episodal event data base for the Caribbean.

FOOD & NUTRITION

259 **PN-AAK-679**

MF $1.08/PC $8.84

Seminar and workshop on food technology in Nicaragua

Baldwin, Ruth
University of Idaho. Postharvest Institute for Perishables
Nicaragua. Ministerio de Industria. Laboratorio de Tecnologia de Alimentos (Sponsor)
U.S. Agency for International Development. Bureau for Latin America and the Caribbean. Nicaragua (Sponsor)
GTS report, no.81-04B, Jan 1982, i, 56p. : En
931132300
AID/DSAN-CA-0265

Sensory evaluation – a scientific discipline used to evoke, measure, analyze, and interpret reactions to those characterisitics of foods perceived by the senses – is a relatively new field which has become essential in developing, improving, and evaluating foods in order to assure consumer acceptance. This report presents the proceedings of a workshop on sensory evaluation held for 29 employees of Nicaragua's Food Technology Laboratory (LABAL).

Workshop participants were informed of the four categories of sensory evaluation. Bench screening entails informal evaluation to eliminate products having little merit, while expert evaluations are common in judging products such as coffee or whiskey. Emphasis, however, is on analytical testing (difference/discriminative or descriptive) by trained judges under controlled conditions and affective testing by large numbers of untrained panelists. Affective testing is always preceded by analytical testing and is usually followed by market testing. All sensory tests generally involve setting up a data collection system, evaluating samples, and statisticaly verifying test results.

Participants gained hands-on experience in both discriminative tests (paired test, triangle test, and ranking tests) and decriptive tests (scoring) and applied this knowledge to develop a score sheet for tomato catsup. Affective tests were discussed briefly, with emphasis on simplicity and the need for a large number of panelists. Such tests, however, will not easily be conducted in Nicaragua and will require LABAL employees to act as panelists.

Criteria for selecting panelists for analytical tests were also discussed, e.g., interest, motivation, cooperativeness, availability, health, freedom from anosmias and aguesias, age (20–50 years), and willingness to forego perfumed cosmetics and smoking. In concluding, the participants addressed the validity of sensory tests, especially the need to state an objective and select an appropriate test.

As a result of the workshop, LABAL employees are prepared to begin a sound sensory evaluation program. However, another consultancy in the near future and U.S. training at a university or a food industry facility are recommended. Appended are directions for conducting the various tests and statistically analyzing the results.

260 **PN-AAK-700**

MF $1.08/PC $1.56

Potato processing for Bangladesh

Shaw, Roy
University of Idaho. Postharvest Institute for Perishables
International Potato Center
Bangladesh Agricultural Research Council (Sponsor)
Bangladesh Agricultural Research Institute. Potato Research Center (Sponsor)
U.S. Agency for International Development. Bureau for Asia. Bangladesh (Sponsor)
GTS report, no.82-03, Apr 1982, 9p. : En
931132300
AID/DSAN-CA-0265

Production of potatoes, a staple in the Bangladesh diet, is expected to increase 5% per year during 1980–85. Because the harvest season is short and storage space limited, processing and/or storage methods must be devised to prevent both postharvest losses and a drastic fall in the price of potatoes. After reviewing available storage alternatives, this report proposes a project to expand existing methods of potato processing.

Although the 1980–81 potato harvest was 1,164,000 MT (40% local older varieties and 60% higher yielding, more perishable Dutch varieties), there existed cold storage capacity for only 200,000 MT. The author considers three alternatives for dealing with this problem: building sufficient cold storage units to store the Dutch varieties; improving the current system of first consuming Dutch varieties while storing local varieties; and processing the Dutch varieties for later consumption to avoid the need for cold storage.

The author favors the last approach and recommends expanding an existing cottage industry which uses a simple solar dehydration technology. A project to expand such a cottage industry must: accomodate the current production/storage/processing/marketing system; conform to local views, government policies, and existing infrastructures; both fill a need and relieve a constraint readily perceived by the people; and be within the intellectual and financial capabilities of the target population.

The work plan for the proposed project identifies the need for a project coordinator, a sociologist, an engineer, and a plant physiologist, and envisions three phases of implementation: (1) studying the existing processing system to identify the appropriate technology to be used; (2) developing the necessary equipment to expand potato dehydration; and (3) demonstrating the equipment and technology nationwide. Such a project is conservatively budgeted at $6,500. Finally, it is recommended that the staff of the Potato Research Institute at the Bangladesh Agricultural Research Institute implement the project since they have the necessary capabilities.

261 PN-AAK-794

MF $3.24/PC $29.51

Study of the Caribbean basin drought/food production problem; final report

University of Missouri-Columbia. Atmospheric Science Department

U.S. Department of Commerce. National Oceanic and Atmospheric Administration. Center for Environmental Assessment Services.

1979, 225p. : En

940099900

PASA CC/CARB 999-1-77

In the Caribbean Basin, year-to-year variations in rainfall are a dominant factor in determining crop yield, and are thus important indicators of food supply. This report examines climatic conditions and crop yields in Caribbean Basin countries in order to develop and refine techniques for predicting drought.

Following background information on climate, soil properties, and subsistence farming in the region, seasonal climatic data for the period 1920-78 are presented for Haiti, the Dominican Republic, Jamaica, and Puerto Rico. The data show that drought tends to occur simultaneously among all Caribbean Basin countries and is physically linked to large-scale atmospheric circulation patterns. The potential value of these patterns in predicting seasonal rainfall is noted. No persistent long-term trends in precipitation were uncovered, however, and there was little evidence that rainfall data can be used to predict impending drought. Deforestation and soil erosion were not found to significantly affect rainfall levels, although they do reduce available soil moisture and thus lower crop yield.

The data were then used to develop an Agroclimatic Monitoring System which would provide early warning of potential food shortages due to drought. A yield moisture index, which weights rainfall according to the moisture requirements of specific crops, was found to be a leading indicator of crop yield. When coupled with data on soil moisture and plant stress, this index provides a low-cost method of predicting yields. Analogue climate/crop yield models for corn, rice, and sugarcane were developed to supplement the Agroclimatic Monitoring System.

Finally, the five-step areal rainfall estimating system of the Center for Environmental Assessment Services (CEAS) was tested and found to be a viable tool for estimating rainfall anomalies of 2 months or longer, and thus to have potential for predicting impending drought. Incorporation of these research results into the CEAS assessment procedures is proposed.

It is concluded that the techniques herein proposed provide a low-cost means of predicting possible food shortages due to drought. Appendices contain simulated yield indices, climatic diagrams of Haiti, and a sample CEAS weather assessment report.

A.I.D.'s Early Warning Program was developed to provide the Agency with advance knowledge of drought-related food shortages in Asia, Africa, and the Caribbean, and thus to improve A.I.D.'s disaster relief capability. **(See items 252, 258, and 261)**

HEALTH

262 **PN-AAK-767**

MF $2.16/PC $14.95

Technical training of Peace Corps volunteers in rural water supply systems in Morocco

Sherer, Keith
Camp Dresser and McKee, Inc.
WASH field report, no.43, May 1982, v, 106p. : En
931117600
AID/DSPE-C-0080

Integrated, community-based, in-service training is effective in providing Peace Corps Volunteers the language and technical skills and the socio-cultural understanding vital to project success. This report describes such a training program conducted for 20 Peace Corps Volunteers working on a UNICEF rural potable water systems project in Morocco.

Against a background description of the project, the components and content of the 16-week training program are detailed. The program began with a 5-week U.S. component which included technical training in sanitary water systems as well as cross-cultural training and evaluation of trainees'suitability for work in Morocco. During the ensuing 11-week in-country component, trainees continued advanced technical training and spent the final 4 weeks in community-based, experiential activities at a project site in Settat Province. As part of their community-based training, trainees were to identify gaps in their Arabic language ability, cultural understanding, or technical skills and to then refer these needs to the appropriate instructor. In accordance with the program emphasis on field work, teams of 2-3 trainees were assigned to communities to gather base line information, recommend replacement or repair of the existing system, and to develop a system operation and maintenance scheme.

Although the overall objective of providing trainees with technical proficiency in all aspects of water systems was met, improvements in some facets of the program were recommended. Constant coordination and feedback among language, cultural, and technical training components should be built into the project design. Training sites should be close to project sites and to water supply material and equipment and should also be visited beforehand to assure that there is adequate electricity and refrigeration. To get a clearer idea of training needs, trainees should be surveyed 4-6 months after program completion. Finally, the experiential training model should be considered for all Peace Corps technical training programs.

Appended are extensive supporting documents regarding the planning, design, implementation, and subsequent evaluation of the training program.

263 **PN-AAL-205**

MF $2.16/PC $12.87

Emergency vector control after natural disaster

Pan American Health Organization
U.S. Agency for International Development. Office of U.S. Foreign Disaster Assistance (Sponsor)
Canada. Canadian International Development Agency (Sponsor)
Scientific publication, no.419, 1982, ix, 98p. : Bibliography, p.71-72, En

Disaster preparedness and effective response in the post-disaster period are integral to the overall strategy for achieving Health for All by the Year 2000. This report, written as a companion to *Emergency Health Management after Natural Disaster*, explores and presents guidelines and information on emergency vector control in the wake of a natural disaster, with special emphasis on Latin America and the Caribbean.

The authors open by reviewing the mechanism by which a disaster may increase the transmission of existing diseases; describing the pre-disaster chores of a Disaster Emergency Committee and a Vector Control Subcommittee (devising plans and keeping up-to-date records on the status of maps, data, equipment, insecticides, vehicles, and other aids needed for effective surveillance); and summarizing immediate post-disaster measures to control insect and rodent vectors.

They proceed to offer detailed guidelines for surveillance, control, and evaluation of control measures for specific vectors – *Aedes aegypti*, Anopheline vectors of malaria, *Culex quinquefasciatus* and other pest mosquitos, rodents, flies, lice, fleas, mites, ticks, and other arthropods.

Finally, the role of consultants in vector control is explored. Consultant teams will usually include an entomologist, a vector control specialist, a rodent control specialist, and a sanitarian; other specialists may be included according to the situation. The Pan American Health Organization (PAHO) maintains a list of experts and a procurement unit to respond rapidly to requests for emergency vector control assistance. Consultants are briefed by PAHO prior to and after arrival in the host country on administrative and situational matters. Once on site, the team assesses the problem, makes recommendations for control procedures and follow-up, and performs on-the-job training in vector control.

Appended are a 35-item bibliography (1955-80); a list of suggested vector surveillance equipment and supplies; tabular information on pesticide application for control of vectors, rodents, and pests; and a list of producers of insecticides, rodenticides, and equipment.

264 **PN-AAK-601**

MF $1.08/PC $9.10

Demographic and socioeconomic correlates of infant growth in Guatemala

Clark, Carol A. M.
Rand Corp.
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Policy Development and Program Review (Sponsor)
Rockefeller Foundation (Sponsor)
Rand note, no.1702-AID/RF, Sep 1981, x, 63p. : Bibliography, p.57-63, En
930008800
AID/OTR-G-1822

Using a multivariate model of infant growth, this study analyzes data from a longitudinal nutrition study and a cross-sectional survey of four eastern Guatemalan villages to determine the biological and socioeconomic determinants of infant growth, with specific focus on family size variables.

After a review of the pertinent literature and a description of the study's design and of the characteristics of the sample, study results are presented. Differences were found among factors significant for infant growth during the child's first year. During the 0-6 month period, important factors included mother's weight and height, number of live pregnancies, short birth interval, number of 15+ year-olds, number of rooms in the house, and child's sex and birth weight. Infant growth during the

6–12 month period, however, related significantly to number of 15+ year-olds, number of preschoolers, calories from the protein supplement, length of breastfeeding, mother's height, child's sex, and child's 6-month weight. This suggests that during the 0–6 month period, when the child is immobile and highly dependent on the mother, maternal characteristics play an important role in infant growth. After 6 months, the child becomes more mobile and less physically dependent on the mother and must begin competing with others for scarce time and food resources.

Policy implications are that family size should be seen as a cluster of mechanisms including maternal health, available child care time, food resources, and crowding; and that nutrition interventions should focus on maternal health during first 6-month period and on household conditions during the second. The author recommends several other interventions, e.g., family planning and breastfeeding, but cautions that these are not causally linked to the data. She also recommends that, to resolve some of the model-building limitations and data problems encountered in this study, future researchers sample a wider range of more favorable infant growth (not just the malnourished) with greater heterogeneity of such crucial factors as income, environmental sanitation, and access to potable water.

Appended is a 73-item bibliography (1965–79).

265 **PN-AAK-351**

MF $5.40/PC $58.50

AID-assisted primary health care projects; summary reviews

Baird, Robert; Clarkson, Frederick; et al.
American Public Health Association. International Health Programs
U.S. Agency for International Development. Bureau for Development Support. Office of Health (Sponsor)
1981, v.p. : En
936590000
AID/DSPE-C-0053

A.I.D. is one of the major sources of external support for primary health care (PHC) programs aimed at increasing the availability of basic health services in developing countries. In this report, 52 A.I.D.-assisted projects are summarily described in order to provide an overview of the Agency's PHC activities and a framework for tracking progress and problems in project implementation, as well as to help identify positive and negative lessons which merit further research. Principal sources used in compiling the report were PID's (Project Identification Documents); PP's (Project Papers); PES's (Project Evaluation Summaries); Special Evaluations (which were available only for a few projects); cables, trip reports, and other project memoranda; consultant and project progress reports; and interviews with AID/W and visiting USAID personnel, as well as with individuals from private and voluntary organizations, consulting firms, and implementing universities.

The projects are listed alphabetically by country according to four regions: Asia, Latin America and the Caribbean, Africa, and the Near East. Main project topics include identification (project name and number, location, dates, funding, responsible offices, contractor, implementing agencies); country statistics; project synopsis, background, and description; implementation experience and in some cases current project status; and a list of specific information sources. Supplementary information is sometimes supplied in a postscript.

266 **PN-AAK-807**

MF $3.24/PC $29.77

Primary health care in political and administrative context; a literature review and research design

Bossert, Thomas J.; Parker, David A.
Mar 1982, iii, 228p. : Bibliography, p.189–228, En
931000300
AID/DSPE-C-0086

Little is known about specific political and administrative influences on primary health care (PHC). Building on a literature review (495 items, 1956–82), this study develops a research model describing the interacting constraints placed by a government's political and administrative structure on the formulation of PHC policies, the administration of PHC programs, and the delivery of PHC services.

Some tentative conclusions about PHC policy drawn from this analysis are that "reformist" regimes are more likely to adopt PHC programs than "status quo" regimes and are less likely to require long-term external support; that political instability may create an opportunity for adopting PHC programs; and that such adoption is more likely where potential beneficiaries and health agencies have greater bargaining power and where health plannng efforts are stronger.

Administration of PHC programs is more effective if: (1) there is commitment to PHC goals throughout the responsible implementing agency, and especially where non-physicians make key policy decisions; (2) administrative responsibility for curative health services is separate from PHC administration; (3) efforts are made to improve administrative skills at all levels; (4) recruitment and training programs emphasize rural origins, appropriate incentives, and rurally-based, team-oriented processes; and (5) horizontal responsibilities are unfragmented in a decentralized administrative structure with good regional and local administrative capacity.

PHC service delivery is more effective in communities where: (1) economic and political resources are more equitably distributed; (2) there are fewer social cleavages; (3) more avenues are available for channeling community participation; (4) PHC services are more available and lower in cost than non-PHC services; (5) PHC is the first point of contact with beneficiaries in a strong health service referral network; and (6) financial and other resources are readily available.

Two areas of future research are suggested: data collection for use in project review and evaluation, and indepth examination of "similar" country case studies.

267 **PN-AAK-113**

MF $2.16/PC $18.59

Primary care health centers: a guide to planning and design with limited resources

Bicknell, William J.; Connor, Eileen M.; Shaw, Susan M.C.
Boston University. Health Policy Institute
Metcalf and Associates, Architects-Planners
U.S. Agency for International Development. Bureau for Science and Technology. Office of Health (Sponsor)
Jan 1982, xii, 160p. : Bibliography, p.153–160, En
931000300
AID/DSPE-C-0085

It typically happens either that primary health care (PHC) programs are planned without considering the factors that

influence building design or that PHC buildings are erected without considering the programs they are meant to serve. To help alleviate this problem, this guide provides a clear, succinct framework for planning PHC services along with the centers to house them.

Emphasis is placed on the need for a team effort between program planners (doctors, nurses, midwives, officials, etc.) and building designers (architects and engineers, etc.) and on avoiding problems arising from inadequate assessment of needs, poor communication, failure to consider operating costs and space requirements, and insensitivity to local customs and political factors. Seven major major tasks are envisioned in establishing a PHC center: (1) evaluating PHC needs and desires of target area; (2) deciding the program of PHC services; (3) estimating PHC service utilization; (4) deciding on staffing patterns and roles; (5) designing the PHC building; (6) specify the building's furnishings; and (7) preparing a budget that carefully distinguishes initial (capital) costs from operation costs and anticipates revenues sources. Rather than specifying particular steps to be taken in accomplishing these tasks, the guide provides questions for the planning and design team and checklists of issues requiring its attention. Considerations discussed relevant to the building design stage include: the space implications of the plan of services; site selection and planning (e.g., availability of water, sanitation, renovation or new construction, building regulations); and whether a PHC center should include beds. The guide concludes by discussing the following issues arising in the context of PHC: referral services, supervision of PHC workers, balancing curative and preventive care, and the relationship of the public and private health sectors. A 102-item bibliography (1966-81) is appended.

268 **PN-AAL-206**

MF $1.08/PC $10.40

Primary health care: bibliography and resource directory

American Public Health Association
1982, ix, 67p. : En
936590000
AID/DSPE-C-0053

Despite the many difficulties the primary health care approach entails, it is essential to recognize that the concept of primary health care and a global commitment to health for all by the year 2000 have provided a shared frame of reference for thousands of health care professionals worldwide. This bibliography and resource directory has been prepared to disseminate state-of-the-art information on primary health care to health care professionals, planners, and decisionmakers worldwide.

Part I presents a 141-item annotated bibliography with references selected for their usefulness, timeliness, availability in English, and low cost. Various aspects of primary health care are covered by chapters on: (1) health care in developing countries; (2) planning and management of primary health care; (3) manpower training and utilization; (4) community participation and health education; (5) delivery of health services, including sections on nutrition, maternal and child health, family planning, medical and dental care, disease control, water and sanitation, and pharmaceuticals; and (6) auxiliary services.

Part II offers a directory of 369 primary health care resources, including 92 periodicals; 15 bibliographies; 40 directories, handbooks, and catalogues; 22 computerized information services; the addresses of 42 DIALOG, MEDLARS, and SDC services outside the United States; and 15 audiovisual and other teaching aids. Next are listed a total of 63 programs in public health education in developing countries, the United States, and the United Kingdom. A list of 16 private donors of pharmaceuticals and medical equipment, 29 development cooperation agencies, and 20 sources of information on obtaining grants completes the volume.

Author, organization, geographic, and subject indexes are appended, and price and availability information are included for most entries.

269 *** PN-AAL-872**

MF $3.24/PC $29.38

Safe water and waste disposal for rural health: a program guide

Morgan, Mary E.
U.S. Agency for International Development. Bureau for Science and Technology (Sponsor)
National Demonstration Water Project
Environmental Services Corporation
Institute for Rural Water
National Environmental Health Association
Water for the world, 1982, vii, 232p. : En
Executive summary: PN-AAL-447
Program planning: PN-AAL-449
931109300
AID/DSAN-C-0063
** U.S. Agency for International Development. Development Information Center*

Providing adequate water supply and sanitation (WS/S) to rural peoples has been described as the most urgent need facing developing countries today. This three-part guide, prepared as part of the National Demonstration Water Project's *Water for the World* series, provides an overview of information needed by people who promote, design, and carry out programs to meet WS/S needs.

Part One of the guide describes the link between inadequate WS/S and disease, which affects children in particular. Water-related diseases, which may be transmitted by insects which breed near water, by contact with water-borne vectors, by ingestion of water-borne microbes, or by the lack of water for hygienic purposes, are listed. They include malaria, schistosomiasis, cholera, diarrhea, onchocerciasis, and scabies. Methods for developing water quality standards for use in preventing such diseases are discussed.

Part Two presents WS/S technologies appropriate to rural areas in developing countries. Steps identified for setting up a WS system are: locating a surface or groundwater source; retrieving water through the use of wells, intake structures, windmills, and/or pumps; removing contaminants through filtration, boiling, chemical disinfection, or more advanced methods; storing and distributing water; and operating and maintaining the system. Systems described for disposing of human, domestic, industrial, and solid wastes range from primitive latrines and overhang toilets to oil-and water-flushed toilets, septic tanks, cesspools, landfills, incineration, and advanced sewage treatment plants.

Part Three describes how to establish and implement programs that effectively match technical solutions to specific WS/S problems. Models and guidelines are offered for national, regional, and community level WS/S planning. Finally, methods to encourage community participation and provide WS/S training are described and strategies for funding WS/S system construction and operation are outlined.

Each chapter concludes with lists of sources and pertinent *Technical Notes* from the *Water for the World* series. The text is highlighted by 30 tables and 15 figures. Appended are a glossary of terms and a full listing of the *Technical Notes* prepared in the *Water for the World series.*

270 **PN-AAK-130**

MF $1.08/PC $.26

Childhood blindness in Tanzania

Mrisho, Fatma; Kinabo; et al.
Johns Hopkins University. School of Hygiene and Public Health. International Center for Epidemiologic and Preventive Ophthalmology
U.S. Agency for International Development. Office of Nutrition (Sponsor)
Bulletin for research information, v.1(3), 1981, p.32–33 : References, p.33, En
931004500
AID/DSAN-CA-0267

In many African countries, including Tanzania, measles, associated with corneal ulceration and necrosis, is believed to be a primary cause of childhood blindness. Against a background presentation of evidence linking vitamin A and protein deficiency to measles and blinding xerophthalmia, this article details recommendations made by a national seminar in Tanzania to launch vitamin A deficiency control measures.

As a result of the seminar, two lines of inquiry were suggested: (1) determination of whether vitamin A and protein deficiency or other factors bring about measles blindness; and (2) documentation of whether xerophthalmia is currently a problem in Tanzania. In carrying out the first investigation, the following steps have been proposed. Children with measles blindness admitted to the Muhimbili Hospital should be given careful eye examinations and watched regularly for up to a month. Those who develop corneal ulceration, and age/sex controls with normal corneas admitted to general pediatric wards at the hospital, should be studied intensively for vitamin A and protein levels, general systemic condition (malaria, tuberculosis), severity of measles, presence of herpes virus, etc. Study results should be compared with the status of children of similar age, sex, and measles severity who do not exhibit corneal ulcerations. Similar but simpler studies of measles in Mwanza will be used to determine whether regional variations exist; results will be further confirmed by a therapeutic/diagnostic trial use of vitamin A.

Regarding the xerophthalmia problem, it has been proposed that regional ophthalmologists, after a short training seminar in the recognition of xerophthalmia, examine on a weekly basis children hospitalized with malnutrition and record the numbers examined; and also record the age, sex, clinical changes, and measles history of children having any degree of xerophthalmia.

The authors note that the existence of only a few hospital cases of xerophthalmia may indicate that the disease is unreported rather than absent, while a large number of cases suggests a serious vitamin A deficiency in the region, requiring further investigation. A 12-item reference list (1967–82) is included.

271 **PN-AAL-119**

MF $1.08/PC $8.45

Severe measles and measles blindness

Koblinsky, Marjorie A.
Johns Hopkins University. School of Hygiene and Public Health. International Center for Epidemiologic and Preventive Ophthalmology
U.S. Agency for International Development. Bureau for Science and Technology. Office of Nutrition
n.d., 65p. : Bibliography, p.56–65, En
931004500
AID/DSAN-CA-0267

While having disappeared in the West well before the advent of antibiotics and vaccinations, severe measles and subsequent childhood blindness continue to be reported from Africa to this day. The objective of this paper is to summarize the available evidence regarding the origin of severe measles and the etiology of measles blindness in Africa by reviewing the available literature and exploring several hypotheses.

Severe measles is characterized by a fatality rate of 2.5–25% and by the presence of complications – pneumonia in 50% of cases and diarrhea in 30%. The accepted theory has been that severe measles is due not to the strength of the virus but to factors in the host, primarily early age of infection and poor nutritional status. However, quantitative evidence supporting this theory is minimal. An alternative theory is that severe measles is due to the synergistic effect of the measles infection and associated complications (e.g., prolonged dysentery). Susceptibility to secondary infections in children with measles is often ascribed to suppression of the cell mediated immune (CMI) response, considered the key defense to the disease. Again, the evidence is indirect and conflicting.

The cause of measles blindness remains unknown. The etiology of the ulcers involving the stroma of the cornea and the ensuing necrosis which permanently impairs vision in 0.8–2–8% of cases has been variously ascribed to vitamin A deficiency, infection by bacteria and viruses (especially herpes simplex) due to lowered corneal and systemic resistance, and to traditional ophthalmic medications.

In light of the lack of evidence supporting the nutritional theory, the authors recommend reopening the question of what causes severe measles. A 164-item bibliography (1843–1982) is appended.

POPULATION

272 **PN-AAK-765**

MF $1.08/PC $4.03

Methodology of the response errors project

O'Muircheartaigh, C.A.
World Fertility Survey
International Statistical Institute
Scientific reports, no.28, Mar 1982, 32p. : References, p.32, En
931054700
AID/CSD-3606

Because response errors can seriously detract from the utility of any survey, the World Fertility Survey (WFS) has undertaken a cross-national project – based on studies in and fertility surveys of the Dominican Republic, Turkey, Peru, and Lesotho – to investigate the types and magnitudes of response errors and the implications of such errors for analysis of past, present, and future WFS surveys. This report, the first in a planned six-part series, describes the methodology employed in the project.

Noting that WFS data analyzed to date has been found quite accurate, the author describes the WFS approach to estimating both sampling error, arising because only a small portion of a population is interviewed, and response errors, deviations from true values. Response error may be uncorrelated (simple), due to unmeasured or transient sources, or correlated, indicating a systematic distortion in responses.

This project attempts to detect such errors through a three-stage process: Stage I, conducting the main survey by randomly allocating subsamples to each interviewer; Stage II, re-interviewing a subsample; and Stage III, subsequent re-interviewing in cases where discrepancies were observed between Stage I and Stage II data in order to determine the source of response error. The specific procedures employed in each country varied somewhat and are described in detail.

The author also presents a general statistical model, based on the work of Fellegi, for calculating response errors. Formulae are provided for calculating simple and correlated response variance, both separately and simultaneously, and for determining the interaction between the two. Derivation of an index of crude (i.e., bivariate) agreement is also given. Appended is a list of 23 references (1960–81).

273 **PN-AAK-763**

MF $1.08/PC $4.94

Evaluation of the Guyana fertility survey, 1975

Balkaran, Sundat
World Fertility Survey
International Statistical Institute
Scientific reports, no.26, Feb 1982, 37p. : References, p.35, En
931054700
AID/CSD-3606

The 1975 Guyana Fertility Survey (GFS), the first attempt to collect information on the fertility behavior of Guyana's people, discovered several interesting demographic trends. This report evaluates the GFS data collected from 4,432 households and highlights future research priorities.

Reporting was relatively high due to the fairly high levels of literacy and education, the cultural significance of most vital events and anniversaries, the well-established vital registration system, and the efficiency of GFS staff. Nonetheless, the authors note three types of errors common to retrospective fertility surveys such as the GFS age misreporting (more so among older women), omission of vital events, and displacement of dates of vital events.

Evaluation of GFS data showed a rise in age at first union and a fall in proportions ever in a union at young ages, especially among Indians who formerly married very young. Both trends are consistent with the recent decline in fertility, largely the result of greater contraception use. Maternity histories indicate a significant decline in fertility since the mid-1960's. Fertility trends obtained from the GFS and from vital registrations are generally consistent, but errors in numbers and dates of births are greater among older age cohorts. Infant and child mortality data appear accurate and reveal a decline through the 1950's and early 1960's which has since leveled off.

Further analysis is needed to disaggregate the decline in overall fertility into its two components – rising age at marriage and declining marital fertility; to analyze differences among ethnic, socioeconomic, and other subgroups; to refine analysis of the effects on fertility of mating patterns and of union formation, stability, and dissolution; to further explore trends in infant and child mortality; and to evaluate Guyana's vital registration system. The text includes 34 tables and a 25-item bibliography (1956–81).

