AGENCY FOR INTERNATIONAL DEVELOPMENT SPRING 1984

HORIZONS

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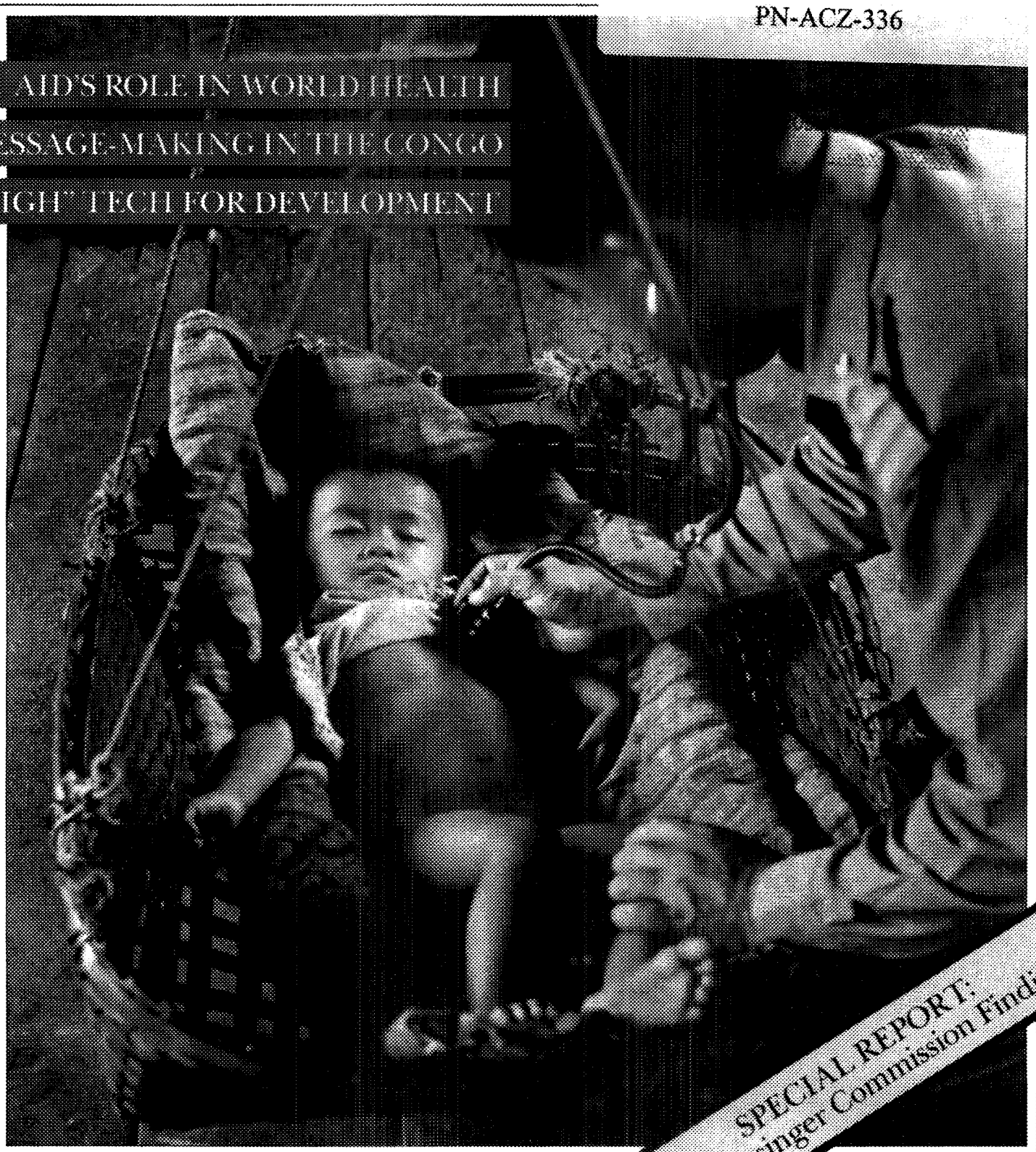
AID'S ROLE IN WORLD HEALTH

MESSAGE-MAKING IN THE CONGO

"HIGH" TECH FOR DEVELOPMENT



SPECIAL REPORT:
The Kissinger Commission Findings

AGENCY FOR INTERNATIONAL DEVELOPMENT VOL. 3 NO. 2 SPRING 1984

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On the cover. "Children's Health. Tomorrow's Wealth," this year's theme for World Health Day, reflects AID's philosophy. A decent level of health is essential if developing countries are to achieve their goals in all sectors. Article begins on page 16.

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ACCENT ON DEVELOPMENT

A BRUSH WITH FLUORIDE: Fluoride toothpaste may be a health hazard in Kenya and other countries in Africa's Great Rift Valley, warn researchers at the University of Nairobi. People in many regions of Kenya get too much fluoride, mainly from natural sources such as water and food. The International Development Research Center (IDRC) of Canada reports that as much as 30% of the fluoride in toothpaste may be absorbed by the body. Children are particularly vulnerable to fluorosis—a disease caused by excessive fluoride intake—when teeth are being formed, and because they like to eat large amounts of the sweet toothpaste.

With about 60% of the population suffering from some form of fluorosis, brushing with fluoride toothpaste is like adding fuel to the fire.

Even a slight excess of fluoride leads to yellowing of the teeth. At higher levels, telltale grey patches appear and the enamel of the teeth fractures. And at yet higher levels, in the 40 milligrams-a-day range, it may cripple or kill.