274 **PN-AAK-552**

MF $2.16/PC $16.64

Surveys of migration in developing countries: a methodological review

Goldstein, Sidney; Goldstein, Alice
University of Hawaii. East-West Center. East-West Population Institute
Papers of the East-West Population Institute, no.71, Apr 1981, v, 120p. : Bibliography, p.101–120, En
932064800
AID/DSPE-C-0002

Although attention to the relationship between population migration and Third World development is growing, there is a serious lack of data on population movements and on the changes in and impact of these movements. This state-of-the-art report examines the purpose, relevance, scope, design, and coverage of the body of sample surveys which have been conducted in response to this need.

The authors find that most sample surveys have two common themes – analyzing the relationship between migration, urbanization, and development; and filling a data gap of importance to the host country. They proceed to highlight the sources of survey data and the trade-off between conducting broad national surveys versus indepth local surveys, and discuss the technical considerations involved in conducting a survey: sample design and size; survey frequency; use of retrospective data and repeat surveys; and identification of out-migrants.

The authors next address the crucial issue of how to define migration. Although all definitions agree that migration entails an origin, a destination, and a time frame, some definitions include a variety of other criteria (e.g., intentions, motives, distance, residence) which hamper cross-national comparisons and mask considerable movement.

Given a certain definition and a set of research tools, demographers should then identify the socioeconomic, demographic, and psychological differences between migrants and nonmigrants and seek to understand the determinants of migration. However, the authors comment that few researchers

have made concerted efforts to collect and analyze the necessary data. In addition, research has centered on adaptation to migration rather than on the multiple impacts felt in the receiving and, especially, in the sending areas.

The authors recommend that increased attention be given to migration and other forms of human movement, especially at the level of the individual; that questions regarding movement be included in both national and local censuses; and that data collection be guided by appropriate theoretical concerns and incorporate new and innovative research methods.

Appended are examples of selected sample survey instruments and a 19-page bibliography.

275 **PN-AAK-503**

MF $2.16/PC $16.90

Population dynamics of Nepal

Banister, Judith; Thapa, Shyam
University of Hawaii. East-West Center. East-West Population Institute
U.S. Agency for International Development. Bureau for Science and Technology. Office of Population (Sponsor)
Papers of the East-West Population Institute, no.78, Dec 1981, vii, 119p. : Bibliography, p.111-119, En
932064800
AID/DSPE-C-0002

Nepal's rapidly growing population – expected to top 20 million by the year 2000 – and its modest resource base pose serious economic, social, and ecological problems. This paper explores Nepal's demographic situation from the 1950's to the late 1970's within the broader context of recent economic, agricultural, and environmental changes.

Against an overview of Nepal's history and geography, the authors discuss the sources of population data for Nepal – the vital registration system, censuses, and a variety of demographic surveys. Using this data, they successively discuss: (1) age reporting and the age and sex distribution of the population; (2) population growth from 1900 to the present and its relation to falling agricultural yields and stagnant per capita farm output; (3) health, nutrition, and mortality; (4) nuptiality and the rising age at which women are marrying; (5) trends in fertility over time and among regions; (6) attitudes toward and prevalence of birth control in light of the country's decade-long family planning program; (7) migration, especally from the mountains to the terai (plains), and the surprising absence of widespread urbanization; and (8) the relationship between Nepal's population and its environment.

Finally, the authors offer three projections, ranging from optimistic to pessimistic, for population growth in Nepal to the year 2030. All forecasts indicate that even if government targets for health improvements and fertility decline for the year 2000 are achieved (an unlikely scenario), Nepal's population will rise from 13.8 million in 1976, to between 21.8 and 25.1 million in 2000, and up to between 26.7 and 51.1 million in 2030.

The report includes 22 tables, four maps, and nine figures. Appended are a glossary of technical terms and a list of 94 references (1953-80).

276 **PN-AAK-500**

MF $1.08/PC $7.28

Regional patterns of intercensal and lifetime migration in Sri Lanka

Abeysekera, Dayalal
University of Hawaii. East-West Center. East-West Population Institute
Papers of the East-West Population Institute, no.75, Sep 1981, v, 46p. : Bibliography, p.45-46, En
932064800
AID/DSPE-C-0002

Policymakers must study past migration patterns if they are to determine and control the impact of public policy. To assess regional patterns of lifetime migration in Sri Lanka from 1946 to 1971 this report documents the volume and direction of interdistrict migration; contrasts the two dominant migration streams; and identifies basic age and sex characteristics of the migrant population.

Based on the examination of public census data, the author observes two dominant migration streams – one to urban Colombo, the most popular destination among in-migrants, and the other to the rural dry zone, which was favored by the government's investment in peasant agriculture and opening of new land and which retains the largest proportion of the gross migrant turnover. The population of other regions – the maritime districts, the *Kandyan* (hill country) districts, and Jaffna – has decreased. The more Westernized maritime district out-migrants moved mainly to Colombo and *Kandyan* district and Jaffna out-migrants moved mainly to the dry zone; *Kandyan* peasants were favored by the government as dry zone colonists. Slightly over half of all lifetime migrants moved into rural locations outside the dry zone. Urban Colombo, the rural dry zone, and other urban areas together equally accounted for the remainder.

Detailed data on the age/sex characteristics of migrants to these four destinations are provided. Migrants were more likely to be males, although the number of females increased over time. Migration increased with age for those up to 20-24 years old and then gradually decreased.

The author concludes that past migration patterns must be viewed within their historical and political contexts – i.e., Sri Lanka's hydraulic past, colonial heritage, operant democratic polity, adverse balance of trade, and welfare actions – and will undoubtedly be affected by future public policy decisions.

Appended are the population schedule and a tree diagram indicating the method of selecting types of lifetime migrants from the 1971 census as well as a 24-item bibliography (1938-80).

277 **PN-AAK-339**

MF $8.64/PC $99.45

Trinidad and Tobago fertility survey, 1977; country report

World Fertility Survey
Trinidad. Central Statistical Office
World Fertility Survey publication, 1981, 2v. : En
931054700
AID/CSD-3606

Although the average number of children per family fell from 6 in the 1950's to 2.5-3.0 in the mid-1970's in Trinidad and Tobago, fertility must continue to decline if the country is to achieve zero population growth. So concludes this two-volume

report (Volume I presents a summary, Volume II the statistical tables) on the 1977 Trinidad and Tobago Fertility Survey.

Against a socioeconomic and demograhpic description of the population of Trinidad and Tobago, the authors summarize how the Survey of 4,359 women was conducted – its administration and staffing, sample and questionnaire design, organization of the pretest and the main Survey, editing and coding of data, data processing, quality control, and response rates.

The substantive findings of the Survey are presented regarding the age, ethnicity, and residence of the sample population; mating patterns and exposure to childbearing; initial, recent, and cumulative fertility; preferences for number of children; knowledge and use of contraception; and the relationship between contraception and fertility preferences. Among the major conclusions which can be drawn from the Survey are that: (1) age at first union rose but is too small to explain declining fertility; (2) women are having fewer births, especially in the first 5 years of a union; (3) urban residence, higher education, and labor force participation reduce fertility; (4) those in a union and able to have a child wanted about one additional child, while 46% wanted no more children; (5) the ideal number of children was 3.8; (6) women are breastfeeding for shorter periods or not at all; (7) 95% knew one or more contraceptive methods, 78% had used some method, and 60% of exposed women were using some (usually an efficient) method; and (8) 34% of those wanting no more children were not using any method.

Included in Volume I are 75 tables. Appended are the questionnaire, sampling errors for selected variables, control forms, and a glossary. Volume II comprises an additional 198 tables.

278 **PN-AAK-551**

MF $1.08/PC $7.02

Nonfamilial roles of women and fertility: Pakistan and the Philippines compared

Shah, Nasra M.; Smith, Peter C.
University of Hawaii. East-West Center. East-West Population Institute
Papers of the East-West Population Institute, no.73, Jul 1981, iv, 47p. : Bibliography, p.44–47, En
932064800
AID/DSPE-C-0002

Although fertility is high and contraceptive use low in both Pakistan and the Philippines, the fertility behavior among working and nonworking women in the two countries is very different. Based on data from the 1973 National Demographic Survey of the Philippines and the 1975 Pakistani Fertility Survey, this report examines the effect of women's work force participation on their recent fertility.

Although there was no significant difference between the fertility of working and nonworking women in Pakistan, in the Philippines, both urban and rural working women had lower recent fertility and fewer children ever born. Among working Filipino women, two groups had lower fertility – those consciously controlling fertility through contraceptive use and another group four times larger which had lower fertility due to other factors. Non-users had lower completed fertility (i.e., children ever born) than did users. Because of their low fertility, a larger number of working than nonworking women expressed a desire for another child.

To explain this inter-country difference, the authors hypothesize that the occupational structure of the female labor force in the Philippines has a greater negative influence on fertility than does the Pakistani structure. About two-thirds of Pakistani women work at home compared to one-third of Filipino women. Working women in Pakistan are concentrated in two or three traditional occupations; Filipino women are in a variety of occupations. Twice as many urban Filipino women are engaged in professional occupations (18% versus 9%). Although urban working women in the Philippines are more educated than their nonworking counterparts, the opposite is true in Pakistan.

The authors recommend that future research emphasize: conceptualizing and measuring the nature of work roles; analyzing the household or family labor supply; and developing methods and data for dynamic analysis of work-fertility sequences within marital careers. The text includes 15 tables and a list of 39 references (1960–81).

279 **PN-AAK-501**

MF $1.08/PC $5.72

Economic consequences and future implications of population growth in China

Dernberger, Robert F.
University of Hawaii. East-West Center. East-West Population Institute
Papers of the East-West Population Institute, no.76, Oct 1981, v, 32p. : Bibliography, p.31–32, En
932064800
AID/DSPE-C-0002

Competing claims for China's economic resources must be constrained over the next decades in order to secure a significantly better standard of living for the nation's growing population. So concludes this discussion of the economic consequences and future implications of past and projected population growth in China, a developing country with the world's largest labor force.

The author briefly summarizes the economic consequences of China's population growth over the past 30 years and comments on the current position in which the Chinese find themselves. Government policies seeking to maximize industrial output, rather than employment, per unit of capital placed the major burden for absorbing the growing labor force squarely upon the agricultural sector from 1957 to 1975. Although employment was found for most, much of the work done added little if anything to output. Thus, although average annual per capita production was greater in the 1970's than in the 1950's, it is questionable whether this remains true after subtracting the cost of inputs.

Using data from a World Bank study, the author projects population growth (ranging from 1.2% to 1.6% per year) and the number of new entrants to the labor force (ranging from 1.8% to 2.4% per year) through the year 2000. In assessing the economic implications of these projections, the author concludes that population pressure will require the Chinese to revert to less efficient, labor-intensive policies or face serious and growing unemployment. As for consumption, the growth of total output should provide a small but steady annual increase in the standard of living; the growth in agricultural (3.5%) output will be relatively higher and that of light and heavy industry (7% and 9% respectively) lower than in the past. Increases in availability of food grains, however, will be less impressive. To achieve production targets, the author foresees increased "non-official" production, the increasing use of imported technology, continued modernization of the military, and greater

use of material incentives. A 13-item bibliography (1957–81) is appended.

280 **PN-AAK-502**

MF $2.16/PC $21.71

Assessment of fertility and contraception in seven Philippine provinces: 1975

Flieger, Wilhelm; Pagtolun-an, Imelda
University of Hawaii. East-West Center. East-West Population Institute
U.S. Agency for International Development. Bureau for Science and Technology. Office of Population (Sponsor)
Papers of the East-West Population Institute, no.77, Nov 1981, x, 154p. : Bibliography, p.149–154, En
932064800
AID/DSPE-C-0002

In 1976, sample surveys of fertility and contraceptive practice were conducted in seven Philippine provinces to test the government's (now abandoned) Total Integrated Development Approach to family planning (FP). This report documents some of the findings of this survey, which covered the number and socioeconomic characteristics of the household population, the marriage and pregnancy histories of ever-married women between 15 and 54, and the FP histories of all married women between 15–54.

Although birth rates in the seven provinces in 1975 were generally high (35/1000), fertility levels varied markedly, especially between urban and rural populations. Only slight declines in fertility rates occurred during the first half of the 1970's, and these were traceable to the small proportion of urban women who delayed marriage after exposure to prolonged and more extensive education and nonagricultural work. Timing of marriage emerged as the key factor explaining urban-rural fertility differentials. Marital fertility rates were uniformly high in all residential strata, suggesting that the fertility behavior of married women, whether urban or rural, differed little in the recent past.

As of 1975, contraceptive practice had had little effect in reducing fertility levels. While modern contraceptives were used effectively by some of the more educated women, contraceptive prevalence rates were low in the more traditional rural areas, due in part to the persistence of the large-family ideal; inadequate contraceptive knowledge among women, leading to a widespread fear of contraceptive side-effects and high dropout rates among users; and a general aversion to innovation.

Up to 1975, the response to modern FP methods had been most positive among women experiencing the greatest amount of social transformation. This seems to suggest that the "cafeteria" approach to FP used to that date, with its lack of closer links to changes in other spheres of life, is not the most effective in rural areas. The Government's plan to couple FP with related and more broadly defined development efforts offers better prospects for reducing the country's population growth rate.

An analysis of the survey data's reliability and a 49-item list of references (1938–76) are included.

281 **PN-AAK-479**

MF $1.08/PC $2.08

Trinidad and Tobago fertility survey 1977; a summary of findings

World Fertility Survey
International Statistical Institute
World Fertility Survey publication, no.33, Nov 1981, 14p. : En
931054700
AID/csd-3606

Changing patterns of contraceptive use and attitudes toward having another child have led to declining fertility in Trinidad and Tobago, implying that a demographic transition is underway. So concludes this summary report on the 1977 Trinidad and Tobago Fertility Survey (TTFS).

Under the TTFS, 3,482 out-of-school women aged 15–49 who had been in one or more unions (i.e., marriages, common law unions, or sexual partnerships) were interviewed. About 50% of these women had entered their first union before age 20 and only 10% had never been in a union by age 25–29. The average age at first union has risen, however, from 17.7 years among women aged 45–49 to 18.6 years among those aged 25–29.

Women are having fewer children during the first 5 years of a union. Those who first entered a union 5–9 years ago had 1.2 children compared to 1.8 for those who first entered unions at least 20 years ago. The proportion of women with six or more children is declining, indicating that the future average size of a completed family will also decline. For the period 1966–76, fertility declined from 4.38 to 2.7 children per woman; during the previous decade it declined by about 1.1 children per woman. Age-specific fertility rates also declined. Subgroup differences in fertility suggest that urban residence, labor force participation, and especially higher education tend to reduce fertility.

Only 54% of all fecund women wanted another child. Older women and those with large families were least likely to want more children. The average number of additional children desired by women of all ages was one. Mean ideal family size was 3.8 children; younger and more educated women preferred smaller families.

Nearly 95% of ever-mated women knew of at least one efficient method of contraception and 78% had used contraception at some time. About 60% of fecund women currently in a union were using contraceptives; 95% of these women were using efficient methods. Current use was highest among the 25–34 age group, women with two to four children, and among more educated women. More importantly, 34% of women who said they wanted no more children were not using contraception. Finally, an increasing number of women were not breastfeeding at all or were doing so for shorter periods.

282 **PN-AAK-480**

MF $1.08/PC $2.34

Senegal fertility survey 1978; a summary of findings

World Fertility Survey
International Statistical Institute
World Fertility Survey publication, no.30, Sep 1981, 15p. : En
931054700
AID/csd-3606

Nascent trends in marriage, breastfeeding, and desired number of children as well as in urbanization and education could lead Senegal to the final stages of demographic transi-

tion. So concludes this summary of the 1978 Senegal Fertility Survey of 3,985 women aged 15–49.

The total number of children ever born to respondents aged 45–49 was 7.2, and the crude birth rate for the 5 years prior to the survey was 48 per 1,000. These figures suggest that fertility in Senegal has not changed much over the past 30 years. Fertility differences among socioeconomic groups were minimal and fertility was only slightly lower in urban than in rural areas. The few differences in fertility that did exist seem to be due to ethnic origin.

The near universality of marriage in Senegal (83% of survey respondents were currently married) is a major factor in this relatively high level of fertility. Respondents'mean age at first marriage was 16.4 years. Polygamy is fairly common among all ethnic groups; 48% of respondents were living in a polygamous union. Dissolution of first marriages is high (29%), but this is counterbalanced by the fact that remarriage is usual.

However, some changes in fertility may be occurring, largely as a result of increasing urbanization and education. Because so few married women in Senegal use contraceptives (only 4% of those sampled), the two most important factors affecting fertility are age at first marriage and length of lactation. Trends in these two areas are contradictory: age at first marriage is increasing slightly among women under age 30, while length of lactation is apparently decreasing among the more educated and urban women. This latter trend might explain in part the slightly higher level of early fertility among urban and educated women.

Modernization may have another important effect. With the decline in infant mortality, it is likely that women will feel more sure of their children's survival and become more receptive to family planning. It should be noted, however, that number of living children seemingly had little effect on respondents'family size preferences, with the average number of desired children being nine.

283 **PN-AAK-481**

MF $1.08/PC $2.60

Haiti fertility survey 1977; a summary of findings

World Fertility Survey
International Statistical Institute
World Fertility Survey publication, no.31, Sep 1981, 18p. : En
931054700
AID/csd-3606

In 1977 a survey of nuptiality, fertility, desired family size, and contraception was conducted in Haiti. Results of the survey, which was based on a sample of 3,351 women aged 15–49 from Port-au-Prince (996), towns of 10,000 or more (281), and from rural areas and towns with populations under 10,000 (2,014), are here presented.

Of the sampled women, 32.2% had never been in a union, 14.5% were in visiting unions (i.e., without cohabitation), 42.9% were in unions with cohabitation, and 24.2% had dissolved unions. Marriage is more frequent than common law union among the better educated and in rural areas. The mean age at first union, most of which are very unstable, is 19.5 years, which is quite low. Two conflicting trends in the pattern of union evolution are apparent – a trend to shift rapidly from visiting to stable unions and a trend of increasing union dissolution due to separation/divorce or death.

The mean number of children born to ever-in-a-union women aged 45–49 is six; only 2.6% had never had a live birth. The mean number of children ever born rises with increasing age at first union. Marriage favors the highest fertility. Cumulative fertility increases with education and is dependent on residence, being higher in rural areas. Surprisingly, the least economically active women are also the least fertile. Infant mortality was 124/1,000; a child's chances of surviving are higher when the mother is married and older. Overall, fertility levels were found to be moderately high, confirming the findings of the 1971 Census and the multi-round Demographic Survey of 1971–75 that the fertility level is moderately high in Haiti.

Fecund women currently in a union considered 3.58 to be the ideal number of children, while 43% wanted no more children. This proportion increases with the woman's age, is unrelated to religion or union history, and is greatest among women who have never worked.

While knowledge of contraception is widespread, ever-use is less common (85% and 37%, respectively). Current use rises with the number of living children, is directly related to the number of desired children, and is more common in consensual than in non-cohabitating unions. Finally, a large number of non-users would like to use contraception in the future.

284 **PN-AAK-424**

MF $2.16/PC $20.67

Population profile of Arusha region

Johnston, Alan
Tanzania. Regional Development Directorate, Arusha. Regional Commissioner's Office (Sponsor)
U.S. Agency for International Development. Bureau for Africa. Tanzania (Sponsor)
Jan 1980, viii, (151p.) : References, p.75–76, En
621014300

Population growth in Tanzania's Arusha Region is the highest in the country and may in fact be in the range of 3.5–3.8% per year. This report, produced under A.I.D.'s Arusha Planning/Village Development Project, provides a demographic profile of the Region to be used in planning the area's long-term development.

After reviewing Tanzania's long tradition of demographic data collection, the author describes Arusha's population in terms of its size, growth, geographic distribution, fertility, mortality, natural increase, migration, age and sex distribution, socioeconomic characteristics, and ethnicity. Various projections of population growth in Arusha Region and in its eight districts and in Arusha city for 1980–1995 are presented. All forecasts use the base population enumerated in the 1978 census and incorporate birth and death rates and sex and age distribution figures from the 1973 National Demographic Survey; migration, thought to be positive, is not included due to a lack of data.

The Government of Tanzania's population policy is assessed. Although having no formal policy (officials have described high population growth as simultaneously constraining and contributing to achievement of development goals), the Government has committed itself to a child-spacing program and to maternal and child health care. Contraception is quietly encouraged, but abortion is illegal.

Given the demography of Arusha Region, the author recommends that A.I.D. support directly productive, income-generating activities rather than follow a basic needs strategy; special attention must be given to the role of women. The recommended program would indirectly contribute to reducing fertility and at the same time expand the economic base needed to

support a growing population and to fund future provision of basic services.

The text is highlighted by 30 tables and six figures. Appended are the methodology underlying the population projections, a description of the role of population projections in development planning, 1978 population data for Arusha Region and its districts, and a 17-item bibliography (1960–79).

285 **PN-AAK-269**

MF $1.08/PC $7.93

Illustrative analysis: recent fertility trends in Sri Lanka

Alam, Iqbal; Cleland, John
International Statistical Institute
World Fertility Survey
Scientific reports, no.25, Nov 1981, 61p. : References, p.60–61, En
931054700
AID/csd-3606

Sri Lanka is one of the Few South Asian countries achieving a substantial and sustained decline in fertility since the 1950's. This report, based on data collected from 6,812 women under the 1975 Sri Lanka Fertility Survey (SLFS), seeks to augment earlier evidence of this trend and to study the fertility behavior of various subgroups of the population.

Beginning with a critical appraisal of the quality of SLFS data, the authors express concern over the probable ommission of children born before 1960 who subsequently died, the displacement backward in time of dates of first marriage and of early births, and the exclusion of single women. The authors proceed to calculate age-specific, age-period-specific, and duration-period-specific fertility rates using the FERTRATE computer system. They then decompose the total fertility rate in terms of changes in marriage rates, changes in marital fertility, and the interaction between the two.

The above analysis showed that Sri Lanka followed the typical Asian pattern of fertility decline–initial declines due to rising age at marriage, followed by a period in which the effects of nupitality and marital fertility were equal, after which falling marital fertility became most important. The overall decline, most of which occurred during 1970–75, may be attributable to Sri Lanka's high educational and welfare standards, its ethnic and cultural diversity, and to government family planning efforts.

The most important finding of the SLFS is the relatively even and synchronous nature of the decline in marital fertility across educational, occupational, and urban-rural categories, a strong contrast to Europe where there were initial lags and pronounced fertility differentials across social classes. Fertility differences in Sri Lanka are due more to religion and ethnicity. This difference may be due to the greater equality of economic and educational opportunity in Sri Lanka.

The report includes 45 tables, six graphs, and a 51-item bibliography (1953–81); an overview of the vital registration system is appended.

286 **PN-AAK-337**

MF $1.08/PC $3.77

Illustrative analysis: marriage dissolution and remarriage in Sri Lanka and Thailand

Smith, David P.
International Statistical Institute
World Fertility Survey
Scientific reports, no.17, Jun 1981, 30p. : References, p.29, En
931054700
AID/CSD-3606

Interest in marriage stability derives from the implications which marriage patterns may have for fertility. This report quantitatively explores marriage dissolution and remarriage in Sri Lanka and Thailand, using data from 1975 Fertility Surveys of both countries.

As a starting point, the author relies on the findings of James Russell (1980). Namely, marriage occurs earlier and over a narrower age range in Thailand; marriage is earlier in rural Sri Lanka and in north and northeast Thailand; and age at marriage is rising in both countries. He proceeds to employ life tables and linear models to determine incremental and cumulative dissolution and remarriage rates; the quality of the data posed no problems. Regression analysis was performed to observe the effects on marriage dissolution of education, age at marriage, residence, religion, work experience, and childbirth.

The analysis showed that during the first 20 years of marriage, dissolution rates are twice as high in Thailand as in Sri Lanka. Marriage stability in Sri Lanka was highest among the educated and those who married at central (i.e., not high or low) ages. In Thailand, dissolution was highest for Moslem women who also, however, tended to be less educated, to marry younger, and to infrequently work before marriage – all factors which independently contribute to higher rates. For both countries, dissolution was higher among Moslems than Buddhists; urban marriages were more stable; work experience prior to marriage stabilized marriages among the young; and childbirth reduced dissolution in the first 2.5 years of marriage. Although rates of remarriage are higher in Thailand than in Sri Lanka, because women with the highest rate of dissolution re-enter marriage most quickly, time spent in unions and rates of fertility are essentially equal in the two countries. The author concludes that dissolution has little impact on birth rates in either country. Included in the report are 11 tables, 17 figures, and a list of 13 references (1958–80).

287 **PN-AAK-267**

MF $1.08/PC $3.77

Evaluation of the Mexican fertility survey 1976–77

Ordorica, Manuel; Potter, Joseph E.
International Statistical Institute
World Fertility Survey
Scientific reports, no.21, Dec 1981, 29p. : References, p.29, En
931054700
AID/csd-3606

In statistically assessing the internal and external accuracy of data collected from 13,080 households and 7,310 individuals under the 1976–77 Mexican Fertility Survey (EMF), Mexico's first, this report found the EMF data to be remarkably error-free

and surprisingly, uncovered several weaknesses in other sources of Mexican fertility data. The report presents detailed findings on age reporting, nuptiality, fertility, and mortality.

Age reporting was as accurate as possible for such surveys. Nuptiality data – which are significantly less affected by response error than in comparable surveys in other countries – show an increase in the mean age at first marriage occurring among women born since the mid–1940's. Marriage history data clearly warrant further and more refined analysis. EMF maternity histories provide reasonably reliable results (a fertility rate of 5.55) which significantly contribute to documenting a decline in fertility. However, data on changing fertility among older ages may be exaggerated as a result of event displacement by less educated respondents. The data regarding infant and child mortality are remarkably consistent and provide convincing evidence that infant mortality is substantially higher than was previously thought.

Evaluation of EMF data uncovered interesting weaknesses in the traditional data bases. There seems to be a significant bias in the census results on marital status and number of children ever born to women of childbearing age. Vital registration statistics seem to be affected by severe underreporting of infant deaths in the first month of life and by marked distortions in the shape, if not in the level, of fertility. Finally, the extra effort made by EMF to collect full marital and pregnancy histories has provided more reliable results than those found in the Contraceptive Prevalence Survey.

The report includes 25 tables, five figures, and a list of 14 references (1966–80).

288 **PN–AAK–268**

MF $1.08/PC $3.90

Preferences for number and sex of children and contraceptive use in Korea

Kim, Nam Il; Choi, Byoung Mohk
World Fertility Survey
International Statistical Institute
Scientific reports, no.22, Jun 1981, 27p. : References, p.29, En
931054700
AID/csd–3606

Women's desires to have a certain number of children – or more specifically, a certain number of sons and/or daughters – can provide strong motivation for their use of contraception. This report uses data on 3,907 married, fecund, and nonpregnant Korean women obtained from the 1974 Korean National Fertility Survey to examine the consistency between respondents'answers and their fertility preferences; the determinants of fertility preferences; and the relationship between fertility preferences and contraceptive use. To do this, the authors constructed a multiple linear regression model containing 36 variables – of which 34 were independent and two, desired future births and present contraceptive use, were dependent.

The major determinants of fertility preference were different than those of contraceptive use. The 34 independent variables explained 53% of the variance in desire for future births. Of these variables, age, marital duration, number of living children, and number of living sons explained 91% of this variance, with the number of living children being the most important. Family type (the influence of elders), as well as residence, wife's education, and attitude toward abortion were other leading determinants of the desire to have another child.

Fertility preference was found to be an important intermediate variable in determining women's use of contraception. Number of sons was the most important determinant of contraceptive use and of actual reproductive behavior, although the differences in contraceptive use were negligible after the birth of two sons. Altogether, the 36 variables explained 17% of the total variance in contraceptive use. Desire for future births contributed most to this explained variance, with education, residence or lifetime migration status, family planning program availability, and family type also being important.

Surprisingly, factors thought likely to be important in a society like Korea – birth order, number of siblings, work experience, and traditional attitudes – were unrelated to both fertility preference and contraceptive use or were subsumed by other variables. The report is amply supported by tables and data; a 25–item list of references (1954–79) is appended.

289 **PN–AAK–425**

MF $1.08/PC $4.94

Assessment of inter– and intra–regional migration in Arusha region

Mlay, Wilfred
Tanzania. Regional Development Directorate, Arusha.
Regional Commissioner's Office (Sponsor)
Oct 1981, viii, 28p. : References, p.15, En
621014300

Assessing migrational patterns is essential in determining the impact of migration on population growth and economic development. This study assesses the inter–and intra–regional migrational patterns in Tanzania's Arusha Region and makes recommendations to regulate migration in accordance with land availability.

A review of the Region's migration data base reveals its inadequacy. Regular collection of migration data through the Chama Cha Mapinduzi reporting system and a one time survey by village chairmen of current migration movements are recommended. Net–migration rates for the Region's six rural districts are estimated and various developmental options are discussed for dealing with the effects of migration in these Districts.

Analysis of current legal and institutional migration regulations shows the need to handle district in–and out–migration at the Regional level. It is thus recommended that the Regional Development Committee establish a task force to assess, district by district, current migration problems and determine possible solutions in line with the following: (1) Districts with a land pressure problem should draw up a list of those wishing to out–migrate and should invest in non–traditional activities requiring little land but many people, while those with an in–migration problem should assess the problem's nature and extent. Districts with room to absorb migrants should assess the extent of this capacity; those lacking a problem should invest in resource conservation and land–use planning to forestall possible out–migration. (2) Consideration should be given to the ecological requirements of the Region's various farming systems and the growing conflict between pastoralists and in–migrants. (3) Districts and villages should be helped in implementing existing migration policies, especially those regarding village boundaries, land surveying and demarcating, and movement in and out of villages. (4) Villages should keep a record of all school–leavers completing primary education and plan for their productive employment in the village. (5) The Regional Planning Office should make migration a priority issue

and help implement the above-noted recommendations. Several statistical charts are appended.

290 **PN-AAK-427**

MF $1.08/PC $6.37

Monitoring population growth in Arusha region: population data collection systems and suggestions for improvement

Kamuzora, C. Lwechungura
Tanzania. Regional Development Directorate, Arusha.
Regional Commissioner's Office (Sponsor)
Oct 1981, vii, 42p. : En
621014300

Rapid population growth in Tanzania's Arusha Region is seriously constraining long-term development and indicates the need for a reliable population data collection system. This document reports on a study to assist the Arusha Regional Planning Office in assessing available population data and estimating fertility, mortality, and migration; in developing a village-level population data collection and reporting system; and in evaluating the prospects for developing a pilot vital statistics collection system.

Based on past censuses and village surveys and on discussions with Government and Chama Cha Mapinduzi (CCM) Party officials, annual population growth in the Region is estimated at 3.8% – a rate which will double the population in 19 years. Natural increase is the major cause of growth in agricultural districts; in-migration is a significant factor in pastoral districts. Fertility, mortality, migration, and population growth are tabulated and population growth is projected for the Region and its seven Districts.

The two present village-level population data collection systems are the decennial national census and the CCM Party village reporting system. The census provides better data, but the CCM system could potentially supply more accurate and timely information by using its grassroots-level cell leaders. The author recommends that cell leaders and village secretaries be provided forms for recording population and migration information which could later be expanded to meet other information needs. Population data should be enumerated once a year, but cell leaders should report births and deaths to village secretaries as they occur.

Registration of births and deaths in the Region is required only in Arusha Town and even there gross underreporting – due to lack of public awareness of the importance of registering vital events – is the norm. Registration could be increased substantially if the registrar's office were better coordinated with hospitals and health centers. Compulsory registration cannot yet be instituted because villages lack adequate infrastructure.

Appended are a report on a consulative visit to Arusha Region, sample data collection and reporting forms, and various population data.

291 **PN-AAK-798**

MF $1.08/PC $3.38

1980-81 Somalia fertility and mortality survey of Benadir, Bay, and Lower Shebelle: a summary of results

University of North Carolina at Chapel Hill. School of Public Health. Department of Biostatistics. International Program of Laboratories for Population Statistics
Laboratories for population statistics summary series, no.4, Dec 1981, 20p. : En
932062300

The 1980-81 Somalia Demographic Survey was the first attempt to develop basic demographic indicators for the Benadir, Bay, and Lower Shebelle regions of Somalia. Separate questionnaries were used to survey first the settled population of Mogadishu and other towns and villages and then the nomadic population. This report summarizes the Survey data gathered on births, deaths, education, literacy, internal migration, and for the settled population only, on labor force participation and occupation.

The settled population is quite "young" (44% under age 15) and has an overall sex ratio of 96 males to 100 females. Although the small sample size makes estimates less reliable, the sex ratio of the nomadic population appears to be 140 males to 100 females, probably due to outmigration of women favoring a settled life. Age heaping was common among both populations. Almost all Somali women and 96% of the men marry; average age at first marriage is 26 for males and 20 for females in the settled population and 28 for males and 19 for females who are nomadic. However, 60% have been married more than once before they reach their late 40's.

Fertility among settled women is 49/1,000 or 7.I births per woman. Nomadic women report an average of only six children ever born and have the lowest lifetime fertility; urban women have the highest. The Brass P/F Method was used to correct for misdating of births.

Since direct methods yield implausibly low mortality rates (7/1,000) two indirect techniques were used and resulted in a crude death rate of 17.8/1,000; life expectancy at birth is 44 years for males and 49 for females. An apparent recent rise in infant mortality rates is 44 years for males and 49 for females. An apparent recent rise in infant mortality rates is ascribed to age misreporting or the higher mortality of children born to younger women.

Overall literacy is 46% (60% for men and 30% for women) but is higher among teens due to the government's literacy campaign. Under 1% of nomad women and only 13% of nomad men are literate. Only 20-25% of the settled population has ever migrated and 87% of nomads spend most of the year in one district. A total of 80% of men and 30% of women aged 25-50 are gainfully employed; 40% were employed in agriculture. A 25-item bibliography (1965-81) is appended.

POPULATION

292 **PN-AAK-797**

MF $1.08/PC $3.51

1980 Bolivia national demographic survey: a summary of results

North Carolina University at Chapel Hill. School of Public Health. Department of Biostatistics. International Program of Laboratories for Population Statistics

Laboratories for population statistics summary series, no.3, Dec 1981, ii, 19p. : En

932062300

AID/DSPE-C-0025

During the past decade Bolivia has improved collection and dissemination of basic demographic data. This report summarizes the major findings of the 1980 National Demographic Survey and, where possible, makes comparisons to the 1975 survey and to the 1976 Census of Population and Housing. The 1980 survey was conducted using a stratified cluster sample of 10,573 households from all the provinces except eight in remote, tropical areas of the country.

A comparison of age, sex, and residence data with 1976 census data indicated little change in the overall age and sex distribution but substantial rural to urban migration, more so among males. A measurement of age heaping by Myers' Blended Method revealed that the quality of age reporting was similar to that of the 1976 census.

Data on marital status showed that the percentage of single males and females declines rapidly as age increases. Using the Hajnal method, which relies on proportions single by age, average age at first union for men was estimated at 24.9 years and for women at 23.0, with both ages lower in rural areas. Data from the 1980 survey yielded a crude birth rate of 40 per 1,000, similar to the rate found in direct reporting and upon application of the Brass P/F adjustment and the Own Children method. Although data from the 1980 survey showed a slight decline in children born, these same sources indicated that Bolivian women give birth to an average of six children. A comparison of direct reports of births from the 1980 survey and adjustments from application of the Brass P/F method and the Own Children method yielded similar age-specific fertility rates. Total fertility rates are approximately 30% higher for rural than for urban areas. The data indicate a 20% decrease in fertility from the 1976 census and the 1975 survey although there is concern that reporting could be inaccurate.

A crude death rate of 9.4 per 1,000 is low for Bolivia, suggesting incomplete death reporting. The data suggest an overall decline of about 25% in child mortality over the 4-5 year period preceding the 1980 survey, similar to declines documented for other countries. Adult mortality is estimated to be near 15 per 1,000 for females and near 14.2 per 1,000 for males for the 4-10 year period preceding the survey, compatible with infant mortality levels.

A 24-item (1966-81) list of references is appended.

293 **PN-AAK-764**

MF $1.08/PC $4.42

Evaluation of the Malaysian fertility and family survey 1974

Yatim, Masitah Mohd

International Statistical Institute

World Fertility Survey

Scientific reports, no.27, Feb 1982, 34p. : En

931054700

AID/CSD-3606

The Malaysian Fertility and Family Survey (MFFS), conducted in 1974-75 as part of an international study of human fertility and reproductive behavior, obtained reliable data on age distribution, nuptiality, fertility, and infant and child mortality in West or Peninsular Malaysia. Using tests of internal consistency and checks against external data sources, this report evaluates the quality of the MFFS data.

Overall, the MFFS survey age distribution is close to that of the 1970 census, although age heaping among females is slightly more prominent in the MFFS. Education and ethnicity influence age reporting—heaping is higher among uneducated females and Malays and lower among educated females and the Chinese. Age misreporting is not a significant problem in the MFFS; of those surveyed, 97.3% reported the same age in both the household and individual schedules.

Although 62% of respondents provided the month and calendar year of their first marriage, some heaping is evident in the distribution of the year of and age at first marriage at dates asssociated with important national events, a trend even more common among illiterate women. The data indicate a trend of rising age at first marriage that is consistent and plausible.

In evaluating MFFS fertility information, both cohort-period rates and current levels and recent trends in fertility were studied. The MFFS and census estimates of mean parity across age groups were very similar and in both cases increased with older age groups. Some minor discrepancies were found between MFFS age-specific fertility rates and those in the vital registration, but total fertility rates were similar. It was also observed that age-specific and total fertility rates were declining in a consistent manner as were fertility rates for cohorts and periods. A similar picture was obtained through the P/F ratio and birth order techniques, thus further confirming the reliability of the MFFS data.

Both the MFFS and the vital registration showed a declining trend in the probability of infant and child mortality. However, infant mortality was lower and child mortality higher in the MFFS than in the vital registration; it is not clear which source is in error. Further analysis by period and age at maternity revealed no systematic deficiencies in the data.

The text is highlighted by 26 tables and 20 diagrams.

294 **PN-AAK-672**

MF $1.08/PC $11.31

Anatomy of a fertility decline: ethnic differences in the experience of Malaysian women, 1950-1976

DaVanzo, Julie; Haaga, John

Rand Corp.

Rand note, Aug 1981, xi, 79p. : En

930006800

AID/pha-1057

Malaysia's rapid socioeconomic growth between 1950 and 1976 was accompanied by a sharp decrease in fertility for Peninsular Malaysian women in all age groups and in each of the three major ethnic groups: indigenous Malays (53% of the population); Chinese (35%); and Indians (11%). This paper uses retrospective life-history data, gathered in a 1976–77 survey from 1,161 Malaysian women under age 50, to study the causes of fertility decline.

After a description of the data and the limitations on its analysis treatment is given successively to trends in age of first marriage and marital fertility, birth spacing (comprising both marriage to first pregnancy and parity-specific interpregnancy intervals); post-partum amenorrhea and menstruating intervals and their two main determinants, breastfeeding and contraceptive use; and the fertility experience of two cohorts of women, aged 25–34 and 35–44.

Results show unequal fertility decline among the three ethnic groups. Before 1970, fertility was highest for Indian women and lowest for Malay women; since 1965 the decline has been sharpest for Indians and most gradual for Malays. Ultimate fertility, however, differs less than do the methods of fertility control. Malays, who live mostly in rural areas, breastfeed much more than Chinese and Indians and have much longer durations of post-partum amenorrhea. The Chinese, who live mainly in urban areas, marry later, breastfeed less, and, in recent years, have depended more on modern contraceptives; currently they have the lowest fertility rate. Indians fall between these extremes: they marry later than Malays but before Chinese, breastfeed less than Malays but more than Chinese, and use contraceptives more than Malays but less than Chinese. While breastfeeding declined during the period studies, the use of contraceptives, especially of modern methods, increased, particularly among Malays. However, it is argued that analyses that ignore traditional methods, including breastfeeding, will overstate the expected change in fertility. Finally, the upward pressure on fertility caused by the decline in breastfeeding was more than offset for most women by delayed marriage and increased contraceptive use.

Appendices include a series of survival curves for interpregnancy amenorrhea and menstruating intervals, and 32 references (1965–1981).

295 **PN-AAK-894**

MF $1.08/PC $1.04

Corneal xerophthalmia and keratomalacia

Sommer, Alfred; Sugana, Tjakrasudjatma
Johns Hopkins University. School of Hygiene and Public Health. International Center for Epidemiologic and Preventive Ophthalmology
Keller (Helen) International
Archives of ophthalmology, v.100, Mar 1982, p.404–411 : References, p.411, En
931004500
AID/DSAN-CA-0267

Of the 5 million Asian children estimated to develop xerophthalmia each year, half a million develop substantial corneal involvement and a quarter of a million go blind. Corneal abnormalities include xerosis, xerosis with ulceration, keratomalacia (softening and ulceration), and scarring. Precise descriptions of these changes and of their causes and pathogenesis has been limited by the lack of studies covering the full spectrum of the disease on large numbers of young children.

In the study reported here, 162 children (aged 1 month to 12 years) admitted consecutively to the Cicendo Eye Hospital in Bandung, Indonesia, with nutritional keratopathy (in degrees of severity inversely related to age) underwent detailed ophthalmic and pediatric examinations. Surface changes ranged from mild haziness through generalized xerosis and formation of thickened, keratinized plaques. Diffuse stromal edema occurred early in the disease. Stromal loss took two forms: relatively small, sharply demarcated, eccentric, noninfiltrated cylindrical ulcers of varying depth; and localized or generalized, usually full-thickness, necrosis. Sometimes all forms of involvement were present in the same individual and even the same eye. Traumatic separation of a keratinized plaque or decomposition of a dellen accounted for some instances of stromal baring, while in other cases, stromal melting appeared to progress below an intact epithelium.

Disturbed Vitamin A metabolism seems to lie at the heart of the problem. It also appears that unique mechanisms, besides the more obvious surface changes, account for some of the corneal changes in Vitamin-A deficient children and that primary and secondary infection have little involvement, despite reports to the contrary. All the children received massive doses of Vitamin A, either alone or togther with supportive therapy, and the vast majority retained central corneal clarity in at least one eye. This favorable course is largely related to the focal, eccentric nature of early stromal loss. In many cases the area of irreversible damage is more limited than it initially appears, although the outlook is dismal for those with complete bilateral corneal necrosis.

Included are 24 color photographs depicting corneal abnormalities and 38 references (1729–1981).

296 **PN-AAK-336**

MF $1.08/PC $4.68

Modern contraceptive use in Indonesia: a challenge to conventional wisdom

Freedman, Ronald; Khoo, Siew-Ean; Supraptilah, Bondan
International Statistical Institute
World Fertility Survey
Scientific reports, no.20, Mar 1981, 37p. : References, p.35, En
932054700
AID/CSD-3606

Data from the Indonesian Fertility Survey, analyzed in this sample study, indicate that a vigorous national family planning program has led to a surpisingly rapid increase in the use of modern contraceptives across all social and demographic strata, especially among the very poor. In the study, a multivariate analysis was conducted of 5,504 exposed women aged 15–49 from six regions in Bali and Java (which together comprise 67% of Indonesia's population) to determine the role of the following independent socieconomic variables as differentials of current contraceptive use: region, number of living children, wife's age and education, husband's occupation, and standard of living. Also included are analyses in terms of the desire for more children, region of residence, and community-level characteristics.

Region was found to have the strongest link to current contraceptive use, a finding worth pursuing for its importance for fertility programs worldwide. Number of children and wife's desire to have no more children also led to high use rates, as might be expected, but only small variance in use can be explained by the joint effect of the independent variables or by

the spouses'occupations. High rates of use (38%) among the poorest families contradict the conventional wisdom (which was, however, borne out in a Thailand study) that contraceptive use among the poor is low due to the economically motivated desire of the poor for a large number of childen. Reasons suggested by the authors for the high use level in Indonesia are the poor's contact with those having a higher standard of living and, possibly, coercive pressure from local officials. These same forces may also explain the greater than expected use of contraceptives found in villages lacking modern amenities. If coercion was indeed applied, however, contraceptive use rates (as distinct from merely accepting contraceptives) may have been overestimated. The report includes 17 references, 16 tables, and one appendix on sampling error.

297 **PN-AAK-300**

MF $1.08/PC $.65

Access to sterilization in two hospitals in Honduras

Janowitz, Barbara; Nunez, Joaquin
Pan American Health Organization
International Fertility Research Program (Sponsor)
Family Planning Association of Honduras (Sponsor)
PAHO bulletin, v.15(3), 1981, p.226-230 : En
932053700
AID/pha-c-1172

Sterilization is one of the most common methods of avoiding pregnancy in Latin America. This article examines the availability of postpartum sterilization at two hospitals in Honduras.

Detailed data were collected on 18,523 women from the Hospital Materno-Infantil, a major university-affiliated maternity hospital in Tegucigalpa, and the Hospital Leonardo Martinez, a general hospital in San Pedro Sula in the economically depressed coastal region. Data analysis revealed a very low rate of postpartum sterilization at both hospitals and the high proportion of sterilizations done concurrently with cesarean deliveries. Only 1/10 of the 3,063 women who stated a desire to be sterilized were actually sterilized. This low rate is not attributable, as might be thought, to the "rule of 80" (living children times age must equal 80) that a women must satisfy if she is to be considered eligible for sterilization in Honduras. The rule was not satisfied by only 27.7% of the women who were sterilized and by only 6.8% of those who planned to be but were not sterilized.

Scarce operating room time due to overcrowding at both hospitals appears to be the key reason for the low sterilization rate. This hypothesis is confirmed by the higher sterilization rate among women delivering by cesarean section than among women delivering abdominally. Among the women sterilized, the percentage of those delivering by cesarean section was a surprising 69% - 67% at Tegucigalpa and 73% at San Pedro Sulla. In contrast, of the women who planned to be but were not sterilized, less than 1% had cesarean deliveries. Once again, these figures cannot be attributed to the "rule of 80"; the proportion of sterilized women who did not satisfy the rule was higher among those having cesareans than among those delivering abdominally. Nor can the figures be due to the fact that cesarean delivery is deliberately chosen to facilitate sterilization; almost all cases showed the existence of independent medical reasons for cesarean delivery.

In fine, the limitations on operating room time make it more probable that women already in the operating room - to have a cesarean delivery - will be sterilized. It is hoped that the operationalizing of two new sterilization facilities at Hospital Materno-Infantil will help alleviate this problem.

298 **PN-AAK-302**

MF $1.08/PC $.39

Quest for a magic bullet

Potts, Malcolm; Wheeler, Robert
International Fertility Research Program (Sponsor)
Family planning perspectives, v.13(6), 1981, p.169-271 : References, p.271, En
932053700
AID/pha-c-1172

Is contraceptive research being asked to do the impossible- produce a reversible, highly effective contraceptive free from side effects? Such a goal, according to this state-of-the-art article on contraceptive technology, has been mainly set by those who provide family planning services and may be in conflict with the expectations of contraceptive users and with biological constraints.

The effort to develop a 5-year contraceptive might be ideal from a demographer's viewpoint, but few women want to space their children that far apart and couples who have completed childbearing might prefer sterilization. The history of contraceptives such as the pill and the IUD indicates that the lower the pregnancy rate, the higher the incidence of side effects. Once the tradeoff between acceptable side effects and level of protection is recognized and quantified, simple methods such as spermicides or even withdrawal become significant and worthy of study.

Sharing contraception can increase its effectiveness and reduce the side effects of long-term use of a given method by allowing each partner to assume contraceptive responsibility in sequence. Combined methods used by one individual such as breastfeeding and spermicide, or nonsurgical sterilization and the use of a medical method to empty the uterus in case of menstrual delay, can also increase contraceptive effectiveness.

The most common combination of methods is the use of contraceptives backed up by abortion. A computer simulation comparing the use of a less effective method having few side effects and a good continuation rate with the use of a highly effective method having many side effects and a poor continuation rate leads to the surprising conclusion that the less effective method, if combined with the option of early abortion, involves no more fetal wastage, and perhaps less. After developing some implications of this approach, the authors conclude that while current contraceptive methods are inadequate to meet goals of family size, the continuous use of contraceptives might be greatly improved if modest failure rates are tolerated and fertility-control services made available. The combined use of contraceptives, sterilization, and abortion is recommended as an approach that results in fewer side effects from contraceptive use and illegal abortion, and ultimately, fewer unwanted pregnancies.

A 13-item bibliography (1972-81) is appended.

299 **PN-AAK-762**
MF $1.08/PC $3.25

Contraceptive use in Java-Bali: a multivariate analysis of the determinants of contraceptive use

Soeradji, Budi; Hatmadji, Sri Harijati
International Statistical Institute
World Fertility Survey
Scientific reports, no.24, Feb 1982, 24p. : References, p.22, En
932054700
AID/CSD-3606

Given the success of Indonesia's nascent family planning (FP) program and the ready availability of data, an indepth study of contraceptive use in Indonesia has been sorely needed. Thus, against a review of population trends and policies in Indonesia, this report analyzes the factors affecting use of efficient methods of contraception.

Applying a multivariate analysis – using demographic, background, and socioeconomic variables – to data drawn from the 1976 Indonesia Fertility Survey, the 1973 Fertility-Mortality Survey, and the 1979 National Socio-Economic Survey, the authors found that 33.5% of exposed women were using efficient methods of contraception in 1976. This proportion, while high in view of the fact that ever-users of efficient methods constituted only 41.5% of exposed women, has been obtained in other countries with relatively new FP programs. However, contraceptive use peaked at ages 20-29 and then declined, possibly due to resistance among older, more traditional women.

In contradiction to previous reports, number of living children (especially sons) was strongly associated with contraceptive use. The desire not to have more children and the attainment of ideal family size were positively related to contraceptive use among 90% of exposed women. The analysis suggests that fertility preferences affect contraceptive use even when the influence of other variables is controlled. Contrary to the usual pattern, contraceptive use was slightly higher in rural than in urban areas, evidence of the FP program's rural strength. Contraceptive use was positively but not strongly linked to education (especially the husband's) and to wife's work experience.

In sum, demographic variables were most important in explaining contraceptive use, followed by background variables (especially province and language) and then by family and fertility variables. Socioeconomic variables had less importance and were often mediated through other variables. The strong regional differentials probably result from variations in the delivery of FP services and supplies or from differences in traditions, norms, or infrastructure. Overall, findings indicate the success of the FP program. A list of 17 references (1956-81) and tables of data are provided.

300 **PN-AAJ-987**
MF $2.16/PC $20.41

Development of population and family planning programs in Somalia: an assessment of initiatives and assistance

Boynton, Willard H.; Montieth, Richard; et al.
American Public Health Association
U.S. Agency for International Development. Bureau for Development Support. Office of Population (Sponsor)
13 Nov 1981, x, 165p. : En
936590000
AID/DSPE-C-0053

Although Somalia is developing a national population and family planning (FP) program, prospects for its success are mixed according to this report on the country's current and planned FP activities. Negative factors include lack of a national FP policy, tradition, a low population density, and a pronatalist mentality stemming from a high infant mortality rate (150/1000) and the needs of the military. On the other hand, most women interviewed expressed a desire for childspacing, a measure which Parliament has approved for maternal/child health (MCH) purposes; the 10 doctors trained by The Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) are eager to increase the currently meager supply of contraceptives; and the politically powerful Somali Women's Democratic Organization (SWDO) is a potential force for spreading FP.

General recommendations are that A.I.D.: support the provision of primary health care, including FP, in an extended health delivery system in Somalia; procure, through an intermediary donor, an adequate supply of contraceptives; assess JHPIEGO's effects on the availability of FP services; expedite implementation of the delayed Primary Health Care Project to extend MCH and FP services to rural areas and define the roles of project participants; contract a U.S. institution to provide technical assistance for the proposed Knowledge, Attitude, and Practice studies; explore the possibility of establishing a Contraceptive Retail Sales Program in Somalia; help the Ministry of Health (MOH) develop an FP information management system; and coordinate FP activities with those of the International Planned Parenthood Foundation. Use of the SWDO health component to communicate FP information and a series of MOH family health and childspacing broadcasts are also recommended. More specific recommendations focus on integrating demographic factors in economic planning; collecting and analyzing health data; and establishing regional statistical offices.

Included are reviews of the social and cultural factors affecting development of a national FP program and of in-country demographic data collection and population research, FP program management, and programs for women; and nine study-related appendices.

301 **PN-AAK-301**
MF $1.08/PC $.78

Use of hospital resources to treat incomplete abortions: examples from Latin America

Fortney, Judith A.
International Fertility Research Program
Public health reports, v.96(6), Nov-Dec 1981, p.574-759 : En
932053700
AID/pha-c-1172

Induced abortions in Latin America, although illegal, are widespread and are done in such a manner that many women require subsequent hospitalization. This paper, based on studies of 27,675 abortions and 78,861 other obstetric cases in nine Latin American countries from 1972 to 1979, examines the extent to which patients with incomplete abortions drain hospital resources.

Among women admitted for treatment of incomplete abortions, length of hospitalization averaged 2–3 nights; 2.8% of patients spent over I week, while the percent spending less than I2 hours ranged from under I% to over 15%. In general, patients in the second trimester and patients with septic abortions or other complications stayed longer and required more extensive treatment. The average time spent in the operating room for curettage was I5–20 minutes; hysterectomies averaged 81 minutes. Where comparisons were possible, it was found that abortion patients were more likely to receive a blood transfusion than were obstetric cases; general anesthesia was used for almost all patients in most hospitals. Patients admitted with aseptic abortions (i.e., with infections) often had other complications, required the most attention, and were the greatest drain on hospital resources.

The author notes that it is difficult to assign a dollar value to the cost of treating incomplete abortions; using the rates charged paying patients can provide only a rough and usually low estimate. The author recommends increasing the efficiency and cost–effectiveness of treating incomplete abortions by using suction curettage under local anesthesia with only a few hours of hospitalization. To reduce the incidence of illegal abortions, it is recommended that contraceptives be made widely available. Every hospital should have an active contraceptive counseling program and offer all methods of family planning, including sterilization, since it is in the post–abortion period when contraceptive acceptance is likely to be highest and when all methods can be safely used.

302 **PN–AAK–008**

MF $1.08/PC $5.59

Contraceptive use in Sri Lanka

Immerwahr, George
International Statistical Institute
World Fertility Survey
Scientific reports, no.18, Jan 1981, 42p. : En
931054700
AID/CSD–3606

Contraception, according to some scholars, now matches the increasing age of women at marriage as a cause of Sri Lanka's declining crude birth rate. This study analyzes data from the Sri Lanka Fertility Survey not published in the Survey's First Report in order to identify the determinants of contraceptive use and to estimate the births averted by female sterilization, Sri Lanka's main contraceptive method (CM).

Discussed in turn are the use of modern reversible CM's (the pill, IUD loop, and condom); female sterilization; year of use of reversible CM's or sterilization; CM first used; a comparison of Survey results with data from the Sri Lanka Family Health Bureau; the reasons for non–use and determinants of ever–use of contraception; current contraceptive use (using multivariate analysis); and the effect of contraception on fertility.

The following conclusions were reached: (1) While contraception is a growing force in Sri Lanka, delay in age of marriage is a still greater cause of the country's declining birth rate. (2) Modern CM's are widely known, but are actually used by only a minority of exposed women. The reasons given for non–use are seldom convincing. (3) The loop has a fairly good retention record, but the record of the pill is poor, partly because of problems in support of its use. (4) Female sterilization protects as many exposed women as all other CM's combined and averts a substantial number of births. In general, women who had been sterilized had particularly high fertility in the years preceding sterilization and had used no previous method of contraception. (5) There has been a considerable shift from traditional to modern CM's. (6) There is a significant geographical and ethnic variation in contraceptive use. Use is highest in the capital, Columbo, and is relatively high in the central highland area (although not in the tea estates). Use is much less among the Tamils and Moors (who have, however, a lower fertility rate) than among the Sinhalese (especially Christian Sinhalese) and varies strongly and directly with female education. (7) A woman's fertility during the first 5 years of marriage appears to be a key determinant of contraceptive use. A 17–item list of references (1968–80) is appended.

303 **PN–AAK–678**

MF $3.24/PC $37.83

Voluntary sterilization: a decade of achievement

Schima, Marilyn E.; Lubell, Ira
Association for Voluntary Sterilization, Inc.
International Federation of Gynecology and Obstetrics (Sponsor)
International Federation of Fertility Societies (Sponsor)
International Federation of Family Health Research (Sponsor)
U.S. Agency for International Development. Bureau for Science and Technology. Office of Population (Sponsor)
(International Conference on Voluntary Sterlization, 4th, Seoul, KR, 7–10 May 1979)
Jun 1980, xii, 283p. : En
932096800
AID/PHA–G–1128

In recognition of the fact that voluntary sterilization (VS) has moved ahead of the pill as the world's foremost contraceptive method, the fourth international Conference on VS (COVS) was held in Seoul, Korea in May, 1979 to identify ways for national health planners to increase VS availability, acceptability, and accessibility. Proceedings of that conference are here presented.

At the COVS plenaries, the use of VS and general family planning (FP) in Mexico, Korea, the United States, Bangladesh, El Salvador, the Philippines, Hong Kong, Thailand, and Sumatra were explored. Although generally faced with shortages of trained manpower and lack of funds and health infrastructure in their work, the conferees reported innovative solutions for providing VS through non–traditional linkages. Sterilization services were seen as an important point of contact between the health care system and the individual, often providing the first exposure to preventive care. Deep concern was expressed that legal changes be made to permit VS where it is currently restricted (case studies on the legal status of VS in Kenya, East and Southeast Asia, and Europe and the Middle East were presented).

Troubled over the health hazards of grand multiparity (widespread in many countries), the conferees sought to define it at Para IV where it would be recognized as a medical indication for sterilization. They urged that multiparas be considered high risk and be given top priority, especially in beginning programs,

as a matter of public health policy. VS reversibility was hotly debated, some advocating its development, others seeing permanency as the proper objective for fertility termination.

Eleven task forces were named to present reports and recommendations for future programs, research, and exchanges of information at five plenary sessions treating: (1) social, cultural, political, religious, and economic factors influencing VS; (2) policy design and implementation; (3) information and education; (4) surgical techniques and their program implications; and (5) legal and ethical aspects of VS. A selection of papers generated by the task forces is provided.

Appendices include lists of conference participants and the countries represented.

304 **PN-AAK-341**

MF $3.24/PC $31.33

Community based distribution of contraception; review of field experience

Osborn, R.W.; Reinke, W.A.
John Hopkins University. School of Hygiene and Public Health. John Hopkins Population Center
Jan 1981, x, 230p. : En
932063200
AID/DSPE-C-0055

It has been postulated that community-based distribution (CBD) of contraception can, at a reasonable cost, satisfy substantial unmet demand for effective fertility control. This report presents findings which validate this thesis and addresses the issue of how the CBD approach can be most effectively and efficiently applied.

First, the authors summarize the information available on 30 A.I.D. projects, including the rationale, chronology, content, and principal results of each project. Next, the paper focuses on seven substantive areas of interest identified in the initial review: efforts at demand stimulation; services mix and methods of delivery; manpower needs, development, and utilization; organizational arrangements; services support and supervision; and research and evaluation procedures. In addition, a review of commercial retail sales experience is presented because of its direct relevance to CBD projects. Finally, the findings from the first two stages of the review are interpreted and synthesized.

After initial implementation obstacles were overcome, the number of CBD projects has increased annually. Thirty were begun during 1974–79 and an average of 6–8 per year are currently being initiated. As the overall CBD concept has gained wider acceptance, projects have increased in size, number, and scope. Public and private CBD programs are culturally acceptable, affordable, and effective in raising contraceptive use from the 15% to the 30–35% level. Only one of the 30 projects was terminated because of poor performance.

Two questions are posed for further research: (1) How can the efficiency of CBD efforts be improved under local conditions? (2) How can the use level be increased to the 50–60% range necessary to have an impact on fertility rates? Recommended are the formalization of a periodic uniform project reporting system and budgeting format, and the development of standard data collection instruments and data analysis systems as well as guidelines for project development and administration.

305 **PN-AAK-335**

MF $1.08/PC $3.77

Factors affecting contraceptive use in Peninsular Malaysia

Peng, Tey Nai; Abdurahman, Idris
International Statistical Institute
World Fertility Survey
Scientific reports, no.23, Nov 1981, 28p. : References p.27, En
932054700
AID/CSD-3606

The extent of contraceptive use among Malaysian women is encouraging and indicates a growing awareness of the benefits of family planning. Thus concludes this report on the determinants of contraceptive use in Peninsular Malaysia.

The authors first summarize Malaysian population and family planning programs and the 1974 Malaysian Fertility and Family Survey (MFFS), from which data on 4,458 exposed women was analyzed for this report. They proceed to discuss the findings of the MFFS regarding the net effect of marital status and duration, age, occupation, education, income, ethnicity, and residence on knowledge of and use of contraception. The authors next explain the method for selecting specific variables and for determining the separate effects of each variable. Current contraceptive use was chosen as the dependent variable; 22 demographic, background, socioeconomic, fertility preference, and perceived service availability variables were selected to be independent.

The direct and indirect determinants of contraceptive use are explored. Specifically, the authors found: (1) contraception is used more to limit (than to space) the number of children; (2) there is little sex preference for children; (3) ethnicity is a key determinant of residence and lifestyle and hence of contraception, with use greatest among Chinese, followed closely by Indians, and distantly by Malays; (4) husband's education and occupation and wife's education and income are equal, strong, and positive determinants of contraceptive use; (5) many who want additional children are using contraception; (6) unmet need for contraception, as indicated by women wanting no more children but not using contraception, is considerable; and (7) 77% of women know of a contraceptive outlet and distance to the outlet is not a significant determinant of use. The authors conclude by recommending encouraging contraception among older and higher parity women, ethnic Malays, and less educated and poorer women.

The report includes 19 tables of data and a list of six references (1971–79); a list of the regression variable and their values is appended.

HUMAN SETTLEMENTS

306 **PN-AAK-811**

MF $1.08/PC $11.18

Land mapping, registration and titling in Indonesia: "the ideal system"; consultants report

Ryan, Betty H.; Sadler, Lloyd; et al.
U.S. Agency for International Development. Bureau for Asia. Indonesia (Sponsor)
Apr 1979, 84p. : En

Indonesia's once adequate land registration and titling system has failed to keep pace with the changing demands placed upon it. This report discusses the system's current problems and socioeconomic impact in preparation for an AID-supported comprehensive land mapping, titling, and registration program – an "ideal" system.

The authors trace the history of the registration and titling system from the Dutch agrarian reform of 1870 and detail the current "Sertipikat" system operated under the Basic Agrarian Law of 1960. The system is criticized as complex, costly, poorly managed, inadequately controlled, inaccurate, and too vulnerable to external influence. The system's operations are summarized, with emphasis on its legal aspects, including the prerequisites to the granting of a land certificate and the different types of land rights (ownership, the rights to use and build, and a land pledge). A description of the mapping system reveals that while it is simple, fast, and economical, insufficient personnel, equipment, and funds will probably prevent the system from completing the voluminous work assigned to it. The social issues related to the system's purpose and benefits are identified.

Detailed recommendations are provided regarding short- and long-run policy and research activities needed to realize the "ideal" system. General recommendations are to: (1) conduct comprehensive statistical and feasibility studies of the time, cost, staffing, and productivity of the present system and proposed modifications; (2) develop a timely and accurate photogrammetric mapping system; (3) minimize the number of registration forms; (4) implement a provisional system until the "ideal" system is in place; (5) train middle-and upper-level managers in U.S. land mapping and titling procedures; (6) develop a technical training program for operational staff; (7) monitor and analyze the development and implementation of the improved system; and (8) provide necessary commodities (e.g., microfilm cameras, readers, and reproducers).

Appended are the names and itinerary of the consultants and data on Central Java, land area and current use, mapping accomplishments, and photogrammetric surveys.

307 **PN-AAK-357**

MF $5.40/PC $54.60

Development potential of new lands settlement in the tropics and subtropics: a global state of the art evaluation with specific emphasis on policy implications

Scudder, Thayer
Oct 1981, v, 406p. : Bibliography, p. 385–406, En
936530500
AID/DSAN-G-0140

The spontaneous or sponsored settlement of largely uncultivated areas has markedly increased since World War II due to population growth, large-scale disease control, and national development planning. This state-of-the-art analysis is designed to improve the design, implementation, management, and evaluation of future new lands settlement.

Against background descriptions of types of settlers and settlements and definitions of settlement success, the author presents the method by which he prepared his study – a review of the literature and field visits to Indonesia, Malaysia, Nepal, the Philippines, Somalia, Sri Lanka, and Sudan.

The dynamics of and the issues to be addressed during the four stages of new lands settlement are detailed. The first stage entails planning, initial infrastructure development, and settler recruitment. Next occurs a period of transition for both the migrant families and the settlement itself. In the third stage, the settlement witnesses socioeconomic development as the previously risk-averse settlers become risk-takers. Finally, administration of the settlement is transferred to the settlers themselves, a step critical to success.

Concluding that government-sponsored settlements'full potential as catalysts to area development has yet to be realized, the author describes an ideal settlement process characterized by: (1) several thousand settler families; (2) use of appropriate and diversified farming systems, emphasizing crop and livestock production rather than off-farm activities; (3) significant yet decentralized host government involvement from the outset; (4) detailed pre-settlement planning; (5) a hierarchically organized system of nucleated communities; (6) the phased provision of infrastructure; (7) emphasis on economic assistance rather than social infrastructure and housing; (8) participation of local beneficiaries; (9) adequate marketing facilities; and (10) ongoing monitoring and evaluation of progress.

Appended are a descriptive list of the settlements studied; a questionnaire for first generation settlers; and a 133-item bibliography (1954–81).

308 **PN-AAK-438**

MF $1.08/PC $3.38

Land tenure in Rwanda

Reintsma, Mary
U.S. Agency for International Development. Bureau for Africa. Rwanda
Oct 1981, 24p. : En

In Rwanda, the most densely populated country in Africa, 95% of the people are dependant on the land, and land tenure is a vital issue. This report traces major developments in the sources of customary and written law which have shaped the de jure land tenure system and describes some aspects of the current de facto land tenure system.

The development of customary law is closely related to Rwanda's tribal history, especially the relationship between the farming Bahutu who vested land ownership in the lineage chief and the pastoral Batutsi who centralized ownership in an all-powerful leader (mwami). By 1900, continued tenure over the land depended on paying tribute to a hierarchical network extending from Bahutu farmers, to lineage or hill chiefs, to provincial Batutsi chiefs, and finally to the mwami. Under German (1898–1917) and Belgian (1917–62) administration, lineage groups began to disintegrate and tribute became an oppressive reponsibility of the individual.

Through written law, especially after 1948, the Belgians attempted several reforms. With independence, these laws were incorporated into the constitution. The resulting system of traditional ownership under the dictates of customary law, non-traditional ownership governed by written law, and State owner-

ship has made land disputes common. The situation has been worsened by the fact that the application of written law and the content of customary law differs by region and that many written laws are only provisional and do not address the real problems. The de facto land tenure situation is characterized by small, fragmented holdings due to a shortage of agricultural land and has resulted in spontaneous farmer migration to undeveloped or urban areas and government-sponsored migration to less populous areas.

The author concludes that reform of land tenure in Rwanda involves few choices given the nearly exhausted land supply, a rapidly growing population, and limited nonfarm employment. It is recommended that agrarian reform based on a codified system of land tenure laws which limits subdivision of holdings, provides for consolidation of scattered plots, and sets a maximum size for holdings be implemented.

309 **PN-AAK-356**

MF $3.24/PC $31.85

Urban functions in rural development, Upper Volta; final report

Fass, S. M.; Pare, Emil
Practical Concepts, Inc.
Upper Volta. Ministry of Rural Development
U.S. Agency for International Development. Bureau for Development Support. Office of Urban Development (Sponsor)
30 Jun 1981, v.p. : En
931000300
AID/SOD/PDC-C-0154

A.I.D.'s Urban Functions in Rural Development project in Upper Volta is aimed at identifying ways to promote rural development by improving the effectiveness of service functions in central villages or towns. To this end, the project undertook to identify over 50 central services provided in 1,300 villages and centers; to analyze them in some detail in 108 settlements; and with local help to evaluate performance in 44 selected centers comprising the most significant villages and the bulk of available functions. This final project report provides an overview of the economy, agriculture, and population of Upper Volta; an analysis of agriculture, population, settlement patterns, and rural development functions in the eastern and center-west regions; a summary of the project's findings; and recommendations for enhancing local government service capabilities.

It was found that while rural services and supporting facilities are reasonably well distributed and generally well staffed, none are working efficiently due to disrepair, poor equipment, and lack of supplies, a situation caused mainly by the sheer lack of available public money. Since attempting a total restoration of these services would be a waste of donor funds and would have no lasting effect, it is recommended that assistance be accorded cantons (seven candidates are identified) that demonstrate an ability to maintain and supply their own service facilities through locally collected funds. A recommended 3-4 year restoration and renewal program includes dispensary buildings, canton offices, rest houses, and expanded schools. Also recommended are construction of granaries and lodgings for local public servants and weekly mail service. Greater mobility for subprefects, establishment of a postal agency, and guaranteed staffing of canton education and health facilities are also suggested. It is emphasized that the community should decide which facilities are to be supported. In a brief postscript, two USAID/UV projects with components similar to those in the above recommendations are identified, as are the efforts undertaken to coordinate them.

A list of 24 references (1977081) in English and French is appended, along with a note on methods and monographs of the principal villages.

310 **PN-AAH-711**

MF $2.16/PC $15.08

Annotated bibliography of rural development, urbanization, and levels of living in Peru

Graber, Eric S.
U.S. Agency for International Development. Bureau for Latin America and the Caribbean. Office of Development Resources. Rural Development Division
Dec 1979, iii, 109p. : En General working document no.1

Any development effort depends on the availability of specific knowledge of the conditions at hand. This annotated bibliography addresses such a need with regard to rural development and general living conditions in Peru.

Included are references to 744, post-1950 publications and reports drawn from the disciplines of economics, sociology, anthropology, political science, agriculture, nutrition, and history. Entries are classified into four main subject areas: (I) general development, social conditions, and levels of living; (2) agriculture; (3) rural life and organization; and (4) small farm development, technology, and marketing. These general subject areas are further specified by 21 sub-topic abbreviations (e.g., population, labor, natural resources) which are placed as a guide next to the entries. Appended is a list of ten bibliographies.

311 **PN-AAK-806**

MF $3.24/PC $29.90

Botswana rural sector study

Barclay, A.H. Jr.; Poulin, Roger J.; et al.
Development Alternatives, Inc.
May 1979, xi, 228p. : En
633007700
AID/OTR-C-1383

A study was conducted in spring 1979 by Development Alternatives, Inc. to define a framework for a proposed 3-year Rural Development Sector Grant from A.I.D. to the Government of Botswana (GOB) to improve productivity and generate employment in rural Botswana. This report presents the study's findings and recommendations.

Part I reviews rural development policy and programs in Botswana, examines GOB commitment to a rural development strategy focused on production and employment, and discusses the rationale behind the proposed framework. Part II describes proposed activities for the first year of the grant, including integrated land use plans, land board development, a water points survey, horticultural development, rural afforestation, wildlife management and utilization, rural industry activities, and small projects. Part III provides supporting analyses of planning and implementation capacities, manpower and training issues, economic constraints, and the sociocultural aspects of rural development in Botswana.

It is recommended that: (1) A.I.D. provide a grant of $3.78 million; (2) a Rural Development Fund be established and administered by the GOB's Ministry of Finance and Develop-

ment Planning, to which A.I.D. would successively contribute $700,000, $1 million, and $1.3 million during the grant period; (3) projects eligible for support be determined jointly each year by the GOB and USAID/B, the GOB having first approved the proposed projects and established their funding requirements; (4) a senior rural industrial officer provide technical advice to the Ministry of Commerce and Industry for a period of 3 person-years, budgeted at $100,000 per person-year; (5) short-term technical assistance be provided as requested and specified in the annual implementation plans (requirements have been estimated at 24 person-months in the first year and 12 person-months in the second and third years, at $10,000 per person-month); (6) a project paper be prepared incorporating the implementation plan for year one and anticipating the obligation of first-year funds; and (7) USAID/B be authorized to obligate funds at the beginning of each succeeding year, upon approval of the annual implementation plan.

312 **PN-AAJ-179**

MF $2.16/PC $15.21

Philippines: Bicol integrated area development

Sommer, John G.; Aquino, Rosemary; et al.
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation
AID project impact evaluation report, no. 28, Jan 1982, ix, 20p. + 8 appendices : En
492030300; 492027500; 492028100; 492031000; 492031900; 492028900

The Bicol River Basin Development Program (BRBDP) in the Philippines is important because it melds three themes current in development thinking – a concerted focus on a discrete geographic area; systematic integration of various services down to the farm level; and income redistribution and equitable economic growth. This report assesses the BRBDP's impact, emphasizing seven A.I.D. projects.

The BRBDP to date has had a limited but promising impact. Much of the first 8 years has been spent building infrastructure (e.g., roads and irrigation systems); designing and starting projects (e.g., agroforestry); training staff (e.g., health workers); and raising resources. Although institutional coordination is satisfactory, the BRBDP is still too centralized. Participation has been adequate except at the critical farmer level; efforts to promote private investment have been few and unsuccessful. Additional detailed findings on the impact of roads and irrigation and on the BRBDP's effect on regional development and on institutions are presented.

Experience gained under the Program has shown that: (1) the BRBDP is a viable model and the river basin a suitable unit for integrated area development and that consistent national support is a must; (2) while hyperbole may gain initial support, disappointment and loss of this support may result from the delays and problems which inevitably arise; (3) the concept of integration is more useful as a planning device than as an implementing procedure; and (4) early beneficiary participation is both possible and crucial to success, which is ultimately measured by changing attitudes. Thus, the authors note that the future success of the BRBDP depends on promoting greater farmer participation, increasing farmers'productivity, and on stronger, more creative leadership from the central BRBDP Program Office.

Appended are an overview of A.I.D. assistance to the BRBDP; the scope and methodology of this evaluation; an economic analysis of the Program; a report on the benefits and beneficiaries of the BRBDP; a description of the BRBDP's institutional aspects; selected farmer profiles and a discussion of the importance of participation; and a list of 32 references (1967–81).

313 **PN-AAK-549**

MF $2.16/PC $20.80

Volta Valley Authority: socio-economic evaluation of a resettlement project in Upper Volta

Murphy, Josette; Sprey, Leendert H.
Purdue University. Department of Agricultural Economics
International Institute for Land Reclamation and Improvement
Netherlands. Office for International Technical Assistance (Sponsor)
U.S. Agency for International Development. Bureau for Africa. Upper Volta (Sponsor)
Jun 1980, 142p. : En
625092600
AID/AFR-C-1257

The Volta Valley Authority (AVV), created by the Government of Upper Volta in 1973 to settle and develop Volta River valleys recently freed of onchocerciasis, has encountered many difficulties in defining adequate farming practices and extension approaches. This report explores these problems and evaluates the AVV program's socioeconomic impact.

After analyzing the AVV's agricultural program, its monitoring and evaluation procedures, and the economics of AVV farms, the authors present their findings. On the negative side, although cotton yields are good, cereals production is erratic and low; recommended crop rotation fertilization practice have not been followed; animal traction has been inadequately exploited; and the technical package being promoted is too complex. Nonetheless, settlers are given farms large enough to earn them an acceptable level of income.

Future land availability has already arisen as a problem and is tied to the larger issue of ambiguous land ownership in the AVV territory. Both female and young adult male settlers lose their traditional individual fields when migrating, forcing many young adults to leave AVV territory. Social programs have been successful; settlers appreciate the availability of schools and dispensaries and are disposed toward group endeavors.

The program has also fallen short of its expected national impact. The program has had only a negligible impact on reducing population pressures on the Mossi plateau and has not provided the anticipated cereals surplus. The AVV has realized that traditional Fulani herders depend on the area more than assumed and that individual migration into AVV areas is rapidly developing. A different strategy might simultaneously promote agricultural development and preserve the area's ecology; the current approach is threatening soil fertility.

The authors conclude that the AVV's experience again demonstrates the need for development planners to learn more about traditional farming systems and the results to be anticipated from introducing new techniques. The report includes 53 graphs, tables, and figures; survey forms and data on rainfall, the 1978 crop, and market prices are appended.

314 **PN-AAK-007**

MF $1.08/PC $5.46

Summary report of the workshop on raising agricultural income and productivity of poor farmers

Shinawatra, Benchaphun; Krongkaew, Medhi
Thai University Research Association
U.S. Agency for International Development. Bureau for Asia. Thailand (Sponsor)
(Raising Agricultural Income and Productivity of Poor Farmers, Chieng Mei, TH, 8–10 Feb 1980)
Mar 1980, 40p. : En
AID/493-9030-T

In order to identify impediments to rural development in Thailand and thereby spur proposals for development interventions, A.I.D. funded a series of three in-country workshops. This report, encompassing four papers on poverty in rural Thailand, presents the proceedings of the first workshop.

The first paper examines the effects of irrigation and water control/management on productivity and income in rural Thailand and concludes that irrigation is the primary income level determinant. The author recommends developing new small irrigation systems, improving existing systems, using a rotational water supply system, and collecting water user fees.

The second paper analyzes land use and management in the context of the interrelatedness of the following production factors: the natural and physical environment; social, economic, and political conditions; resources; technology; and the farmers themselves. The author concludes that there is no shortage of agricultural land but rather that inadequate technology is limiting productive land use. He argues that it is a poorly adapted rent system rather than land tenancy difficulties which is limiting production. Surprisingly, a review of government data 1953–78 shows that the decreases in average farm size since 1963 are slight and therefore should not be lowering production.

Noting a widening gap between rich and poor in rural Thailand, the third paper details the importance, to the poorer farmers, of off-farm employment and income (although, on-farm earnings per hour are still higher). To increase rural incomes and also the demand for rural labor, the authors recommend the promotion of rural industry, farmer training, and farm mechanization.

The fourth and final paper, on the socioeconomic characteristics of farmers groups found that villagers identified as poor by other villagers tended to be landless farmers and/or farm laborers. The author argues for upgrading the specific skills of farmers groups, for breaking the patron/client relationship with the government, and for fielding independent village advisors.

Appended are a description of the workshop's background, the workshop schedule, and a list of the participants.

315 **PN-AAK-473**

MF $4.32/PC $45.11

Pisces studies: assisting the smallest economic activities of the urban poor

Ashe, Jeffrey; Brown, Jason; et al.
U.S. Agency for International Development. Bureau for Science and Technology. Office of Urban Development
Sep 1981, xiv, 378p. : En
931109000

From 20 to 50% of city dwellers in the developing world are engaged in informal small businesses ranging from selling chewing gum to making furniture. This report – based largely on the lengthy case histories from Africa, Latin America, the Philippines, and India which comprise the bulk of the document – summarizes the results of the initial research phase of A.I.D.'s PISCES project, detailing the level and impact of current assistance programs which target small businesses.

The study found that loans of $12–300 were effective in assisting significant numbers of small businesses most of them run by women, enter the business sector and increase profits, and in stimulating community improvement efforts. Types of assistance corresponded to the needs of the three levels of beneficiaries. Subsistence-level businesses were helped, mainly through community-based efforts, to earn income, while small entrepreneurs were helped in forming small groups to collectively guarantee loans and share business advice without the help of large staffs. Established businesses were expanded through innovative commercial bank programs. Only the latter two types, however, can be reached by simple, low-cost programs.

Successful projects were found to be those which reflected the plans and desires of beneficiaries and the levels of skills and knowledge in the community; used staff who related to the poor and could generate a grass-roots response; promoted the program directly in the community rather than through a central office; used reputation among community residents as the main criterion for client selection; and kept loans small, short-term (3–6 months), and low-interest and encouraged adequate loan payback according to the client's cash flow. Evidence was also found for the benefits of providing job skills training to the youth of the very poor, market assistance, and (although this showed mixed results) bookkeeping and management training.

Donors can encourage these experimental efforts by enabling small and large PVO's, large corporations, national development foundations, and goverment agencies to set or expand PISCES-type efforts.

Included is a synthesis of the study's major findings by the A.I.D. Project Director.

316 **PN-AAK-681**

MF $1.08/PC $10.01

Integrated rural development: nine critical implementation problems

Morss, Elliott R.; Gow, David
Development Alternatives, Inc.
U.S. Agency for International Development. Bureau for Development Support. Office of Rural Development and Development Administration (Sponsor)
IRD research note, no.1, Feb 1981, iv, 77p. : En
936530000
AID/DSAN-C-0065

Integrated rural development (IRD) projects, a key outgrowth of the New Directions mandate adopted by A.I.D. in 1973, often encounter similar implementation problems. This report discusses nine of the most frequent and significant of these problems, analyzing their causes and suggesting future research strategies.

These problems include: (1) lack of beneficiary participation and inadequate decentralization; (2) non-use of information systems programmed in the project design; (3) political, economic, and environmental factors beyond the control of project management; (4) the scarcity of strong leadership, sophisticat-

ed planning skills, efficient logistical support, and a wide range of specialities in support of technical assistance; (5) inappropriate organizational placement and linkages among participating agencies; (6) excessive start-up time, inaccurate time estimates, and inappropriate phasing of project activities; (7) shortages of local counterparts to work with the expatriate team; (8) differing project agendas among project implementors; and (9) sustaining IRD project benefits after project termination.

317 **PN-AAK-888**

MF $2.16/PC $20.02

Organization and administration of integrated rural development in semi-arid areas: the Machakos integrated development program

Meyers, L. Richard
U.S. Agency for International Development. Bureau for Development Support. Office of Rural Development and Development Administration (Sponsor)
Nov 1981, xii, 145p. : En
931115700
AID/DSAN-C-0212

Despite substantial worldwide experience with integrated rural development (IRD) projects, knowledge of how such projects should be organized and administered is insufficient. This report examines the potential for IRD in semiarid lands based on a case study of the Machakos IRD project in Kenya.

Part I describes the design, organization, and administration of the Machakos project. In light of the project's goals of decentralization, integration, and participation, as well as its various components, project experience is explored, emphasizing the success or failure of administrative and organizational mechanisms. The author highlights questions about dispersion versus concentration of project resources and the choice and sequence of project activities. He argues that IRD is best effected through the lower levels of the bureaucracy, assuming the presence within this group of minimal planning and implementation skills.

Part II describes a micro-level, socioeconomic field study of 226 households in the project area. Against an overview of the agro-climatic, sociocultural, historical, and demographic context of semiarid areas, the survey's research design and field procedures are presented. Survey findings are provided regarding the general nature of the project area, crop production, land holdings, livestock assets, and sources of income as well as the target population's perception of the project, their soil conservation practices, and their gain from the project's credit program.

The author concludes by identifying issues which policymakers interested in IRD in semiarid lands must consider – the economic importance of off-farm income; the risk and expense of credit programs; the potential gains in productivity from different farming techniques which are not tied to capital and income resources; the need for labor-saving technologies; and the importance of promoting soil conservation.

Appended are a list of 81 references (1920-80); a description of the Machakos credit program; an overview of the project's approach to soil conservation; and an outline of major steps in the project's payment and budget processes.

318 **PN-AAK-757**

MF $1.08/PC $5.20

Generic survey protocol for the housing guaranty program

Mayas, Jean-Marie B.; Goldenberg, David E.
Lawrence (Johnson) and Associates, Inc.
U.S. Agency for International Development. Bureau for Science and Technology. Office of Housing (Sponsor)
Feb 1980, 37p. : En
Companion report: PN-AAK-819

Survey instruments employed in A.I.D.'s housing guaranty (HG) program data collection efforts have been deficient in many ways. This report, a complement to A.I.D.'s *Data Collection Manual for the Housing Guaranty Program*, is designed to provide guidance in constructing survey instruments for acquiring data on shelter and housing.

The authors recommend that: questionnaires have fewer than 5 pages and require less than 30 minutes to complete; a mix of open-ended and closed questions be used; the survey format facilitate data coding; and that non-ambiguous language be employed. In addition, responses must be grouped in a specific and meaningful way, a task usually requiring an understanding of the host country situation.

The authors then present prototype questions in the following areas: (1) respondent information (selection, age, and sex); (2) household roster; (3) migration (length of residence at present location, past residence, future mobility); (4) shelter affordability (employment, income, expenditures, credit, and savings); (5) tenure status; (6) current shelter (size, materials, infrastructure, and construction); and (7) attitudes, perceptions, and preferences.

319 **PN-AAK-766**

MF $3.24/PC $26.65

Proceedings: Asian conference on low income shelter and housing finance

U.S. Agency for International Development. Bureau for Development Support. Office of Housing (Sponsor)
Thailand. Government Housing Bank (Sponsor)
(Asian Conference on Low-income Shelter and Housing Finance, Bangkok, TH, 15-19 Feb 1981)
Feb 1981, iv, 199p. : En

Providing shelter to low-income households is a growing problem brought on by soaring urban populations and interest rates, sluggish economic growth, and rapid inflation. This report presents the proceedings of the second Asian Conference on Low Income Shelter and Housing Finance, held February 15-19, 1981 in Bangkok, Thailand and attended by over 120 officials from eight Asian countries and the United States.

Presented during the first day of the Conference were papers on: issues in low-income housing finance; a global view of mobilizing savings and investment for housing; a review of housing finance and low-income shelter in Thailand, including the role of the Thai National Housing Authority; an overview of housing policies and finance in Indonesia; and a description of U.S. international housing finance assistance. A panel discussion was included.

Papers presented on the second day addressed: the role of government-sponsored financial institutions in the housing sector, with particular reference to India; housing finance in the Philippines and Latin America; lowering unit costs as a strategy in the supply of low-income rural shelter; mortgage finance and

financial markets; housing credit and long-term credit markets; and the international fixed-rate bond markets and the growth of dollar financing.

On the third day of the Conference papers were presented on: alternatives to conventional mortgage finance systems; private sector housing finance and low-income shelter in India; and financing housing deficits for low-income groups. The Conference closed with a discussion of key issues which had been raised (e.g., mobilizing informal funding sources, the proper level of government intervention in the housing sector, and secondary mortgage markets). Appended is a list of delegates.

320 **PN-AAK-706**

MF $2.16/PC $21.71

Seventh conference on housing in Africa

U.S. Agency for International Development. Bureau for Science and Technology. Office of Housing (Sponsor)
(Seventh Conference on Housing in Africa, La Pirogue, MU, 30 Mar-3 Apr 1981)
Mar-Apr 1981, viii, 158p. : En

The seventh Conference on Housing in Africa, co-sponsored by A.I.D. and the Government of Mauritius, was held at Mauritius, March 30-April 3, 1981, with over 125 representatives from 20 countries and six international organizations in attendance. The theme of the conference, proceedings of which are here presented, was programs and techniques for implementing low-income housing.

A synthesis of the results of four plenary sessions, nine discussion groups, and a USAID panel on implementation was presented by the Mauritius Minister of Housing. The summary followed three conference subthemes: (1) policy components to facilitate implementation of low-income housing (appropriate institutional framework and legislative base, effective land policy, comprehensive financial policy, long-term manpower policy, development of appropriate standards and housing types for all income groups); (2) principles of onsite implementation (operational control, long-range coordination, involvement and education of target population, market surveys, flexible project planning, more simplified survey standards, and prequalification of construction firms); and (3) principles of post-occupancy implementation (estate management experience input into new project planning, joint post-occupancy decisions by occupants and management, good communication between management and beneficiaries, ensured political support for community decisions, debt collection through salary deductions/deposits at the financing institutions, improved onsite administration and community education to facilitate data collection for non-salaried beneficiaries, onsite stocks and small construction loans as means to obtain building materials, and provision of technical assistance such as prototype plans and building technicians to accelerate onsite construction).

Supplementary papers include formal submissions by delegations from Niger and Sudan. Two bibliographies total 25 items (1968-80). A list of participants is appended.

321 **PN-AAK-562**

MF $1.08/PC $6.37

Self-help housing in Egypt: a student design competition

Akin, Omer
Carnegie-Mellon University. College of Fine Arts. Department of Architecture
U.S. Agency for International Development. Bureau for Development Support. Office of Housing (Sponsor)
Foundation for Cooperative Housing (Sponsor)
Jul 1980, 45p. : En
931022100
AID/TA-C-1345

Urban Egypt's need for housing is among the most pressing in the Third World, with annual urban growth estimated at 4% and with 1,000 new migrants appearing daily in Cairo. Existing housing is substandard, overcrowded, and lacking in water and sanitary facilities. This document reports on a student competition to design a self-help, expandable housing development in Helwan, near Cairo, sponsored by Carnegie-Mellon University as part of an A.I.D./Government of Egypt demonstration housing project.

Against an overview of the origins of the Egyptian housing crisis, the authors discuss the objectives of the Helwan project in terms of the site (location, climate, and other characteristics); housing units (design, the need for flexibility and adaptability, and family structure); the informal housing sector; ownership; cultural factors; public life; neighborhood and block layout; movement; infrastructure; and building systems and materials. Students were instructed to emphasize one of eight evaluation criteria without violating the others. Criteria included site planning, ownership, adaptation, climate, indigenous design and techniques, economy of means, functional make-up, and appropriateness of construction. The three winning entries are detailed and diagrams and drawings are provided regarding community, cluster, and individual unit design.

The competition highlighted the difficulty of dealing with a culturally, financially, socially, and technologically alien situation existing on a site inaccessible to the designers. A series of design issues also arose regarding undesignated public space, the urban fabric, building frontage, integration of design and appropriate technology, and growth of units and control of layouts. More importantly, the competition demonstrated: (1) the need to reexamine implicit assumptions about the sources of design ideas; (2) the evolutionary nature of urban design; (3) the many levels of abstraction in housing problems; (4) the importance of facing up to technological challenges; and (5) the use of architecture as a device of future development. A list of 32 suggested readings (1958-79) is included.

322 **PN-AAK-544**

MF $3.24/PC $29.64

Dominican Republic shelter sector assessment

Planning and Development Collaborative International
U.S. Agency for International Development. Bureau for Development Support. Office of Housing (Sponsor)
Apr 1980, 2v. : En
Spanish edition, PN-AAK-546
912001500
AID/SOD/PDC-C-0155

Poverty, mass unemployment, high and rapidly rising population densities, and poor health and nutrition have created an

overwhelming shortage of housing in the Dominican Republic. This two–volume evaluation of the nation's housing sector analyzes current housing availability and needs, discusses the resources of the construction and financing sectors, and makes recommendations for achieving future housing objectives.

Over 350,000 rural and urban families live in sub–standard dwellings. Low–income housing needs will represent 70% of urban demand and 90% of rural demand for new housing in the next 5 years (1985). While many public and private organizations which finance and construct housing do exist, their lack of coordination leads to duplication of services and a concentration of delivery to other than the marginal sectors of the urban population. Current norms and practices of construction institutions do not adequately surmount barriers to producing dwellings for the poor in regard to land acquisition, limited availability of land amenable to basic services, and non–use of local material and labor resources. In fact, there has been no overall planning or financing of projects to provide housing for the poor.

To improve housing sector conditions, it will be necessary to increase both the levels of housing production and programs targeting low–income groups and to improve the process of financing and awarding dwellings. To these ends, an institutional infrastructure must be developed. Pilot programs devoted to the construction of low–income dwellings should be established under the coordinating eye of a new office to be established in the Instituto Nacional de la Vivienda. Other housing and financial institutions should initiate new policies for instituting loans and mortgages, transferring government property to private ownership, using local materials and labor, revising interest rates, and establishing funds to finance priority housing and services. Specific recommendations to implement the above strategy are included.

Volume II presents annexes on: the country's internal migration, family income and expenditures, the effect of different interest rates on proposed housing solutions, and the current and projected economic situation.

323 **PN–AAK–814**

MF $4.32/PC $41.60

Indigenous building techniques of Peru and their potential for improvement to better withstand earthquakes

Hartkopf, Volker
Carnegie–Mellon Univeristy.
Peru. Ministerio de Vivenda y Construccion. Oficina de Investigacion y Normalizacion (Sponsor)
U.S. Agency for International Development. Bureau for Science and Technology. Office of Engineering (Sponsor)
INTERTECT
1981, vi, 313p. : En
931022100
AID/TA–C–1345

The planning, design, and construction of housing in seismic areas of Peru needs improvement. This report, noting the richness of and the potential for improvement of traditional technologies, traces the development of housing construction practices from pre–Inca times through the Spanish and modern eras, details improved technologies, and describes important considerations regarding future construction.

Part 1 examines early Andean construction techniques (adobe, tapial, champa, stone, and composite); architectural solutions (building types, forms, and configurations); and solutions to technical and aesthetic problems.

In Part 2, the author explores the Spanish influence and currently practiced technologies. Detailed are basic construction materials (earth, stone, bamboo, and wood); other materials (e.g., tiles, metal, cement, brick); and construction technologies (adobe, tapial, quincha, stone, and bajareque).

Part 3 discusses recent improvements in the above materials and technologies. Specifically addressed are improvements in traditional materials; the use of stabilizers, combined materials, and processed materials; and research on new materials such as agricultural residue, sulphur concrete, jute–plastic, ferro–cement, and binders; and advances in construction operations and building elements. Recent improvements in adobe, tapial, bajareque, and bamboo construction are highlighted.

Finally in Part 4, the author points to the need for: (1) multi–story, irregular, aseismic construction; (2) subdivision of irregularly shaped buildings into structurally independent parts; (3) further combination of existing materials and technologies; and (4) implementation of socioeconomically and technically well–designed demonstration projects in order to gain local acceptance. The report contains 416 photographs and diagrams and a list of 34 references (1973–81).

324 **PN–AAK–819**

MF $1.08/PC $8.32

Data collection manual for the housing guaranty program

Mayas, Jean–Marie B.; Goldenberg, David E.
Lawrence (Johnson) and Associates, Inc.
U.S. Agency for International Development. Bureau for Science and Technology. Office of Housing (Sponsor)
Feb 1980, 60p. : En
Companion report: PN–AAK–757
AID/OTR–C–1782

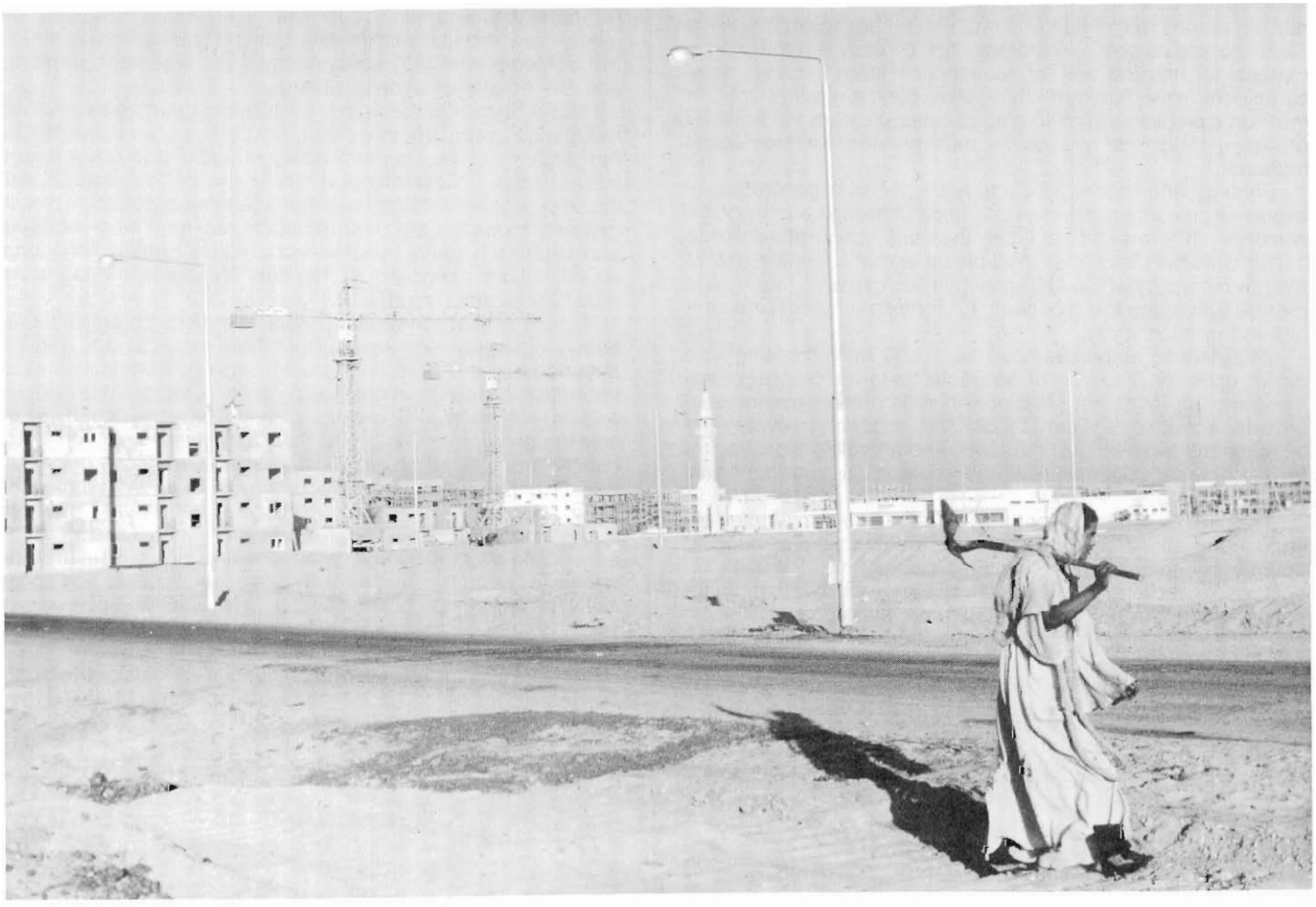
A.I.D.'s housing guaranty (HG) program provides technical assistance and capital lent by private American financial institutions to assist developing countries to plan, finance, and construct a variety of housing and shelter–support projects. This manual identifies general data needs relevant to the HG program and raises several issues which must be addressed in developing useful survey instruments.

The authors first outline the various types of activities supported by the HG program – slum and settlement upgrading, sites and services, core housing, and completed housing for sale or rent. A variety of data are required at three stages in the course of an HG program: in preparing a national shelter sector assessment prior to development of a project; in compiling project identification, design, and implementation documents; and in conducting an evaluation of the completed project.

The manual emphasizes collection of the above data from primary sources, especially through surveys, rather than from secondary sources (i.e., through review of existing sources). The specific data elements addressed are the principal respondent's age, sex, past migration, employment, income, shelter characteristics, credit history, tenure status, and savings experience as well as his/her attitudes, perceptions, and preferences regarding housing and community problems.

Finally, the authors consider several factors which influence data collection, namely, sociocultural and environmental variations, the intended use of the survey instruments and data, the type of project being considered, the role of women in develop-

ment, and the time dimension. Also examined are the varying capabilities of different groups of countries: those where urbanization is well underway and over half the population is urban (e.g., Argentina); countries where the majority of people are still rural and pressure on the land is relatively low (e.g., Algeria); countries which are predominantly rural but rapidly urbanizing (e.g., Ivory Coast); and countries with severe pressure on the land and subsistence economies (e.g., India).



Urban Egypt's need for housing is among the most pressing in the Third World.

ENVIRONMENT & NATURAL RESOURCES

325 **PN-AAK-707**

MF $2.16/PC $13.52

Economic contributions of wild plants and animals to developing countries

Prescott-Allen, Robert; Prescott-Allen, Christine
U.S. Department of State. National Committee for Man and the Biosphere (Sponsor)
World Wildlife Fund – U.S. (Sponsor)
International Union for Conservation of Nature and Natural Resources
Philip Morris Inc. (Sponsor)
Feb 1982, 96p. : En

While wildlife makes an important and often essential contribution to the economies of developing countries, not only is much of this contribution difficult to evaluate, but wildlife resources are often overexploited. So concludes this review of available information on the role played by wildlife in developing countries as a direct source of food, fuel, fibre, medicine, and income, and as an indirect source of ecological support and genetic material.

Much of the animal protein consumed in developing countries comes from the wild, and wild plants are the principal food for domesticated animals and probably supply essential vitamins and trace elements in some areas. Even though firewood is seriously depleted in many areas, most fuel for cooking and heating comes from wild trees and shrubs because alternative fuels are unavailable. Wild plants are a ready source of raw material for housing and for household articles such as mats, containers, and furniture; they also play a central role in traditional medicine. Wildlife also benefits Western medicine by providing drugs as well as animals needed for biomedical research.

Forestry and fishery products are significant generators of export income in a number of countries. Although such income is modest in terms of total GNP, the contribution of wildlife to local economies is crucial. Wild plants and animals are one of the few means by which rural communities can earn money and provide one of the few prospects for building a modest industrial base in such areas.

Wild genetic resources have been and will increasingly be drawn upon as a source of desirable traits for crop development and improvement. Wild ecosystems protect watersheds, provide a buffer against floods and drought, recycle and increase the availability of nutrients, and provide critical habitat for economically, genetically, and ecologically important wild species.

The above suggests that wildlife resources are important enough to justify detailed evaluations of their role in developing country economies. The widespread depletion of wildlife resources, especially of valuable genotypes, indicates a need for conservation efforts which should be aimed at sustaining resource levels and integrated with other development objectives.

Appended is a list of 187 (1953–81) references.

326 **PN-AAL-208**

MF $3.24/PC $33.93

Draft environmental profile of Uganda

Varady, Robert G.
U.S. Agency for International Development. Bureau for Science and Technology. Office of Forestry, Environment, and Natural Resources (Sponsor)
U.S. Department of State. National Committee for Man and the Biosphere (Sponsor)
University of Arizona. Office of Arid Lands Studies. Arid Lands Information Center
U.S. Department of Interior. National Park Service
Jun 1982, xii, 258p. : En
RSSA SA/TOA 1-77
National Park Service contract no. CX-0001-0-0003

Throughout the 1970's, Uganda experienced intense political instability, the effects of which have threatened its human and animal populations and its physical and vegetative resources. This report summarizes information available in the United States on Uganda's natural resources and environmental problems.

Examined in detail are Uganda's: (1) geography and climate; (2) population; (3) land use; (4) geology, soils, and mineral and energy resources; (5) water resources; (6) vegetation; (7) animal resources, their exploitation, and conservation efforts; (8) natural phenomena, such as disease and disaster; (9) misuse of land; (10) wildlife extinction; (11) urban environmental problems; and (12) environmental management problems and the effects of internal disorder.

The authors conclude that the physical damage sustained by Uganda's infrastructure during the politically unstable 1970's has diminished the country's ability to respond to environmental problems. Critical transport facilities were devastated; training of personnel for resource management, agricultural development, medical care, and technical research was impaired; and Uganda became isolated from regional and international scientific and economic exchanges. Resource management now has but low priority.

Uganda's environmental problems reflect its agriculturally based economy and result from both political and natural occurrences and from human interference. Its principal environmental concerns, in decreasing order of importance, are: (1) wildlife extinction – thousands of animals were destroyed by soldiers during the 1970's and thousands more are in constant danger from poachers; (2) deforestation and overgrazing – forested areas have been reduced by 65% and once plentiful grasslands near the Sahelian zone have been nearly eliminated; (3) numerous infectious and environmentally related diseases, complicated by poor sanitation and lack of safe drinking water; (4) natural disasters – drought, earthquake, and especially fire; and (5) problems caused by urban overpopulation – a result of the internal chaos, external events, and rapid population increase of the 1970's.

Appendices include reports on various aspects of the Ugandan environment and a 20-page bibliography (1902–81).

327 **PN-AAK-035**

MF $2.16/PC $23.92

Draft environmental profile on Rwanda

U.S. Department of State. National Committee for Man and the Biosphere (Sponsor)
U.S. Agency for International Development. Bureau for Science and Technology. Office of Forestry, Environment, and Natural Resources (Sponsor)
University of Arizona. Office of Arid Lands Studies. Arid Lands Information Center
U.S. Department of Interior. National Park Service
Aug 1981, viii, 180p. : Bibliography p.158–180, En
RSSA SA/TOA 1-77
National Park Service contract no. CX-0001-0-0003

With its rapid population growth and limited natural resources, Rwanda faces a number of serious environmental problems according to this draft report on the country's geography, climate, demography, geology, mineral and energy resources, soils, water resources, and flora and fauna. Rwanda has a diverse but fragile tropical ecology and its climate and rainfall are adequate for two growing seasons. However, Rwanda's landlocked location, total dependence on agriculture, and lack of mineral resources adversely affect development efforts.

Six environmental problem areas are noted: (1) Rwanda's population, already the densest in Africa, will occupy all arable land by 2000. The absence of modern agricultural techniques and the lack of urban employment opportunities increase the pressure on agricultural lands. (2) Rwanda's forests function as a climatic regulator and are essential to rainfall catchment. The removal of trees for farm land, fuel, and construction places an intolerable burden on forest preserves. Large-scale reforestation efforts and the development of alternate fuel sources are badly needed. (3) Animals are excessive in number, suffer from malnutrition and disease, and are of low productivity. Overgrazing results in the loss of quality grasses and leaves pasture land vulnerable to indiscriminate burning. Improved programs of herd management must be undertaken on a larger scale. (4) Deforestation, overgrazing, and traditional cropping practices threaten the fertility of Rwanda's fragile soils and cause extensive erosion. Pilot programs of ecologically oriented agriculture have been very limited in scope. (5) Malaria, measles, contaminated water, and chronic malnutrition affect most Rwandese. Swamp clearance, irrigation, and reforestation projects are likely to worsen these health problems by extending the environments suitable to disease-carrying vectors. (6) Several rare and endangered species are threatened with extinction in Rwanda's two national parks because a lack of funds and personnel make it difficult to control encroachment and poaching.

Appendices include extensive floral and faunal surveys, a summary of environmental law, a review of related A.I.D. projects, and a 227-item (1956–81) French and English bibliography.

328 **PN-AAK-708**

MF $1.08/PC $9.75

Evaluation of photographic imagery parameters relating to agricultural inventories in the Domincan Republic

Schultink, Ger; Karteris, Michael A.
U.S. Department of Agriculture. Economic Research Service. Comprehensive Resource Inventory and Evaluation System Project (Sponsor)
U.S. Agency for International Development. Bureau for Technical Assistance. Office of Agriculture (Sponsor)
Michigan State University. Department of Resource Development
Dominican Republic. Secretary of State for Agriculture
CRIES working series, 1981, viii, 65p. : En
PASA AG/TAB-236-15-76

The major objective of A.I.D.'s Comprehensive Resource Inventory and Evaluation System is to evaluate the potential of the agricultural resource base in selected developing countries. This report describes a study conducted in the Dominican Republic to determine the effect of the interpreters'skills, type of image, and image scale on interpretation accuracy for several crops.

The test site, in the east central portion of the Cibao Valley, is covered by savannah and subtropical broadleaf forest and is generally flat. Aerial photography and related ground truth were obtained in March 1979 and a follow-up ground survey was conducted a month later. Test site aerial photography consisted of 70mm black-and-white, color infrared, and color transparencies at scales of 1:10,000, 1:20,000, and 1:30,000. Ground truth consisted of written descriptions of crop types, growth stage, and boundaries. Four interpreters with varying experience were given 1.5 hours of training to become familiar with the appearance of crops in aerial imagery and to enhance their ability to classify fields. They then proceeded to interpret all 74 fields on every type and scale of imagery tested.

Statistical analysis of the results revealed a mean interpreter accuracy of 77%. Differences among the four were negligible (2.9%), indicating that experience was not a significant determinant of accuracy. It is thus recommended that training be conducted using photography from the same scale, film type, and date as those to be used in actual photointerpretation. Although color and color infrared photography allow more accurate land use classification, black-and-white film can produce a less costly yet reliable inventory. It was also found that the optimal combination of successful classification is achieved using 1:30,000 photographs. The authors therefore recommend the use of black-and-white film at a scale of 1:30,000 as the most cost-efficient and versatile combination.

The report contains 14 tables, and 10 figures. Appended are a classification key, information on films and filters, a tabulation of each interpreter's findings, and data on interpretation accuracy.

ENVIRONMENT & NATURAL RESOURCES

329 **PN-AAK-924**

MF $2.16/PC $19.24

Proyectos agricolas en pequena escala y ambientalmente consistentes: lineamientos para la planificacion (Environmentally sound small-scale agricultural projects)

Volunteers in Technical Assistance
Consorcio Mohonk, El
Coordination in Development
1981, 133p. : Es
Also available in English, PN-AAK-597, and French, PN-AAK-925
938016200
AID/SOD/PDC-G-0235

Sound planning for small-scale agricultural projects in developing countries calls not only for adequate technology and funds, but also for the integration of social, cultural, economic, and very importantly, environmental considerations. This manual, prepared as a product of a meeting between 66 PVO's and environmental organizations involved in agricultural development projects worldwide, is intended for use by agricultural planners and extensionists to help them incorporate environmental concerns into small-scale projects.

Against a background discussion of the importance and fragility of a balanced ecosystem and an exposition of the possible disruptive effects of agricultural projects on the environment, the manual identifies the essential agricultural input variables and describes alternatives for their environmentally sound management.

The chapter on water management identifies water sources and movements and explains the possible negative (and positive) repercussions of water management on the water table level, on soil and water quality, and on the health of humans and other species in the food chain. Next discussed is soil erosion and its causes, forms, and effects on agricultural inputs; alternative land use measures are suggested for erosion control.

The next chapter, on soil nutrients, explains the various sources of nutrients, be they natural or due to human intervention; discusses the dangers to the environment and human health of large quantities of nitrogen or phosphorus compounds; and suggests adaptive techniques of fertilization. Environmentally sound versus chemical control of plagues is discussed next, with the conclusion that the best method of pest control is to integrate various natural alternatives with the minimal, well monitored use of chemicals. Finally, simple schemes are presented for estimating the costs and benefits of using available resources to achieve logically and efficiently determined goals and objectives.

Appended are a list of collaborating organizations, an illustrative map, and a 77-item list of references (1961-80).

330 **PN-AAK-970**

MF $2.16/PC $21.97

Draft environmental profile of Burundi

U.S. Department of Interior. National Park Service
U.S. Department of State. National Comrnittee for Man and the Biosphere (Sponsor)
University of Arizona. Office of Arid Lands Studies. Arid Lands Information Center
Dec 1981, 157p. : En
National Park Service contract no. CX-0001-0-0003
931111300
RSSA SA/TOA 1-77

Burundi, despite its temperate climate and abundant rainfall, faces serious environmental problems due mainly to rapid population growth and limited natural resources. Thus concludes this draft environmental profile which describes in detail Burundi's geography, climate, population, land use, geology, minerals, energy resources, soils, vegetation, water resources, fauna, environmental policy, and environmental problems.

Burundi is a strictly agricultural country which lacks mineral resources and has no outlet to the sea. Its rapid population growth, coupled with a lack of employment opportunities, is increasing the pressure on agricultural lands. The need for new farmland, along with increasing demand for wood for fuel and construction, has already placed an intolerable burden on Burundi's tiny forest lands. Although reforestation efforts are underway, alternative fuels must be developed if Burundi's forests are to survive.

Livestock competes with Burundi's human population for land. There are far too many animals and most are in poor health. Pasture lands are subject to extreme overgrazing; in many places quality grasses have been replaced with less nutritious varieties. Overgrazing, deforestation, shortened fallow periods, and traditional cultivation methods threaten the fertility of Burundi's soils. Moreover, Burundi's failure to take adequate soil erosion control measures has caused serious loss of precious topsoil. Efforts to conserve natural flora and fauna have been impeded by lack of land and money and poor enforcement of environmental legislation.

Burundians are vulnerable to endemic sleeping sickness and malaria, contaminated rural water supplies, and chronic protein-calorie malnutrition. Certain environmentally oriented development projects (e.g., swamp clearance, reforestation, irrigation) are likely to worsen health problems.

Maps and tables are used throughout the report to illustrate Burundi's environmental status. Appendices present additional data on economic indicators, development assistance programs, agricultural production, climates, soils, and medicinal plants. A 141-item bibliography (1952-81) is included.

331 **PN-AAK-955**

MF $1.08/PC $4.55

Land resource and land use classification concepts and methods

Putman, John; Ackerson, Kenneth; Witter, Scott
U.S. Department of Agriculture. Economic Research Service. Natural Resource Economics Division
ERS staff report, no.AGES820111, Jan 1982, : En
USDA PASA AG/TAB 236-14-76
931023601

Increasing world demand for food has led developing countries to attempt to raise their agricultural production. This report

describes the concepts and methods used by A.I.D.'s Comprehensive Resource Inventory and Evaluation System (CRIES) Project to classify and evaluate land in order to assist developing countries with agricultural planning and policy analysis.

The CRIES land classification system develops geographic and soil data for three levels of policy planning: development of broad objectives and priorities; selection and general siting of programs; and designing and siting of projects to achieve program goals. CRIES is intended primarily for the higher levels of analysis, but can also delineate quite small geographic areas useful for unique, highly valuable agricultural production.

CRIES uses two components – soil and climate – to delineate broad, relatively homogenous geographic areas, termed resource planning units (RPU's), and to identify smaller and even more homogenous production potential areas (PPA's) within an RPU. RPU's provide overviews of a country's physiographic regions. Agronomic analyses are made at the PPA level. A PPA is by definition sufficiently uniform with respect to plant adaptability and potential management requirements and productivity as to enable its development potential to be usefully interpreted for national and regional planners.

CRIES interprets data on PPA's and their distributional patterns (which can also affect agricultural potential) at two levels. General interpretations – based on such factors as soil potential, climate, and restrictive features – indicate the physical environment's potential for supporting agricultural endeavors. More detailed interpretations denote where major crops or crop groups are adaptable and indicate yield potential. These crop recommendations are generalizations, best suited for initial screenings for national planning purposes.

The report includes data on CRIES's information sources, methods, mapping, and soil taxonomy and briefly describes CRIES's methods for developing information on existing land use or cover (e.g., crops, forest, cities). Appendices provide sample descriptions of two RPU's and their PPA's and define some technical land classification terms.

332 **PN-AAL-217**

MF $3.24/PC $28.34

Draft environmental profile of Zimbabwe

Speece, Mark W.
U.S. Department of Interior. National Park Service
U.S. Department of State. National Committee for Man and the Biosphere (Sponsor)
U.S. Agency for International Development. Bureau for Science and Technology. Office of Forestry, Environment, and Natural Resources
University of Arizona. Office of Arid Lands Studies. Arid Lands Information Center
Jun 1982, iv, 217p. : En
National Park Service Contract no. CX-0001-0-0003
RSSA SA/TOA 1-77

Zimbabwe faces an array of environmental problems in both rural and urban areas, many of which were exacerbated by the years of civil war and international economic sanctions. This report highlights these problems while assessing the country's geography, climate, demography, economy, geology and mineral resources, water resources, soils and agricultural resources, vegetation, and fauna.

Soil erosion is heavy on 12% of commercial farm land and irreversible on about half of marginal lands where, prior to majority rule, 95% of the population was forced to live. Deforestation is serious in most areas, having been brought about by the annual clearing of 70,000 ha for agricultural use and 75–100,000 ha for fuelwood. Increasing herd sizes are exacerbating rangeland degradation. Wildlife is threatened by the destruction of natural habitats associated with human encroachment.

The country's modern health care system is unable to meet the rapid increase in demand which has occurred since majority rule in 1980. Further, sanitation and water systems are inadequate and water borne diseases are a problem, especially in irrigated areas. Industrial pollution (e.g., sewage), while not a nationwide problem, has brought about the eutrophication of lakes near Salisbury and other urban centers. Also air pollution has damaged vegetation, and mining has caused local pollution problems.

The authors conclude that the prospects for reversing these conditions are, in many cases, bleak. The opening of lands previously under European control to Africans will not relieve population pressure on the land but will extend erosion and devegetation; encouraging urbanization to relieve population pressure will increase urban pollution and health problems.

Among the appendices are a 10-page list of the literature cited and a 159-item bibliography (1899–1980).

333 **PN-AAL-218**

MF $3.24/PC $30.29

Draft environmental profile of Burma

Varady, Robert G.
U.S. Department of Interior. National Park Service
U.S. Department of State. National Committee for Man and the Biosphere (Sponsor)
U.S. Agency for International Development. Bureau for Science and Technology
University of Arizona. Office of Arid Lands Studies. Arid Lands Information Center
Jun 1982, v, 233p. : En
National Park Service Contract no. CX-0001-0-0003
RSSA SA/TOA 1-77

Lack of capital, poor infrastructure, internal disorder, and administrative inefficiency – rather than large development schemes – have seriously impeded the exploitation of Burma's natural resources and thus have been the cause of its environmental problems. So concludes this environmental profile of Burma's geography, climate, population, land use, geology, soils, mineral and energy resources, water resources, flora, fauna, and environmental policies.

Although Burma suffers from recurring natural disasters, the Burmese Government has no systematic evacuation or relief plans. Periodic but unpredictable cyclones damage property, soils, and crops and kill both humans and animals. Flooding of extensive riverine plains, caused by cyclones or excess precipitation in mountain watersheds, reduces agricultural production, causes erosion and sediment loading, and helps spread infectious diseases. Earthquakes are common and occasionally devastating.

Shifting cultivation, illegal timber exploitation, and natural fires have destroyed as much as two-thirds of Burma's moist tropical forests. This deforestation has facilitated erosion, soil nutrient loss, and weed infestation and has reduced water infiltration and percolation. Reforestation is difficult and expensive.

Burma's 20-year isolationist policy has seriously hampered environmental and resource management. Participation in regional and international research and exchange activities has been avoided. Scarce financial resources and infrastructure,

and administrative inefficiency limit the enforcement of environmental laws.

Finally, while Burma has adequate medical facilities, its water treatment and sewage processing plants are insufficient. Accumulated rainfall and high temperatures help spread infectious disease. Malaria, gastrointestinal ailments, and other water–and animal–borne diseases pose a continuing threat to public health.

Appendice's treat demographic and economic characteristics, mineral deposits, fertilizer and pesticide use, environmental legislation, donor projects, and floral and faunal reserves. Also included are 25 illustrations, 41 tables, a list of 158 references (1936–81), and a 229–item bibliography (1921–81).

334 **PN–AAL–219**

MF $2.16/PC $19.37

Draft environmental profile of El Salvador

Hilty, Steven L.
U.S. Department of State. National Committee for Man and the Biosphere
U.S. Agency for International Development. Bureau for Science and Technology. Office of Forestry, Environment and Natural Resources (Sponsor)
University of Arizona. Office of Arid Lands Studies. Arid Lands Information Center
U.S. Department of Interior. National Park Service
Apr 1982, viii, 137p. : En
National Park Service Contract no. CX–0001–0–0003
RSSA SA/TOA 1–77

El Salvador's current civil disorder makes development of a coordinated policy for addressing the country's enormous environmental problems unlikely. From this viewpoint, this report profiles El Salvador's geography, climate, population, land use, geology, soils, water resources, energy resources, vegetation, and fauna.

Deforestation, El Salvador's most serious environmental problem, has been encouraged by cultural traditions, inappropriate land tenure laws, a lack of economic incentives, population growth, and inequitable land ownership. Deforestation has also contributed to other problems – soil degradation, loss of water quality, and the extinction of many native species of flora and fauna. Finally, environmental pollution (e.g., urban wastes, toxic chemicals) permeates almost every facet of Salvadoran life.

The report includes 20 figures and 26 tables. Appended are lists of existing or endangered mammals, birds, flora, and fauna; a description of environmentally significant A.I.D. programs in El Salvador; and a 94–item bibliography (1883–1980).

335 **PN–AAK–831**

MF $1.08/PC $8.84

Ecological Aspects of development in the humid tropics = Les Aspects écologigues du développement sous les tropiques humides = Aspectos ecológicos del desarrollo en las zonas tropicales húmedas

U.S. Department of Interior. National Park Service (Sponsor)
U.S. Agency for International Development. Bureau for Science and Technology. Office of Forestry, Environment, and Natural Resources
National Academy of Sciences. National Research Council. Committee on Selected Biological Problems in the Humid Tropics
1982, vi, 52p. : En, Fr, Sp
Provides summaries in English, French, and Spanish of the full report under the English title, PN–AAK–832
AID/cx–0001–0–013

It is expected that 90% of the population growth in the remainder of this century (1.5 billion people) will be in humid–tropical countries. Unfortunately, tropical lowland forests and wetlands are incapable of supporting this growth and current exploitation practices can precipitate self–defeating, long–term damage.

This report briefly examines tropical ecosystems, offering discussions of natural resources, germplasm and conservation of genetic resources, agriculture, ecological and management considerations for forested lands, soil management, and surface water resources. The authors then explore three divergent tropical exploitation strategies.

One strategy recommends that substantial parts of these ecosystems remain untouched to serve as parks and reserves, repositories for scientific study, sources of natural resource germplasm, food sources for aboriginal people, and as a means to help maintain air and water quality and control erosion.

The second strategy is characterized by the substantial use of timber resources through sound forest management including selected cutting, limited clear cutting, underplanting, shelterwood forestry, and reforestation.

The third strategy involves even more environmental stress as it calls for conversion of selected forested and extensive deforested areas for use in food production and for the application of contemporary agricultural practices and large quantities of fertilizer.

The authors's general recommendations suggest that development agencies support resource exploitation but that ecological assessment, study, and planning be given equal support and emphasis. More specifically, development agencies should support workshops, seminars, and other colloquiums to encourage: new farming methods based on diverse crops and germplasm; a worldwide network for studying and distributing fruit crops; agricultural development focused on secondary forests; water and water quality preservation in the wetlands; forest regeneration projects; modern soil management; and the design of criteria for agroforests based on traditional agroforestry and food production methods.

336 **PN-AAK-880**

MF $2.16/PC $17.68

Water use in Eastern Botswana: policy guide and summary of the water points survey

Roe, Emery; Fortmann, Louise
Cornell University. Center for International Studies
Botswana. Ministry of Agriculture (Sponsor)
Feb 1981, xxxiv, 96p. : Bibliography, p.73–80, En
931113500
AID/DSAN-C-0060

A Water Points (WP) Survey was undertaken in Botswana's eastern communal areas to study the effect on the cattle range of different physical types of WP's and of WP management; identify those who benefit from publicly provided livestock water; and assess the effectiveness of group management of dams.

Survey evidence, here summarized, showed that publicly-provided WP's serve both rich and poor, although the rich are more likely to use them. Different WP types were found to affect range conditions differently, although in a less direct manner than originally assumed. Although WP's owned by groups or the government have better dry season range conditions than those owned privately, some of this difference is due to the poorer range conditions around private open wells. There was no evidence that publicly-provided WP's cause more damage, measured along a transect, than privately owned ones, nor that groups manage WP's badly in comparison with private managers. Fewer range differences emerge when comparing physical types, and these center around open wells having poorer total grazing scores and greater bush encroachment than other types, especially boreholes. The type of access livestock users have to WP's best explains differences in range conditions across the WP's in the survey area.

In 1974, the Government of Botswana began building dams for livestock watering purposes, placing the dams under the management of cattlemen charged with maintaining dams, regulating water supplies, and raising money for operation and repair costs. The survey found that while the groups do not completely fulfill their responsibilities (being essentially seasonal ad hoc groups rather than permanent committees), the dams, after 5 years of use, are not in as bad a state as their predecessors and have not had a particularly negative affect on range conditions.

Included are general and specific recommendations to improve water use and land use planning; guidelines for livestock and domestic water use projects, for choosing types of WP's and sites for water development in the communal areas, and for group management of dams; a chronological list of 32 major consultancies and reports (1964–81) relating to water use in eastern Botswana since the nation's independence; and a 110-item bibliography (1943–81).

337 **PN-AAK-759**

MF $2.16/PC $17.55

Engineering study of desalination using salt gradient solar ponds

Nardone, P.
Burns and Roe Industrial Services, Inc.
Dec 1981, v.p. : En
931000300
AID/SOD/PDC-C-0304

Potable water in the Cape Verde archipelago is scarce. Natural sources must be supplemented by desalinated water, production of which requires expensive petroleum. Thus, this report examines the technical and economic feasibility of using salt solar gradient ponds for desalination of seawater to serve the home and business needs of a community of 6,000 people such as Palmeiras, Island of Sal.

All salt gradient ponds work on the same principle – by absorbing and maintaining heat in the form of insolation in the lowest, densest, and saltiest portion of the pond. This heat, which can then provide all or part of the energy required for the desalination process, is removed by running the concentrated salt brine through a heat exchanger which, in turn, transfers the heat to a power plant. Two types of plants were considered: a multistage flash distillation (MSF) plant which uses the hot pond brine (either once through or recycled) for seawater heating and a reverse osmosis (RO) plant which uses low temperature rankine-cycle power.

Although the MFS process is proven, yields higher quality distilled water, and may be more reliable, RO plants have faster start-up and shut-down, produce water which is less corrosive, and are simpler to operate. Capital costs are 13% less for the MSF plant (due to the reduced size and cost of the pond), while annual operating costs are 18.4% less for the RO plant. Based on the the smaller size of the plant and on its reduced power requirements, the authors select the RO plant as best-suited to conditions on the Island of Sal.

Although the solar pond does yield a positive internal rate of return, this return is inferior to that of either a diesel-powered or wind-powered system. It is therefore recommended that construction of a salt gradient pond be postponed until economic conditions are more favorable.

The text includes numerous tables, diagrams, and calculations; a 25-item list of references (1966–81) is attached.

338 **PN-AAK-883**

MF $5.40/PC $63.57

Water points survey

Fortmann, Louise; Roe, Emery
Cornell University. Center for International Studies
Botswana. Ministry of Agriculture (Sponsor)
Jan 1981, xlviii, 450p. : Bibliography, p.427–434.
931113500
AID/DSAN-C-0060

Much of the conventional wisdom concerning water in the eastern communal areas of Botswana has little basis in fact. So concludes this detailed report on the findings of a water points survey conducted in 1979 in order to determine the costs to the government and to the economy of maintaining various types of water facilities and to guide future dam construction and water development in the region.

Data, presented herein with approximately 100 tables, were collected by interviewing 458 households at 12 sites, monitoring the use and condition of water points and range land, and scoring cattle's physical condition. Findings are presented in separate chapters covering: (1) the convenience and cost of water at villages, lands, residences, and cattleposts; (2) the characteristics of users, the factors affecting water point access, and the protection of the rights of the poor; (3) the effects of water point type on livestock watering numbers and on range and cattle condition; and (4) group management of dams.

Based on these data and stressing the need to take local views into account, the authors offer numerous and detailed recommendations for improving communal water and land use

planning, ensuring equity, improving the efficiency of small dams, providing support for dam groups, evaluating grazing, and improving conditions in the 12 surveyed villages. To aid in planning projects which affect livestock and domestic water use in Eastern Botswana, the authors present guidelines on choosing water development areas and water point types and for group management of dams. Appendices provide the survey methodology and background information on dam construction and water use in Botswana.

339 **PN-AAK-942**

MF $2.16/PC $16.25

Training of trainers workshop for technology transfer in water supply and sanitation

Carney, James; McCoy, Louise
U.S. Agency for International Development. Bureau for Science and Technology. Office of Health (Sponsor)
Camp Dresser and McKee, Inc.
WASH field report, no.45, Jun 1982, iii, 119p. : En
931117600
AID/DSPE-C-0080

As an essential step in strengthening technology transfer under the Water and Sanitation for Health (WASH) Project, a training of trainers workshop was held for ten Georgia Institute of Technology personnel charged with promoting the A.I.D. handpump in LDC's. This report outlines the design, proceedings, and recommendations of the workshop.

In designing the workshop, it was assumed that participants possessed extensive training experience and were technically competent concerning hand pumps, and that the methods of conveying information are nearly as important as the information itself. Thus, the overall purpose of the workshop was to increase participants'awareness and application of learning, communication, and motivation theories in their technology transfer efforts.

The participants and the two trainers discussed a variety of topics during the week-long workshop – recognizing success and problems in the field; using the experiential model; assessing individual training styles, theories of motivation, communication and feedback skills, task analysis and performance objectives; preparing micro-training units; evaluating the group process; and developing field training courses.

At the close of the workshop participants were asked what further steps were needed to support the training component of the handpump technology transfer program. Their recommendations included providing management training to improve administrators'responsiveness, development of training manuals and audiovisual aids, a follow-up workshop, further funding for hardware design and language training, more feedback from the field to WASH officials and consultants, and developing new training techniques such as demonstration projects.

The trainers were generally pleased with the workshop but suggested greater emphasis on training as a vehicle of technology transfer, more attention on developing training materials with field applications, and a follow-up workshop to be held in 4-6 months.

Appendices include a list of participants, the workshop agenda, copies of the reference materials used during the workshop, and a summary of participants'evaluations of the workshop.

340 **PN-AAJ-609**

MF $1.08/PC $10.92

Panama: rural water

Meehan, Robert; Viveros-Long, Annamaria
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation
AID project impact evaluation report, no.32, May 1982, viii, 16p. + 9 appendices : En
525017000; 525018100

Toward attaining health for all by the year 2000, Panama's Department of Environmental Health (DEH) began a program in 1970, and was assisted by A.I.D. from 1972-81, to provide 500 piped water systems and 1,300 handpumps to small villages. This report analyzes the impact of this project.

By 1980 562 water systems had been completed and access to piped water was nearly universal. Half the systems were gravity-fed the others had electric, diesel, and occasionally gasoline pumps. Villagers organized community health committees which contributed labor, local materials, and cash and made a commitment to operate and maintain the completed systems. Personnel from all communities were trained to handle simple repairs.

Following an initial shakedown period, performance was good with the best records being in villages with strong community participation and a commitment to system maintenance. The 2,400 hand pumps installed in the smallest villages, however, proved unreliable due to high repair rates and inadequate maintenance. Monthly household charges ranged from 25 cents for gravity systems to $3 for diesel-powered systems. Few villages had difficulty covering operating costs.

Piped water contributed significantly to reducing rural infant mortality from 59 to 35/1,000 in 10 years and to decreasing the incidence of diarrhea. Participation in building and maintaining the systems promoted community initiative and self-reliance. Women and girls were relieved of the time-consuming duty of gathering water, enabling them to more fully enjoy the amenities of life. Although unintended, the systems helped stem rural-urban migration and were clandestinely used to water vegetable gardens and small livestock.

The authors attribute the project's success primarily to effective administration and prior DEH experience, use of simple and reliable technology, community participation, adequate water resources, and moderately high rural per capita income. However, there is a potential for problems due to DEH budget cuts, rising energy costs, and growing improper use of piped water.

Appended are the project logframe; the evaluation methodology; water system designs and regulations; data on sites and on water system, well, and latrine installation; a list of interviewees; and photographs.

341 **PN-AAK-829**

MF $2.16/PC $21.97

Impact of interventions in water supply and sanitation in developing countries

Lindstrom, James D.
Logical Technical Services Corp.
U.S. Agency for International Development. Bureau for Science and Technology. Office of Health (Sponsor)
U.S. Department of Health and Human Services. Office of International Health (Sponsor)
(Pan American Health Organization Seminar, Washington, DC, US, 25-26 Mar 1980)
Apr 1981, ix, 158p. : En
OIH-282-79-0107

What measures will best improve water supply and sanitation in developing countries and what are the effects of various interventions on a community's health and social well-being? These questions were explored by 15 speakers at a multidisciplinary seminar hosted by the Pan American Health Organization for A.I.D. staff and others in the Washington development community. Proceedings of the seminar are herein presented.

Speakers on the seminar's first day focused on the public health implications of water supply and sanitation improvements. The first two papers identify the relationships among various diseases and poor sanitation, water quality, and water availability. The next three, respectively: review research into the epidemiology of water-related diarrheal diseases; discuss ways to integrate water supply and sanitation interventions with primary health care; and analyze the cost-effectiveness of alternative measures for controlling enteric diseases.

On the seminar's second and final day, the interrelationships between water supply and sanitation and a community's productive capacity were discussed. Papers explored: the impacts of improved water supply on women and children and the role of women in assuring the success of water/sanitation projects; ways to evaluate the economic impacts of water supply; the impact of a community's behavioral and decision-making habits on a water supply and sanitation project; and activities under the U.N. Drinking Water and Sanitation Decade.

The papers show that while certain links between water supply and sanitation and health are clear, others are not yet well-understood, primarily due to the lack of strong epidemiological studies. A community's organization and its input into the design of water supply and sanitation systems strongly influences a system's eventual success. Therefore, community linkages should be developed early, before engineering designs are completed; the designs themselves should ensure continuing community involvement with and responsibility for the system. The speakers also suggested that water supply and sanitation be integrated with other development sectors and stressed the need for a much larger cadre of trained people than currently exists.

342 **PN-AAJ-624**

MF $2.16/PC $13.13

Community water supply in developing countries: lessons from experience; evaluation summaries and conference findings

Dworkin, Daniel M.
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation (Sponsor)
(Conference on Community Water Supply, Washington, DC, US, 24-28 Jan 1982)
AID program evaluation report, no.7, Sep 1982, x, 82p. + 3 appendices : En

Because efforts to improve rural water supplies in developing countries have faced increasing criticism and declining donor interest in recent years, A.I.D. began in 1979 a 3-year effort to analyze its experience with community water supply projects. From 1979-1982, 15 projects funded by A.I.D. and other donors in Kenya, Korea, Panama, Peru, Tanzania, Thailand, and Tunisia were evaluated in terms of the water systems' reliability, benefits, and accessibility (i.e., equity). This report presents the full proceedings and recommendations of a 1982 conference held to discuss the results of these field evaluations.

The evaluations were conducted to field test the relevance of the following hypothetical attributes of successful water projects: host country and community commitment; realistic national goals; financially sound support institutions; coordination of donor support with all project needs; appropriate technology; the presence of complementary health, education, and sanitation activities; and increased availability of clean water.

In general, the evaluations supported the above hypotheses; indepth discussions of each point are presented. The participants went on to recommend that: (1) A.I.D. use both Health Account and Food and Nutrition Account funds for water projects; (2) the issue of water quality be addressed within a project's socioeconomic setting; (3) community interest be guaged early on and projects be designed to be locally self-supporting; (4) strong financial and technical institutions be developed to oversee system construction and maintenance; (5) related training needs be adequately addressed; and (6) special sanitation and education components not be included automatically but on the basis of local need and demand. Lists of the conference participants and evaluation team members are appended.

343 **PN-AAK-749**

MF $7.56/PC $89.05

Community water supply activity under AID and its predecessor agencies

Lamoureux, Vincent; Pease, Jean
U.S. Department of Health and Human Services. Public Health Service. Office of International Health
1979, 2v. : En

Since the 1940's, A.I.D. and its predecessor agencies have been providing technical assistance, training, and economic aid to community water supply projects in Latin America, Africa, and the Near and Far East. This two-volume report provides a factual summary of these community water supply activities and accomplishments.

An introduction presents a brief history of community water supply activities under such A.I.D. predecessors as the Mutual Security Agency, the Technical Cooperative Administration, and the Foreign Operations Administration, and of A.I.D. activities conducted during the 1960's in cooperation with the World Health Organization and the Pan American Health Organization. Improved water supply resulting from these activities has had important agricultural and public health benefits, but the projects have also had some weaknesses, such as failure to protect new water sources from contamination and lack of sufficient technical assistance to meet local demands. Technical and financial assistance is now increasingly being provided by international organizations. Included in the introduction are short regional summaries and a fiscal summary.

Presented next are country summaries of water supply projects conducted in Latin America and Africa (Volume I) and in the Middle East (including Southern Asia) and Far East, along with brief descriptions of worldwide water supply activities (Volume II). The country summaries generally contain: a list of projects; narrative descriptions of each project's history, goals, scope, progress, and funding; names of U.S. personnel assigned to the projects and the years assigned; loan summaries; references; and a table summarizing total U.S. obligations, expenditures, and commodity expenditures; host country contribution; life of project in man-years; number of U.S. and participant trainees; and special remarks.

The information in this report was obtained from the E-1 parts of annual Country Assistance program books. Because many of these records were incomplete, unobtainable, or contained classified information, the report cannot be considered complete.

344 **PN-AAK-753**

MF $2.16/PC $17.94

Investment analyses of fuelwood plantations in Sri Lanka

Medema, E. Lee; Hatch, Charles R.; Christophersen, Kjell A.
Idaho University. College of Forestry, Wildlife and Range Sciences
U.S. Department of Agriculture. Forest Service. Science and Education Administration (Sponsor)
U.S. Agency for International Development. Bureau for Science and Technology. Office of Energy (Sponsor)
Contribution, no.221, Sep 1981, 76p. + 4 appendices : En
PASA no. AG/05B-5709-6-79
USDA contract no. 53-319R-1-123

Heavily dependent on forest resources as a source of energy and facing increasing deforestation, Sri Lanka has focused on maximizing biological production of wood fiber on fuelwood plantations. This report presents financial, economic, and biological analyses of this practice and develops a procedure for determining the feasibility of establishing fuelwood plantations to grow *Eucalyptus camaldulensis*.

The financial analysis focuses on the returns to an inventor based on actual costs and revenues and also includes a base case scenario of investment assumptions and a sensitivity analysis of these assumptions. Soil Expectation Value (representing the value of an infinite series of plantings on a given plot) is also determined.

The economic analysis assesses the returns to society of *E. camaldulensis* plantations. Both the financial and economic analyses use maximization of net present value (NPV) as the criterion for determining efficient resource allocation and incorporate real internal rates of return.

The biological analysis uses site index (which relates the height of the tallest tree in a plantation to the age of the plantation) as the quantitative measure for ranking plantation productivity. The authors produce site index curves and yield curves as well as yield estimates for *E. camaldulensis*. Regarding plantation management regimes, tree spacing and methods of tree maintenance are considered.

Based on detailed, quantitative conclusions, the authors conclude the Sri Lankan planners must determine the amount of plantation land required to meet the nation's fuelwood demand. A method of using the analyses in this report to make this determination, which entails considering the alternative energy sources and land uses, is outlined. Appended are a 25-item bibliography (1967-80); yield tables for *E. camaldulensis*; estimation equations; graphical presentation of sensitivity analyses; and a glossary.

345 **PN-AAK-887**

MF $1.08/PC $9.49

Forestry resources development assistance: a selective bibliography of reports

U.S. Agency for International Development. Bureau for Development Support. Office of Development Information and Utilization
U.S. Agency for International Development. Bureau for Development Support. Office of Science and Technology
U.S. Agency for International Development. Bureau for Development Support. Office of Agriculture
Nov 1980, 68p. : En

This bibliography of 58 abstracts of reports on forest resources development assistance was compiled to help inform and orient A.I.D. personnel and U.S. Peace Corps representatives involved in forestry or related natural resource projects. The reports cited vary in origin, scope, and detail, but all are available at the A.I.D. Development Information Center (DIC).

References are categorized in the areas of general works, U.S. government policies and programs, or technical and geographical reports. Each item includes author, title, publisher, report number, date and pagination, as well as DIC catalog number and A.I.D. publication number when available.

346 **PN-AAK-069**

MF $1.08/PC $5.07

Energy in Rwanda – a synopsis

Reintsma, Mary
U.S. Agency for International Development. Bureau for Africa. Rwanda (Sponsor)
Aug 1981, 31p. + 2 annexes : En
698013500
AID-696-021-T

To assess Rwanda's current and projected energy situation, this report summarizes available information on the country's chief actual and potential energy sources and on the Government of Rwanda's (GOR) energy policies and plans.

Wood and hydroelectric power are currently Rwanda's two main energy sources. Forested areas are declining by about 1,600 ha/yr and wooded commune areas are almost depleted due to charcoal production and the daily use of wood for cooking and heating by over 90% of the population. Since 1978, the GOR has attempted to control cutting activities through a forestry management program. Hydroelectric power is the country's main source of energy for industry, the public sector, and a few urban areas. This power is supplied by two main stations: Ruzizi I, 28.2 megawatts (MW), and Ntaruka, 11.25 MW. Future hydro needs will be met by the construction of new large hydroelectric stations, i.e., Mukungwa station in 1981, Ruzizi II and Gihira stations in 1985, and Rusumo falls station in the 1990's. Distribution relies on two high-tension lines which link Ntaruka and Ruzizi with Kigali and on several medium-tension lines which extend this network to urban centers. Due to Rwanda's scattered settlement pattern, hydroelectric power will not reach most households, but will continue to be the major source of energy for Rwanda's industries.

The existence of 50-60,000 million cubic meters of methane gas, suitable for use as is or for the production of urea-based fertilizer and methanol, could help meet Rwanda's future energy needs. However, exploitation is slow due to unresolved technical problems, high costs, low demand, and the need to share the resources with Zaire.

With reserves of from 5-50 million tons, peat could be substituted for charcoal, but it too is not being heavily exploited because it is generally of poor quality and not easily accessible and because Rwanda lacks the drainage structures needed to excavate it. Non-traditional energy sources are being studied by the Centre d'Etudes et d'Applications de l'Energie au Rwanda which tests appropriate technologies in solar power, wind, biogas, and geothermal energy.

347 **PN-AAJ-886**

MF $2.16/PC $14.17

Economic costs of renewable energy

Gordon, Robert; Gorden, Marsha; et al.
U.S. Agency for International Development. Bureau for Science and Technology. Office of Energy (Sponsor)
Development Sciences, Inc.
2 Apr 1981, 103p. : En
930007700
AID/SOD/PDC-C-0306

Are renewable energy systems (RES's) economically competitive with fossil fuels in developing countries? Underlying this question are several assumptions which this report reviews and tests, using a net present cost analysis method, in three case studies – a water-pumping system, rural electrification, and gasohol as a gasoline substitute – for the period 1980-95.

Assumptions reviewed are the rising price of oil (the key assumption), the declining price of photovoltaics, methods for comparing technology costs, the greater reliability and life expectancy of RES's in remote rural areas, the use of local RES's to reduce energy import bills, and the relation of cost to technology scale.

In the case of water pumping, the key variable was found to be not the price of oil (which accounts for only 10% of the pump's total cost), but rather the development of solar technology and associated photovoltaic module cost reductions which will make solar-powered pumps, at least on a small scale, economically viable in the late 1980's. A home-made windmill was found to be cost-effective only after 1990 and then only for the highest fuel price scenario and at high wind speeds, suggesting the limited applicability of some "appropriate" technologies.

Scale was the chief factor in electrifying small villages, the main determinant again being technological development rather than oil prices. It was found that: wind-powered machines work well where wind is adequate; diesel power, even at high costs, will be more economical until the early 1990's; improved photovoltaic systems will become relatively attractive by the early 1990's and very attractive (due to declining prices) by the end of the century.

Gasohol is already cost-efficient in some developing country areas and will become more economical as fuel prices rise into the 1990's and as more grain for ethanol becomes available. A limiting factor is the availability of a feedstock and the extensive land required to grow sufficient quantities.

The authors conclude that the key assumption that RES's will become increasingly competitive as oil prices rise is essentially true, provided that RES's can be developed on a sufficiently small scale. The authors warn, however, that extrapolation of study results is limited because of the site-specificity of most RES's.

348 **PN-AAK-900**

MF $2.16/PC $14.30

Proceedings of workshop on energy, forestry and environment, volume I: workshop summary

U.S. Agency for International Development. Bureau for Africa
1982, 110 p. : En
Volume II, Discussion Papers/case studies: PN-AAK-901
Volume III, Country Energy Papers: PN-AAK-902
698013500
AFR-0135-C-00-1087-00

Oil price increases, drought, famine, and rapid population growth have created a perilous situation in Africa's energy, environment, and forestry interactions. Recognizing the problems this situation poses for African development, A.I.D.'s Bureau for Africa sponsored a workshop aimed at identifying and addressing key issues, improving information on energy projects, and making recommendations for A.I.D. action. This report presents the workshop proceedings in three volumes.

Volume I presents a summary of the workshop, including the agenda, a list of participants, an overview of AFR program histories, the workshop report, a strategy for action, and a list of recommendations. General principles which emerged from the workshop include: (1) African energy and environmental problems defy generalization due to the variety of existing

ecosystems, infrastructures, and resource bases; (2) energy issues are part of the larger development process; (3) two key components of the energy problem are fossil fuel problems in urban areas, and traditional fuel and environmental problems in both urban and rural areas; (4) an energy strategy should be threefold, calling for more efficient use of existing energy sources, increased production of energy from renewables and fuelwood, and better natural resource planning and management; (5) A.I.D. resources are limited and must be carefully invested if they are to have a substantial impact; (6) resolution of energy problems requires a much longer planning cycle than A.I.D. currently employs.

Recommendations were made in regard to: building A.I.D. and host country capacities to deal with energy problems; managing natural resources and renewable energies; conserving traditional energy; and increasing conventional energy efficiency. Other recommendations concerned evaluating project experience to date, improving planning data, training Africans for energy programs, developing A.I.D staffs, and supporting forestry research.

Appendices include energy policy and position papers, a review of the activities of A.I.D.'s Offices of Energy and Forestry and Natural Resources, and an A.I.D. forestry policy determination. Volumes II and III present, respectively, 41 case histories and 21 energy profiles of African countries.

349 **PN-AAK-677**

MF $2.16/PC $14.95

Retrospective analysis: NRECA's activities with AID funding, 1962-1981

National Rural Electric Cooperative Association
1981, 110p. : Bibliography, p.109-110, En
932011700
AID/SOD/PDC-G-0076

Rural electrification (RE) has proven to be one of A.I.D.'s most effective responses to Congressional mandates to serve the poor and do so through cooperatives when possible. This report overviews the National Rural Electric Cooperative Associations's (NRECA) 20-year experience in providing developing contries with A.I.D.-financed technical assistance and training; examines NRECA-A.I.D. relationships; provides examples of NRECA's performance in 17 countries; briefly describes non-A.I.D. NRECA projects; and identifies opportunities for NRECA and A.I.D. to jointly undertake a broader range of energy-related activities in the future.

Early NRECA efforts were concentrated in Latin America where eight countries were helped to establish electric cooperatives which are still operating. In Asia, NRECA helped several countries to establish successful large RE projects and create national entities to support and manage them. While NRECA projects have proven the effectiveness of cooperatives in strengthening local involvement in development (even in countries with unsuccessful prior experience with cooperatives), NRECA has also assisted in non-cooperative RE ventures. Four recent evaluations of NRECA projects show that RE is valued highly by rural users, reaches poor as well as better-off households, and provides significant social and economic benefits. The projects attracted substantial follow-on funding, and, because they were identified with the generosity of the American people, abetted U.S. foreign policy.

Among the recommendations are that: (1) cooperatives be broadened to encompass more types of rural energy; (2) productive uses of electricity at the village and farm levels be given higher priority; (3) projects that have sound host country management and financing and can contribute to a positive image of the United States and afford commercial benefits to both host countries and the United States be given funding priority; (4) technical assistance continue to be provided to countries not interested in cooperatives; (5) multilateral development banks (likely future funding sources) evaluate the role of RE in rural development; (6) A.I.D. units interested in RE reach agreement on project purposes; and (7) A.I.D. make better use of NRECA's project planning expertise.

350 **PN-AAK-704**

MF $1.08/PC $8.97

State of the art report on status of wood hydrolysis for ethanol production

Baker, Andrew J.; Jeffries, Thomas W.
U.S. Department of Agriculture. Forest Service
Jun 1981, 54p. + attachments : En
PASA no. AG/STR-4709-6-79
936570900

Ethanol is a potentially important substitute liquid fuel for energy-deficient developing countries. This state-of-the-art report describes the most prominent methods for producing ethanol from wood.

There are two general methods for producing ethanol from wood: (1) acid hydrolysis of wood into hexose sugars which are then fermented into ethanol, and (2) enzymatic hydrolysis, which involves pretreating wood to yield a product from which cellulose is hydrolyzed into sugar which is then fermented into ethanol. Acid hydrolysis is more advanced and uses a lower-cost catalyst, but produces only 30-60% of theoretical yields. Enzymatic hydrolysis could utilize available equipment, achieves 90% of theoretical yields, and produces less waste, but requires pretreatment of the wood and is more expensive.

The authors proceed to discuss in succession: the availability, reliability, and chemical composition of raw materials; the specific acid hydrolysis processes used by Georgia Institute of Technology, New York University, American Can Company, Forest Products Laboratory, and a Brazilian firm; mechanical, thermal, solvent, acid and other methods for pretreating wood; and the enzymatic hydrolysis processes used by Natick, Gulf Oil Company, Massachusetts Institute of Technology, and Penn/General Electric. Presented next are descriptions of current technologies for fermenting hexose (conventional practice, vacuum fermentation, immobilized cells, and zymomonas fermentation) and pentose (xylulose fermentation, direct conversion of xylose to ethanol, and bacterial fermentation).

The authors conclude that since few techniques have reached the pilot plant and production stages in developed countries, equipment and production costs cannot be established. However, the developing countries most likely to consider producing ethanol are those with high forest growth capacity; an energy deficit; a need for economical, internally-produced liquid fuels; and a low capacity for producing agricultural materials for ethanol production. Appended is a 106-item bibliography (1819-1981).

351 PN-AAK-824

MF $1.08/PC $1.95

Preliminary review of biomass energy options in Costa Rica and the national alcohol fuel program

Jones, Jerry L.
Stanford Research Institute
U.S. Agency for International Development. Bureau for Latin America and the Caribbean. Costa Rica (Sponsor)
U.S. Department of Agriculture. Forest Service (Sponsor)
30 Jan 1981, 8p. + appendix : En
53-319R-1-13

For an agricultural, oil importing country such as Costa Rica, the use of biomass as a source of transportation fuels is a topic of great interest. This analysis is intended to assist the Costa Rican government and USAID/CR to identify possible biomass energy projects. While emphasis is on technologies for converting biomass into liquid fuels, agronomic issues and alternative energy options are also explored.

Costa Rica plans to build six facilities for converting biomass (primarily sugarcane, supplemented by molasses, cassava, and banana wastes) to hydrous ethanol. When all six are constructed, annual production will be 120 million liters or about 60% of the volume of gasoline currently used. Ethanol appears to be a reasonable choice. However, if Costa Rica could produce sufficient wood, other liquid fuels could become important in the future.

The following issues relating to biomass conversion technologies are identified: use of hydroelectrically powered drives in sugarcane processing to allow use of bagasse as a fuel; possible sources and costs of energy for converting starch crops like cassava to ethanol; the optimal method for treating stillage; and the feasibility of using fermentation reactors. No definitive recommendation on the scale of ethanol production is made due to the lack of an environmental impact assessment.

Complete substitution of gasoline and diesel fuel by ethanol would require an almost 50% increase in cultivated land. The current plan is to produce all the sugarcane for fuel in areas not currently producing sugarcane for sugar. However, several questions must be resolved regarding sugarcane and cassava characteristics, yields, and harvesting problems in high rainfall areas; the desirability and feasibility of producing a high fiber content sugarcane; and the suitability of other crops (e.g., sweet sorghum) as fuel sources.

Finally, with regard to nonalcohol renewable energy, several ideas warrant consideration: electrically powered mass transit; electric cars; vehicle-mounted gasifiers operating on wood chips or pelletized fuels produced from excess bagasse; anaerobic digestion of animal manure and other agricultural wastes; and energy recovery from municipal solid wastes.

352 PN-AAK-825

MF $4.32/PC $41.99

State of the art report on methane fermentation of biomass

Woods, Sandra L.; Vause, Kurt H.; Skrinde, Rolf T.
Olympic Associates Co.
U.S. Department of Agriculture. Forest Service (Sponsor)
U.S. Agency for International Development (Sponsor)
Sep 1980, xii, 290p. : En
PASA no. AG/STR-4709-6-79
936570900

Research and development on biogas have emphasized technologies for expediting natural methane generation from anaerobic digestion of biomass. This indepth study reviews the status of biogas technology in developing countries and assesses the feasibility and desirability of expanding biogas production.

First, based on an extensive review of the literature, the principal technical, social, economic, and environmental issues associated with methane production from farm-and feedlot-scale biogas plants and from marine biomass, urban refuse, and landfill are delineated. The microbiological processes underlying anaerobic digestion and the influences of various environmental factors (e.g, mixing, heating, toxicity, pH, retention time, nutrients) on the digestion process are then described. Raw materials available for biogas, different biogas plant designs (e.g., Chinese, Indian, Philippine, and bag), and the maintenance, operation, and safety of biogas plants are discussed. Next, the composition, fuel value, and processing of biogas are examined; attention is also given to the uses of sludge by-products.

The ecological, health, and sociocultural implications of constructing and operating biogas plants in developing countries are reviewed and the status of biogas technology in the following countries is described: Bangladesh, the Peoples' Republic of China, Ecuador, India, Indonesia, Jamaica, Japan, South Korea, Pakistan, the Philippines, Rhodesia, Taiwan, Tanzania, and Thailand. Generally, biogas production is in the developmental stage; even where advanced programs exist, beneficiaries are few. Finally, the economic benefits of methane generation in developing countries are outlined and some cost factors are presented.

The authors conclude that in both developed and developing countries the energy value obtained through biogas generation is only slightly greater than the costs involved. Thus, a major factor in implementing biogas projects is reclamation of by-products for animal feed and fertilizer. In rural areas where kerosene is expensive and labor inexpensive, a very simple biogas system producing a substantial portion of a family's needs may be feasible, but even in these cases current plant designs may be too costly. Cost effectiveness improves when human waste is incorporated into the system. More than 50 tables and 30 figures are included.

EDUCATION

353 **PN-AAJ-989**

MF $1.08/PC $11.44

Observations and recommendations related to the summer workshop on population and environmental education

Murphy, Elaine M.; Cancellier, Patricia
American Public Health Association
U.S. Agency for International Development. Bureau for Development Support. Office of Population (Sponsor)
12 Nov 1981, (88p.) : En
936590000
AID/DSPE-C-0053

At its current 3% growth rate, Egypt's population will double to over 85 million by the year 2004. Given these alarming statistics, the Egyptian Ministry of Education (MOE) began yearly workshops in 1977 to provide an orientation in population and environmental education (P&EE) to enable Egyptian teachers to introduce modern methods and materials in these subjects in the school system. In October 1980 the MOE initiated a year-long correspondence course in population studies to prepare participants for the 1981 workshop, the subject of this report.

The workshop's agenda focused on using a large number of nontraditional teaching methods (e.g., brainstorming, problem-solving, role-playing, etc.) to treat the six subject areas (key population concepts, influences on population growth, Egyptian and world population problems and policies, physiology of reproduction, and population planning); and on evaluating participants'performance in the correspondence course and at the workshop, as well as their attitudes (through pre-and post-test surveys) towards P&EE issues and specific teaching methods.

Based on their observations, the U.S. consulting team prepared a list of recommendations. These included that: the MOE form subject area P&EE teams to identify and develop curricula and teacher guides with emphasis on teaching method rather than population theory; separate trainer-of-trainer workshops for each discipline be held to prepare a number of participants from each geographical district to lead local P&EE workshops funded by MOE; outside lectures on physiology of reproduction and other subjects not directly related to developing local workshops be reduced or omitted; the MOE consider reducing the number of topics into which P&EE is integrated in order to achieve large-scale training more quickly in a few disciplines; the high priority of P&EE be reflected in national student examinations; and that special attention be given to attitudinal reorientation toward population-related issues such as women's rights, male involvement in and religious or traditional barriers to family planning, sex education, contraception, and Egypt's population policy.

Appendixes detail the workshop's agenda and materials and include an 18-item list of references (1975-80).

354 **PN-AAK-430**

MF $2.16/PC $22.75

Report of twenty years of science education in Africa

Yoloye, E.A.; Bajah, S.T.
Science Education Programme for Africa
Carnegie Foundation (Sponsor)
May 1980, 174p. : En
Science Education Programme for Africa, v.1
Volume 2: PN-AAK-431
698039000

Curriculum innovation in science education (SE) was introduced in Africa in the 1960's in response to African aspirations for educational as well as political independence. This document reviews the history of this innovation from 1960 to 1980.

Analysis of a survey of 13 African countries indicates similar patterns of SE development. A review of this development covers initial education commissions, large-scale national conferences, and the activities of the Educational Development Center, Inc. (EDC, then known as Educational Services, Inc.). Significant foreign aid is outlined (A.I.D., private foundations) and brief descriptions are provided of conferences held in Israel (1960), Ethiopia and the United States (1961), Italy (1964), and Nigeria (1965); of the international workshops held in Uganda (1965), Tanzania (1966), and Ghana (1967); and of the science centers established in Ghana, Kenya, Malawi, Nigeria, Sierra Leone, Tanzania, and Uganda. The similarities and differences in educational reform are illustrated by descriptions of African education in the 1960's in the aforesaid countries (Malawi excepted) and in Botswana, Lesotho, Swaziland, Ethiopia, The Gambia, and Liberia.

Sections follow on ECD's development of two AID-funded SE programs -the African Primary Science Program (APSP) and its successor, the Science Education Programme (SEPA); also covered are SEPA's programming development, character as an agency, and impact in African countries. In a final reflection, it is noted that APSP's child-centered, and open-ended approach to "teaching the way of the scientist" heralded a much-needed (and still developing) revolution in elementary SE; and that SEPA has succeeded as a regional institution by providing communication among countries, optimizing manpower, and by exemplifying five factors essential to the success of any regional organization - reliance on people rather than administrative structures, flexibility, institutionalization of major SEPA projects, trust on the part of donors, and humility in stressing long-term effectiveness rather than immediate visibility.

Appended are reports on the science teacher educators' program (1975-79) and the International Centre for Educational Evaluation (1971-78).

355 **PN-AAK-431**

MF $2.16/PC $15.73

Report of the Botswana Conference

Science Education Programme for Africa
(20-year Review Conference of the Science Education Programme for Africa, BW, 20-24 May 1980)
May 1980, 125p. : En
Science Education Programme for Africa, v.2
Volume 1: PN-AAK-430
698039000

A science education conference was convened at Gaborone, Botswana in May, 1980 to review the past performance, current status, and future prospects of the AID–funded Science Education Programme for Africa (SEPA). This report outlines the program of the conference and summarizes its principal discussions.

Included are summaries of conference reviews of: (1) the evolution of SEPA and its forerunner, the African Primary Science Program (APSP); (2) SEPA programs in the 1970's, along with a brief history of SEPA's growth and SEPA's financing, and international relations; (3) international specialized agencies that are potential collaborators with SEPA, including the Organization for African Unity (OAU), three organizations of the United Nations (the Educational, Scientific, and Cultural Organization, the United Nations Environmental Programme, and the Economic Commission for Africa), A.I.D., and the German Foundation for International Development; and (4) Volume I of the Review Report of SEPA.

Also included are recommendations for SEPA funding and for programs for the 1980's. Suggested fund–raising efforts included the timely payment of dues by member states and an increase in those dues, a membership drive, administrative levies on consultancy contracts accepted by SEPA for non–SEPA countries, the sale of SEPA materials, seeking endowment, increased support for delegates by member states, and a drive for observer status within the OAU. Suggestions for future programs centered on eight areas: assisting countries in running their workshop/science programs; establishing new, specialized centers such as those at Njala and Ibadan; producing innovative curriculum materials; establishing a SEPA clearinghouse for science material and the exhibition of science equipment; registering and providing resource persons; awarding a SEPA prize for research conducted in accordance with SEPA objectives; developing programs on mathematics/science interface at the primary and secondary levels and in the field of non–educational science. Also included are recommendations for disseminating SEPA ideas and materials and for restructuring SEPA.

Appended are texts of four addresses given at the conference.

356 **PN–AAK–576**

MF $3.24/PC $28.21

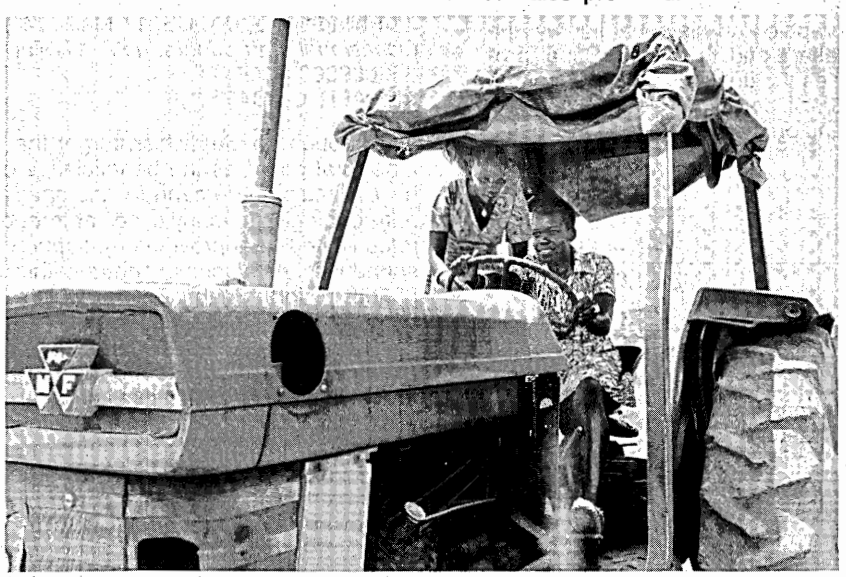
International directory of agricultural education institutions, volume I: Africa

Swanson, B. E.; Nkajimeje, Maxwell; et al.
University of Illinois. Bureau of Educational Research
1981, 218p. : En
Vol. II, Latin America and the Caribbean: PN–AAK–577; Vol. III, Asia and Oceania: PN–AAK–578
931115500
AID/DSAN/XII–G–0115

The gross lack of information on the educational capacity of Third World agricultural education institutions was highlighted by the World Food and Nutrition Study, conducted by the U.S. National Academy of Sciences in 1976–77. As an outgrowth of that Study, this directory provides a first step in inventorying the resources of intermediate and higher level educational institutions with programs in agriculture, veterinary medicine, fisheries, forestry, and home economics in Africa (Volume I), Latin America (Volume II), and Asia (Volume III).

The survey of intermediate institutions was conducted in 1979, using questionnaires in English, French, Spanish, and Portuguese. Higher level institutions were surveyed in 1980, using English, French, and Spanish questionnaires. Among the data collection problems encountered were the opening and closing of institutions, changes in the status of institutions, and reorientation of institutions to non–agricultural fields. As a result, the authors caution that some omissions and inaccuracies in the data are to be expected.

For each country, the directory provides, at minimum, an overview of elementary, secondary, and higher education and the names and addresses of the agricultural institutions surveyed. For many countries, data on enrollment, curricula, faculty, and employment of graduates for selected institutions are also provided.



Educational institutions with programs in agriculture—such as the Yambio Agricultural Training Center in Sudan where these students are gaining hands-on experience—are making a significant contribution to increasing food production in the developing world.

SOCIAL SCIENCE

357 **PN-AAH-736**

MF $3.24/PC $27.04

Social impact of development on ethnic minorities

Maybury-Lewis, David; Barfield, Thomas; et al.
Cultural Survival, Inc.
15 Mar 1980, 199p. : En
930004900
AID/OTR-G-1638

The poor political and economic judgement and lack of sociological imagination that have all too often characterized post World War II development assistance programs have had a negative social impact on the disadvantaged who are the purported beneficiaries of development. Examples of these strategic flaws and their consequences in Afghanistan, Brazil, Sudan, and as dramatically evidenced in the 1977–1979 revolution, Iran, are detailed in this report. A "cultural survival manifesto" is presented stressing the need to promote local participation and cultural pluralism to ameliorate the social problems that may result from a merely technological approach to project planning. Project successes and failures are analyzed to point out both positive directions and the manner in which some development projects have contributed to genocide, disadvantaged ethnic minorities, and proletarianization caused by displacement from the land.

Brazilian Indians are being killed by disease, land grabbing settlers, and assimilation, a process which threatens their physical survival and ensures their cultural disappearance. Ethnic minorities, a strong force in Sudan, Afghanistan, and Iran, are being manipulated by development projects, further exacerbating inter-ethnic rivalries, migration, and discrmination. The displacement of ethnic minorities from their land in Iran, Brazil, and Sudan is studied in light of landowners, welfare, and crowded labor pools.

One section of the report addresses the Dez Irrigation, the Qazvin industrial park, the Qataghan cotton, and the Helmand Valley projects, all within Iran and Afghanistan. Compared are the projects'economic productivity; level of technology; sociological factors; land availability; and the influence of foreign, rather than domestic assistance. The section on Sudan includes an introductory geographic and historical survey, the Gezira scheme, the "New Halfa," and the Joglei Canal projects. The final section discusses the goals and rationale of the Transamazonica Highway in Brazil, and the project's effects on colonization, landownership, and on the ecology and the Indian inhabitants of the region.

358 **PN-AAJ-923**

MF $1.08/PC $2.99

Societal view and perceived social integration with emphasis on the farmer's cooperatives in Kenya

Moland, John Jr.; Williams, Thomas T.
Southern University. Unemployment-Underemployment Institute. International Economic Development Programs
Moran Industries, Inc.
1979, vii, 16p. : En
931014073
AID/CSD-3415

To understand the dynamics of farmer cooperatives (FC's) in developing countries, it is necessary to ascertain FC members' sociocultural views and attitudes about cooperation, cohesion, and integration. This AID-sponsored study explores such views in Kenya by analyzing data from a 1978 sample survey of 140 FC members and 48 nonmembers from the rural villages of Masai and Muthetheni.

Survey respondents from the two locations were similar with respect to age, education, gross family income, and type of housing, but differed significantly in regard to the male/female ratio and religious affiliation. Perceptions of social integration were measured by responses to five questions on togetherness, equality, confidence in officials, and present-future orientation.

The survey findings verified the presence of a true sense of village togetherness, with confidence in one's fellow man, in village officials, and in the future. The democratic values of equal opportunity and of the right to participate in the business and governance of the village were also noted. Values in regard to time reveal a future-oriented society which believes in planning and making sacrifices to ensure future gains. Nonmembers in the area also expressed positive feelings about the future and about social togetherness, indicating a probable strong indentification among nonmembers with FC values and attitudes.

Future analysis will focus on the extent to which demographic features – sex, age, religion – may account for differentials among FC members and between FC members and nonmembers. Income and farming activities will be examined both as independent and dependent variables in relation to the respondent's membership status and other variables.

359 **PN-AAK-795**

MF $1.08/PC $3.64

Anthropological contributions to the North Shaba rural development project

Barclay, A.H. Jr.
Development Alternatives, Inc.
(Society for Applied Anthropology, 1979 Annual Meeting: Panel on Anthropology and Rural Development, Philadelphia, PA, US, 17 Mar 1979)
Occasional staff papers, no.9, 17 Mar 1979, 25p. : En
660059000
AID/AFR-C-1349

Although policies which target the amorphous category of "the rural poor" as the beneficiaries of development projects have stimulated demand for the specialized knowledge of the anthropologist, in many cases anthropologists have found their roles limited to approving or disapproving of a project's social soundness. As a point of contrast, this paper discusses a major project in North Shaba, Zaire in which anthropological contributions decisively influenced project design and implementation.

The author traces the project's origin in response to the region's decade-long economic decline, rising maize imports, and low level of agricultural production. The Government of Zaire (GOZ) initially intended to increase maize production through compulsory resettlement of small farmers onto large mechanized farms. Upon application to A.I.D. in 1975, however, the project was redesigned into an ambitious experiment in bottom-up development characterized by A.I.D.'s processual approach to project design – slow initial implementation, flexibility, small farmer participation in decisionmaking and commitment of resources, strengthening of local organizations, and inclusion of an information system.

The three A.I.D. anthropologists, using rapid reconnaissance techniques and visiting over 100 villages, performed three main tasks. They generated evidence to support a redesigned project (e.g., the heterogeneity of existing farm practices); they decided what activities to include under the project (e.g., extension services for women, recruiting Pygmy wage laborers, and offering incentives to local blacksmiths); and they developed guidelines for project implementation (e.g., criteria for selecting secondary farm service centers). Implementation began in mid–1977 and accelerated in mid–1978 when most project components became operational (achievements in staff development and building an information system are highlighted); however, the project's future is now uncertain due to GOZ financial constraints.

Although the anthropologists in this project had a greater familiarity with the project site then is usual, the author nonetheless concludes that by employing anthropologists and using a processual approach to project design, many of the classical errors that occur in large projects can be avoided.

360 **PN–AAL–289**

MF $1.08/PC $3.25

Social organization and small watershed development

Doherty, Victor S.; Miranda, Senen M.; Kampen, Jacob
International Crops Research Institute for the Semi–Arid Tropics
Economics program progress report, no.26, Oct 1981, ii, 22p.
: References, p.17–18, En

While research on agricultural development in small watersheds in the semi–arid tropics has pointed to the benefits of collecting runoff in ponds for supplementary irrigation, such a strategy poses many questions regarding the social organization, ownership, and management of such facilities. This report discusses economic and anthropological research conducted in southern India on this topic by the International Crops Research Institute for the Semi–Arid Tropics (ICRISAT).

In order to analyze the potential for cooperation among small groups of farmers, the authors offer a basic distinction between two types of cooperative behavior: (1) rule–based cooperation, which is predominantly long–term, passive, predictable, invariant, and possible with either large or small groups; and (2) decision–based cooperation, which is short–term, situational, and usually carried out by small groups. Using past ICRISAT research, the authors then hypothesize that farmers prefer that small–sized sources for supplementary irrigation be privately owned by individual farmers.

To test this hypothesis, data were collected from three villages where ICRISAT Village Level Studies (VLS) were being conducted – Aurepalle, Shirapur, and Kanzara. The behavior of the farmers sharing rights to wells in the VLS sample contradicted the above hypothesis. The system of cooperation followed by farmers sharing rights to wells is clearly rule–based, the village being the organizational and management unit. On the basis of these data, the authors revise their hypothesis to state that farmers prefer small sources of irrigation water to be individually owned unless there is an established system for rule–based decision–making (as was seen in the VLS sample).

This implies that the development of small ponds to collect runoff for irrigation could be part of an overall village water resource development project. However, critical questions still remain unanswered regarding population stabilization, the need for intensive agriculture, resource availability, and of utmost importance, the social organization of the target community as regards the possiblity of cooperative action.

The social organization, ownership, and management of the irrigation structures necessary for agricultural development in small watersheds is a subject which has only recently been investigated.

TECHNOLOGY

361 **PN-AAL-209**

MF $1.08/PC $10.66

Evaluation of scientific and technical information distribution and use in Latin America: the NTIS program in five selected countries

Fanning Firfer, Marina
InterAmerica Research Associates, Inc.
U.S. Agency for International Development. Bureau for Latin America and the Caribbean. Office of Development Resources (Sponsor)
Jul 1982, iii, 53p. + 5 annexes : En
598004400; 598057200
LAC-0044-C-00-1048-00

To assess the operations of the National Technical Information Service (NTIS) in disseminating technical and scientific information throughout Latin America and the Caribbean, a survey, results of which are here presented, was conducted of 99 users of NTIS information in five representative countries (Mexico, Costa Rica, Colombia, Peru, and the Dominican Republic).

The report first details the survey's design in terms of selection of sample countries, survey instrument preparation, field testing, data collection, development of a users'hierarchy to categorize data for analysis, and finally, selection of end users to be sampled. Survey findings are then presented regarding respondent characteristics, access to and frequency of use of NTIS products, usefulness of information, most and least liked aspects of the NTIS program, information utilization, application profiles, Spanish-language materials, publicity through the Applications of Modern Technology to International Development bulletin, other sources of information, and finally technical information needs.

Fully 96% of the respondents found the information they received helpful, 22% applied it to research, and 34% used it directly in some manufacturing or building process. Only 2% of the respondents discarded information unread.

Indications are that the information has been used extensively (81% usage rate) both to adapt existing technologies and to generate new ones. Data concerning environmental, energy, industrial, and food production issues were most often requested.

Despite several complaints about access, document illegibility and/or obsolescence, delivery delays, and poor understanding of the data base's scope, evaluators found the program to be an effective source of information which is promoting technological change and building technological capacity in Latin America. Evaluators recommend continued program support but, in order to strengthen the ordering process and outreach, the number of NTIS distribution centers should be increased and staff reassigned from ordering to promotion; ordering should be direct from NTIS.

Appended are a pre-test interview guide, telephone contact and call record sheets, an interview guide, and interviewer's instructions.

362 **PN-AAH-272**

MF $3.24/PC $27.56

Microbial processes: promising technologies for developing countries

National Academy of Sciences. National Research Council. Board on Science and Technology for International Development
1979, xi, 210p. : En
AID/CSD-2584

Microbes can often perform a variety of useful functions, including fermentation, waste treatment, and food preservation, more efficiently and purely than man can by using chemical processes. Current environmental and economic constraints make the exploitation of microbial processes even more urgent. This report discusses some of the existing microbial processes which hold the greatest promise for use in developing countries.

The authors first explore the biological needs of such microbes as bacteria, fungi, algae, protozoa, and viruses. The major factor in selecting materials for use in microbial processes is the presence of carbon; agricultural raw materials are the most important carbon source. Utilizable nitrogen and sulfur and often sodium, potassium, phosphorus, iron, and other minerals are also needed. Noted are several currently underutilized raw materials, e.g., the winged bean.

The authors then outline existing microbial processes in the areas of: (1) food and animal feed production, including food preservation and fortification; (2) soils, plant health and nutrition, and nitrogen fixation; (3) insect control; (4) fuel and energy, e.g., ethanol, methane, and methanol; (5) waste treatment, including composting and recyclying through fermentation; (6) cellulose conversion; and (7) medicine, specifically antibiotics and vaccines. Provided for each process are a nontechnical summary, the methodology and potential value of the process, special needs and limitations, research and development requisites, suggested readings, and sources for obtaining microorganisms.

Given the vast potential of microorganisms, methods of obtaining the necessary pure cultures are detailed. Several of the existing major pure culture collections are described, preservation methods are summarized, and the process for obtaining a patent is noted. Appended are regulations for packaging and shipping viable microbial cultures.

363 **PN-AAK-705**

MF $3.24/PC $37.18

State of the art report for small scale (to 50 kw) gas producer — engine systems

Kaupp, A.; Goss, J. R.
University of California, Davis. Department of Agricultural Engineering
U.S. Department of Agriculture. Forest Service (Sponsor)
Mar 1981, iv, 278p. : En
PASA no. AG/STR-4709-6-79
936570900

Based on a literature search of over 1,200 publications (most concerning work done prior to 1950), a review of over 600 papers obtained through the search, and 130 responses to questionnarires sent to 400 institutions in 63 countries worldwide, this state-of-the-art report details small gas producer engine systems (GPES's) currently in operation, manufacturers of off-the-shelf equipment, the technical feasibility of installing

new systems in developing countries, constraints and difficulties related to gasification, and research conducted at the University of California at Davis on gasification of wood and crop residue. Topics include a history of small GPES's, the chemistry of gasification, fuel for small and medium fixed bed gas producers, conditioning of producer gas, the latter's application in internal combustion and diesel engines, and the economics of GPES's.

Although over 1 million small GPES's were in operation before and after World War II, the design and construction of GPES's is today a lost art. Despite the growing interest in gasification, there is a lack of functional units and off-the-shelf equipment, and probably only four or five companies worldwide are capable of delivering a small GPES within a reasonable time span.

The most promising candidates for small-scale GPES's are crop and wood processing industries with waste recyclable for fuel. Low speed engines, such as the Humphrey pump, could use gas for fuel. The two most likely scenarios for introducing small GPES's into developing countries are: (1) providing a complete system manufactured by an industrialized country, or (2) manufacturing these systems in a developing country for its own use. Although the second scenario is considered preferable, the first is more likely in the near term.

Recommendations include reviewing 1930-50 data on small units; relating fuel to country conditions, with possible use of plentiful biomass fuels (nutshells, fruit pits, corncobs, rice husks); limiting fuel processing to drying; and delaying introduction of large units. It is also recommended that prototype design and testing be done at established institutions or under expert supervision in Third World countries.

References total 252 items in English, German, and Swedish (1906-81).

364 *** PN-AAL-290**

MF $2.16/PC $18.20

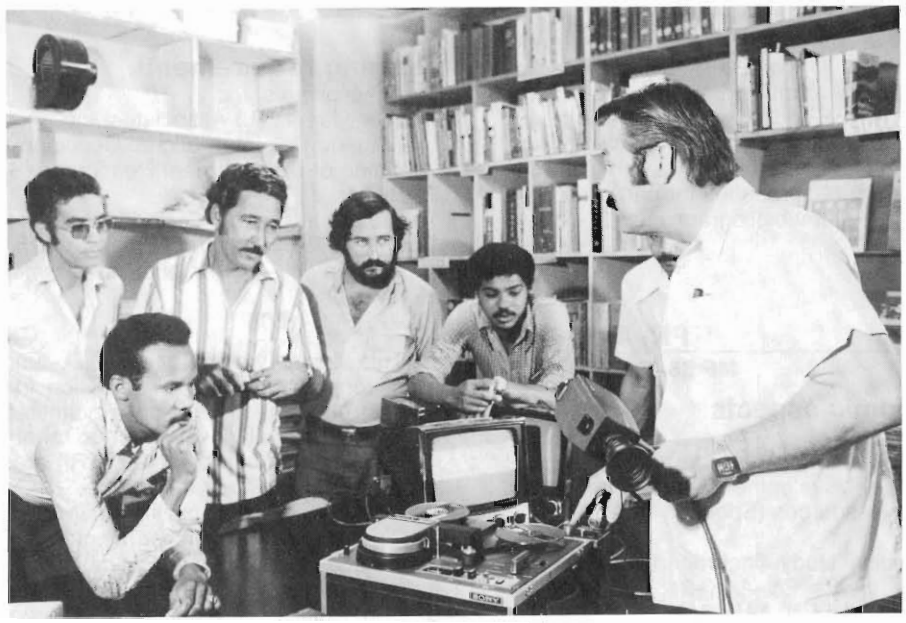
Project profiles

Academy for Educational Development
U.S. Agency for International Development. Bureau for Science and Technology. Office of Education (Sponsor)
Clearinghouse on Development Communication
AID studies in educational technology and development communications, Jul 1982, 144p. : En
Also available in Spanish, PN-AAL-291; French, PN-AAL-292; and Arabic, PN-AAL-293
931123100
AID/DSPE-C-0066
** Available from AED free to qualified clients. English $10; Spanish, French or Arabic $6.00*

The communication media are being successfully used to support development projects in a variety of sectors in countries around the world. This volume presents profiles of 85 of these projects being conducted in the fields of agriculture, education and human resources, integrated development, nutrition, population, and women in development.

Each 2-page profile has a uniform format, listing the project's title and country, the target audience, the project's objectives, the media employed, donor/sponsors of the project, project duration, and the names of people to contact for more project information. Following these information items is a narrative description of the project, its results, notable facts regarding the project, and a list of bibliographic references. The profiles are indexed by sectoral focus, country, and use of media.

Examples of the varied projects covered in the report include: assistance to rural broadcasting in Afghanistan; school-on-the-air in India; cattle-dip management in Kenya; educational television in American Samoa; literacy training in Bangladesh; adult education in the Canary Islands; the Danfa Comprehensive Health Project in Ghana; audio cassette listening forums in Tanzania; a breastfeeding campaign in Trinidad and Tobago; the Korean Mothers'Club Campaign; and promotion of women's access to education in Upper Volta.



Communication media are being successfully used to support development projects in a variety of sectors. Here, agricultural extension workers in the Dominican Republic are being trained to use video equipment.

TRANSPORTATION

365 **PN-AAH-107**

MF $1.08/PC $6.50

Transportation Technology Support for Developing Countries. Synthesis 1: Maintenance of Unpaved Roads

National Academy of Sciences. National Research Council. Transportation Research Board
1979, 50P. : En
931111600
AID/OTR-C-1591

Growing highway traffic and lack of proper maintenance are hastening the deterioration of roads – many of them donor-funded – throughout rural areas of the developing world. This illustrated report provides LDC highway agency maintenance personnel with guidelines for effective maintenance of unpaved, low-volume roads.

Chapter I reviews common maintenance problems, e.g., labor-intensive practices; the bias toward construction over maintenance; limited funds, especially at the local level; non-maintainable roads; scarce equipment; poor quality materials; the absence of work programs and budgets; inadequately trained personnel; and lack of systematic management practices. Chapter II briefly describes basic maintenance operations and defines basic terms.

Chapter III discusses the various functions of the headquarters, district, and workforce levels of a highway agency regarding maintenance as well as planning, budgeting, training, and equipment. Chapter IV outlines management practices in the areas of work activity definition, road system classification, roadway inventory, level of service and work performance standards, annual work programs, resource needs, performance budgeting, training, and work authorization, scheduling, reporting, and control.

Chapter V reviews factors which a developing country should consider before opting for highly mechanized operations, and presents guidelines for using hand tools and improvised small units of equipment and for managing fleets of equipment. Finally, Chapter VI details standard mechanized and manual work methods for: (1) surface maintenance, including resurfacing and patching; (2) drainage, e.g., cleaning and repairing ditches and culverts; (3) roadside maintenance, including vegetation and erosion control and litter pickup; (4) maintenance and inspection of bridges and associated approaches, waterways, substructures, superstructures, and decks; (5) traffic services maintenance; and (6) road rehabilitation and betterment. Alternative approaches for particular conditions are presented. A 36-item bibliography (1927-79) is included.

366 **PN-AAK-015**

MF $6.48/PC $75.79

Technical and economic aspects

Lyon Associates, Inc.
Snitzler (James R.) Associates, Inc.
U.S. Agency for International Development. Bureau for Africa. Office of Development Resources (Sponsor)
12 Oct 1981, 583p. : En
Tanzania rural roads feasibility study; final report, v.1
Volume II, Training Requirements: PN-AAK-016; Volume III, Environmental Assessments: PN-AAK-017
621014800
AID/AFR-C-1605

A major impediment to Tanzania's rural development efforts has been the poor condition of its rural roads which restricts access to social services and markets. The objectives of this A.I.D.-funded three volume feasibility study are to assist in the construction or rehabilitation of roads in the Dodoma and Singida regions and the Same and Mwanga districts of the Kilimanjaro region and to provide these districts with the ability to maintain roads by improving their administrative, planning, construction, and maintenance capacities. This volume deals solely with the technical and economic aspects of the study.

Among the results of the study's economic analysis are: 60% of the benefits to be realized by Tanzania's combined rural road improvement (RRI)/agricultural technology program will result from the RRI component; RRI will enjoy a 17.3% internal rate of return on investment; an estimated 4,560 laborers will be employed annually for maintenance; and natural resource, forestry, fishery and sundry small industries will enjoy easier, less costly transportation.

Among the conclusions of the study's social analysis are: RRI will have no appreciable effect on population distribution; RRI will raise the standard of living of rural Tanzanians but its effect on women is uncertain because it is unlikely that women will benefit from either the new employment or extra income the projects will afford; and delivery of other social services (education, transportation, health, etc.) will improve as access to rural areas expands. Criteria for choosing which roads to improve are provided based on economic, social and cost factors. The study proposes a 3-year project to: clear and shape 4,335 kms in the RRI area, resurface and construct embankments on 2,835 kms, construct culverts and repair drift and bridges on 17,280 meters; provide necessary training; and hire women wherever possible. A 3-year follow-on maintenance program is recommended to begin as soon as individual roads have been repaired. Additional recommendations included the establishment of: a reliable, village-level, baseline data system; a highway identification and numbering system; a highway inventory system; and a traffic count on RRI roads.

367 **PN-AAK-016**

MF $1.08/PC $4.03

Training requirements

Lyon Associates, Inc.
Snitzler (James R.) Associates, Inc.
U.S. Agency for International Development. Bureau for Africa. Office of Development Resources (Sponsor)
1981, 31p. : En
Tanzania rural roads feasibility study; final report, v.2
Volume I, Technical and Economic Aspects: PN-AAK-015; Volume III, Environmental Assessment: PN-AAK-017
621014800
AID/AFR-C-1605

This second volume of an A.I.D.-funded feasibility study of road construction and rehabilitation in Tanzania presents a training program to develop a quantitatively and qualitatively adequate Tanzanian work force to rehabilitate the road system in the rural road improvement (RRI) area, and to maintain the road system after rehabilitation.

After describing Tanzania's general training situation along the lines of the Pan African Conference on Highway Maintenance and Rehabilitation (Ghana, 1977), the country's specific training situation is detailed as follows: personnel shortages exist in regard to engineers, road foremen, and a number of trainee categories (e.g., drivers, mechanics) and are projected in regard to future maintenance personnel needs; on-going

training programs have been operating below full capacity; and shortages of equipment exist which should be filled by donors over the life of the RRI project.

Based on Government of Tanzania policies, the training approach will be centralized in planning control but decentralized in operation, with Tanzanians apprenticed to expatriate advisors at every level in order to eventually make training a totally Tanzanian activity. Also, on-the-job training (OJT) will be stressed in order to begin the RRI project as quickly as possible. Screening and selection of trainees will be based on their immediate usefulness in operations and their potential for acquiring skills required for their prospective jobs. The conduct of training will be as follows: (1) instructors, who are provided with job performance requirements for each worker category, will conduct OJT; (2) once trainees have perfected the first level or task they will be certified according to objective criteria and then graduated to additional levels or tasks if appropriate; and (3) the training program will be assessed quarterly through onsite visits and assessments will be sent to the Project Coordinator. Job descriptions and duties are provided for each of the following categories: road engineers and foremen, equipment operators and mechanics, storekeepers, tire repairmen and welders, drivers, and vehicle mechanics. Lastly, training costs are estimated.

368 **PN-AAK-017**

MF $1.08/PC $9.10

Environmental assessment

Lyon Associates, Inc.
James R. Snitzler Associates, Inc.
U.S. Agency for International Development. Bureau for Africa. Tanzania
n.d., v.p. : En
Tanzania rural roads feasibility study; final report, v.3
Volume I, Technical and Economic Aspects: PN-AAK-015-AAK-015; Volume II, Training Requirements: PN-AAK-016
621014800
AID/AFR-C-1605

This third volume of the Tanzanian Rural Roads Feasibility Study assesses the environmental impact of the proposed Rural Road Improvement (RRI) Project.

The assessment begins with background data on Tanzania's geological, soil, and climatic conditions, its vegetation and animal populations, agriculture, water resources (particularly those in the RRI regions) mineral resources, and demographic information on the human environment (e.g., population, health, etc.). The impact of the RRI project on population distribution and land use strategies is expected to be minimal because the program will not create new roads but rather rehabilitate existing ones; as a result no major redirection of productive assets will take place.

Although most of the remaining environmental impacts are long-term, the assessment team provides them for the benefit of Tanzanian planners who must be aware of environmental trade-offs in implementing any development project. Improved roads will permit more farmers to move from subsistence farming to production for marketing. The subsequent increase in agricultural production along the repaired roads may cause soil exhaustion despite mixed cropping practices; a decrease in wildlife habitats; an increased use of chemical amendments which may contaminate water sources; and overuse of water resources. A likely positive effect will be increased livestock production with greater access to farm-to-market roads. The entire health and education sectors are expected to benefit from the RRI with supplies, personnel, and service deliveries moving more easily from central locations to needy rural inhabitants. Secondary impacts from construction and maintenance of roads include borrow and quarry operations, temporary or permanent disruption of watershed continuity, loss of and encroachment on floodplains, the impediment of watercourses, and the destruction of archeological artifacts. Nonetheless, the assessment concludes that the overwhelming balance of social and economic consequences of the proposed RRIP are beneficial to rural Tanzania and the project should be implemented. A 22-item bibliography (1970-80) is appended.

369 **PN-AAL-211**

MF $3.24/PC $29.12

Field report: an assessment of transport infrastructure relative to Zambian coastal linkage

Moeller, Philip W.
U.S. Agency for International Development. Bureau for Africa. Zambia
28 Mar 1980, viii, 216p. : En
698013500
AID-611-002-T

Inadequate internal transport is the major constraint to Zambia's economic development, restricting food production, mining, marketing, foreign trade, commerce, and industry. This study assesses Zambia's transport system, emphasizing import/export traffic.

The author first examines rail transport – including the Zambian, TAZARA (Tanzania-Zambia), Malawi, Mozambique, Rhodesian, South African, and Benguela Railways – and Zambia road haulage. Next, he assesses the major road routes providing access to seaports and the conditions of port facilities at Dar es Salaam, Nacala, Beira, Maputo, and East London.

In light of this information and given the critical nature of the 1980 shortage of maize in Zambia, the author provides a detailed forecast of domestic maize supply, determines when imports will be needed, and indicates the best routes for transporting emergency maize supplies from the United States and the Republic of South Africa. Finally, the author explores the impact of a political settlement in neighboring Zimbabwe, noting the potential for political instability, the growing dissatisfaction with dependence on Tanzania, and Zambia's rapprochement with Mozambique.

The author concludes that the poor state of transport in Zambia is due to misuse and poor maintenance of equipment; poor management, both public and private; and inadequate as well as unsafe cargo storage and handling. Projections of port usage are included. To improve transportation between Zambia and foreign seaports, the author recommends upgrading existing infrastructure, especially the human aspects, rather than making extensive investments in new rail or road lines. Toward this end, it is recommended that A.I.D. assist the Zambian Government in targeting problems and identifying resources for their resolution, in designing and obtaining funding for projects, and in communicating with domestic and foreign agencies interested in transport issues.

Appended are a 12-item bibliography (1977-79); descriptions of the transport activities of eight other donors; inspection, bridge, and port status reports; and summaries of various rail routes between Zambia and Mozambique.

TRANSPORTATION

370 **PN-AAH-972**

MF $1.08/PC $10.40

Kenya: rural roads

Roberts, John E.; Clapp-Wincek, Cynthia; et al.
U.S. Agency for International Development. Bureau for Program and Policy Coordination. Office of Evaluation
AID project impact evaluation report, no.26, Jan 1982, xiii, 19p. + 9 appendices : En
615014700; 615016800

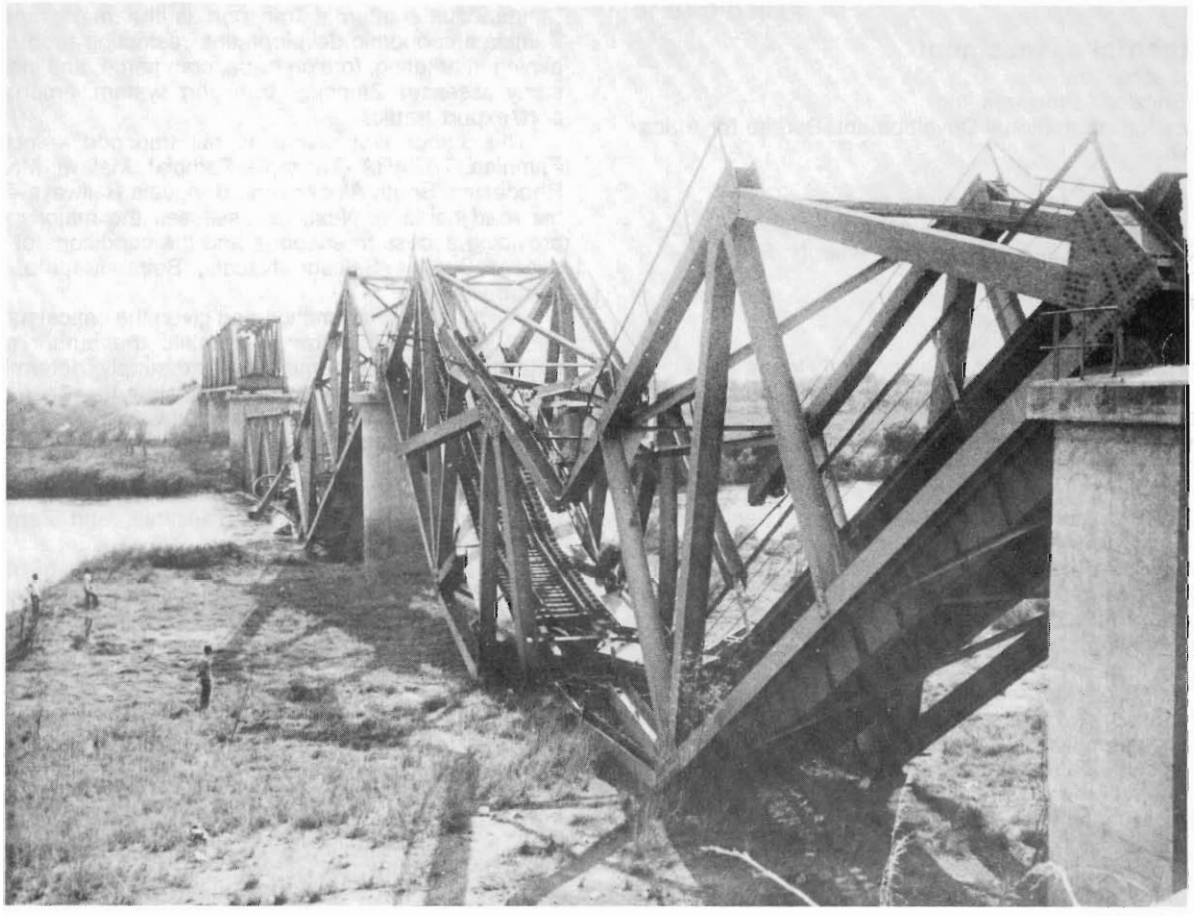
A.I.D's ongoing rural roads project in western Kenya is designed to provide isolated rural areas with all-weather accessibility to production and social services, largely through a program to identify, construct, and maintain 14,000 kms of rural access roads (RAR's). This study by an AID/W team details the project's impact to date.

Most RAR's were found to be well-constructed and serviceable, but direct economic benefit – apart from the generation of local employment due to the labor-intensive nature of the RAR program (the project's graveling, bridging, and culverting program, by contrast, employs capital-intensive techniques) – was not in evidence. Pedestrian traffic dominates due to a lack of vehicles and the high costs of vehicle use, while the fixed prices of staples and major commodities prevent buyers/sellers from recuperating transport costs and thus serve as a disincentive to private sector development in isolated areas. A variety of public service and official-use vehicles are urgently needed to serve such areas. More positively, the RAR program seems capable of being institutionalized in view of the commitment of both officials and people to labor-intensive methods and a road selection process that begins at the local level.

Maintenance activities, especially those of a labor-intensive nature, were found to be successful, but a lack of indigenous engineers threatens long-term maintenance. Roads built under the Vihiga-Special Rural Development Program already require almost total rehabilitation; an agreement to perform such work during the present project was concluded as a result of this evaluation.

Lessons learned are the benefits of the RAR program's labor-intensive and participatory approach and the need to: promote more effective road use by coordinating other integrated development activities at both the national and local levels; undertake cost and supervisory planning to ensure post-project road maintenance; and resolve the policy causes of the project's current lack of direct socioeconomic impact (an appendix argues for an integrated time-phased strategy). Lessons of general import for A.I.D.'s Kenya program are also noted.

Appendices also include a review of other evaluations of rural roads in Kenya.



Inadequate internal transport—exemplified here by a bridge on the Chambeshi River destroyed during the Zimbabwean civil war—is the main constraint to Zambia's economic development. (See item 369)

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...Because of its pervasive impact on human existence, water can enhance—or the lack of retard—development in all sectors.

(Continued from inside front cover)
and purifying water) as well as benefits (e.g., increased labor productivity resulting from improved health). In addition, the economic importance of water in growing crops, raising livestock, and developing aquatic resources cannot be underestimated.

Irrigation and On-Farm Water Management

In the arid and semi-arid regions that comprise 50% of the world's arable land, water is a critical input on which farm production increases depend. Several of the reports announced in this issue of *ARDA* examine irrigation needs and strategies. These include a review of current A.I.D. irrigation projects in India and the country's irrigation development options in the 1980's (item 234); an evaluation of A.I.D.'s Rahad Irrigation Project in Sudan (item 231); and an impact evaluation of A.I.D.'s Sederhana project to construct and rehabilitate simple irrigation systems in Indonesia (item 236).

On a somewhat larger level are an assessment of the impact of the Bicol River Basin Development Program—an integrated program which included construction of irrigation structures (item 312)—and a report (item 233) which examines the need for irrigation in each country and major river basin of the Sahel. The latter recommends a prototype large-scale irrigation infrastructure project as consistent with A.I.D.'s mandate to benefit the rural poor.

But building irrigation structures is not enough. Improved on-farm water management and utilization are essential to increasing food production and conserving scarce water. Addressing these issues are a strategy guide to planning small on-farm water management projects (item 235) and a guide to technologies developed under A.I.D. auspices to help small farmers maximize use of scarce water (item 232). A manual on planning small-scale agricultural projects (item 329) discusses, among other topics, the effects of water management on human and animal health and on soil and water quality. Item 237 analyzes A.I.D.'s On-Farm Water Management project in Pakistan, while item 360 discusses the sociological aspects of small watershed development.

Despite man's best efforts to effectively manage scarce water supplies, drought still looms as an ever-present and unavoidable threat. However, it is possible to develop early warning systems to predict impending drought-related food shortages. Three of the documents in this issue describe such systems developed by A.I.D.—for the Caribbean Basin (items 254 and 258), Sub-Saharan Africa (item 258), and South and Southeast Asia (item 252).

Livestock

Water is also a crucial input in animal husbandry and is a key limiting factor to greater livestock production in much of the developing world. This issue announces five papers based on the 1979 Botswana Water Points Survey: a detailed report on water accessibility and use (item 338); a look at farmers' water point use strategies (item 336); an examination of the effects on livestock of different types of water points, of the beneficiaries of public livestock water, and of the effectiveness of group management of dams (item 238); a report on the unique problems facing women farmers in Botswana, including problems in obtaining water (item 169); and a system for rating cattle's physical condition which correlates physical condition with past water and food availability (item 239).

Aquaculture

Water is synonymous with the environment of one phylum of animals which holds great potential for supplementing the food supplies of developing countries—namely, fish. Accordingly, this issue of *ARDA* includes several reports on the subject of aquaculture. Of special importance is a manual for project planners on the environmental aspects of aquaculture (item 244). Two innovative experiments conducted in the Philippines on integrating animal husbandry and aquaculture are the subject of item 251. Item 250 discusses the future importance of understanding fish behavior in order to improve the operations of capture and culture fisheries. Three papers deal, respectively, with fishery management and efficiency, the practices of local fishermen, and ornamental fish in Colombia's Upper Meta River system (items 245, 246, and 247). Item 249 outlines a proposal for conducting a catch assessment survey for that portion of the Niger River in Niger, while another report (item 243) assesses the state of aquaculture development in Ecuador. Finally, item 248 presents a bibliography of the Leiognathidae, a long-ignored but potentially valuable family of fish.

Prospects

Looking to the future, the *Global 2000 Report to the President* notes that population growth alone will cause at least a doubling in the demand for water. While there will apparently be an adequate quantity of water to satisfy aggregate demand in the year 2000, the quality of this water and its relative availability in various parts of the world do not bode well for many developing countries. Water quality appears threatened not only by the harmful effects of waste disposal, but also by the process of salinization, a natural phenomenon hastened by man's increasing dependence on irrigated agriculture. Such trends in water quantity and quality will place the greatest pressures on those countries—especially in Africa, South Asia, the Middle East, and Latin America—where low per capita water availability, high population growth, and efforts to improve living standards will greatly expand the need for water. It is with this forecast in mind that development practitioners around the world must plan and the people of the developing world must live.

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