IDRC funded a study by the University of Nairobi and the Ministry of Water Development documenting the seriousness of endemic fluorosis in Kenya. Experiments to find simple, economical defluoridation techniques are under way.

SIMPLE, INEXPENSIVE, systematic, and participatory is the approach to evaluation outlined in a new sourcebook prepared by the American Council of Voluntary Agencies for Foreign Service with AID support.

The sourcebook, *Approaches to Evaluation: Evaluation Sourcebook for the PVO Community*, combines case studies with a how-to manual, charts, worksheets, an evaluation framework, information-gathering tools, and a survey of the state-of-the-art of PVO evaluations. For information on how to order, contact the council at 200 Park Avenue South, New York, NY 10003.

LEAF-NIBBLING NUISANCES: The crucifer vegetables—ones that produce flowers with a crosslike form, hence the name—aren't only snappy side dishes for humans. Diamondback moths (*Plutella xylostella*) feed on their leaves—reducing both yield and quality. Many smallholders around urban centers, in highland regions, or in specialized production areas who grow cruciferous vegetables—such as cabbage, cauliflower, and mustard—for food and income can't afford to share the profits with pests. The moth has developed resistance to chemical insecticides and has become a major problem for farmers in some areas.

Vegetable-crop researchers are working on alternative control methods for the diamondback moth, including use of sex attractants, juvenile hormones, microbial agents, predators and parasites, and insecticides with novel modes of action. Research progress was shared last month at an international workshop at the Asian Vegetable Research and Development Center in Taiwan. For more information on findings, contact N.S. Talekar, Entomologist, AVRDC, PO Box 42, Shanhua, Tainan 741, Taiwan.

NUTRITION, HEALTH EXPERTS CONFER: More than 80 nutrition and health policy experts from 35 countries met in Cairo recently to discuss "Nutrition in Primary Health Care." The conference was sponsored by the International Nutrition Planners Forum and hosted by Egypt's Ministry of Health. The AID-supported forum brings together senior developing country officials responsible for nutrition policy or programming. It provides opportunities for developing country health and nutrition leaders to share experiences and information.

Participants identified major issues related to nutrition and primary health care, and prepared a series of specific, practical recommendations.

Major issues discussed were:
• potential advantages and disadvantages of integrating nutrition components into primary health care activities;
• criteria for selecting specific nutrition considerations and components;
• identifying target populations at high risk of malnutrition;
• methods for mobilizing and sustaining participation;
• nutrition training requirements for primary health care workers; and
• operational research.

Plans are under way for a follow-up workshop on nutrition in primary health care for West African nations. Full proceedings are being prepared and will be available soon. A summary of the conference proceedings is available from AID, Science and Technology Bureau, Office of Nutrition, Washington, DC 20523.

VOLUMES OF BUSINESS: U.S. firms' overseas activities in 221 nations are comprehensively covered in the 10th edition of Uniworld Business Publications, Inc.'s directory. *The Directory of American Firms Operating in Foreign Countries* presents valuable information on the subsidiaries, branches, divisions, and affiliations of 3,200 firms with overseas operations.

The directory, the first since 1979, has updated information in its three volumes. The set is priced at $150. To order, write Uniworld Business Publications, Inc., 50 East 42nd St., New York, NY 10017.

FEET FETE: John Parry, a consultant to the United Kingdom's Building Research Establishment, has made the back-breaking, messy chore of crushing clay for brick-making easier. He has developed, with help from the Intermediate Technology Industrial Services, an affordable machine to replace crushing by foot. Not only does the device save a lot of drudgery, writes John Madeley in *Development Forum*, it can crush 8 tons a day—enough for 5,000 bricks. That's compared to one ton crushed by foot.

Four people operate the machine, which is based on the pendulum principle. One person feeds clay into a container at the top. Two people swing the pendulum to and fro, causing a circular crushing head to grind the clay into fine particles, ready for brick-making. Oversized lumps not broken by the grinding heads fall out of a shoot to be returned to the feed hopper.

The machine is easily maintained. The "teeth" on the circular grinding head, the most likely parts to wear out, are ordinary nuts and bolts which can be taken off and replaced by new ones from local markets. The crushed clay made by the machine can be used for making pipes, tiles, or pottery.

For more information, write Intermediate Technology Workshops, c/o J.P.M. Parry and Associates Ltd., Corngreaves Trading Estate, Overend Road, Warley, West Midlands B64 7DD, U.K.

TURNING A PROFIT: African governments are cautioned against creating state-owned or managed food-marketing bodies to prevent oligopolistic private sector food trading practices. Reason: there is little evidence that such oligopolies actually exist. (An oligopoly is a market situation in which a few producers control the demand from many buyers.)

That's the observation of Abe Waldstein of AID's Rural and Institutional Development's small farmer marketing access project. Waldstein shared his views with the Society for International Development marketing work group in a recent talk on "Where is all that food storage we hear so much about anyway?" He told the group that many African governments assume that traders stockpile food acquired cheaply after the harvest. The traders supposedly then sell at inflated prices when food becomes scarce.

But according to Waldstein's field work in Niger and Rwanda, what actually happens is quite different. Trading is mainly a part-time activity by people looking for a quick return on surplus cash. Because there are many traders, competition is keen. Because competition makes market conditions difficult to predict, large-scale storage is risky. Also, storage and security costs for large amounts of food in private warehouses are high.

In light of these findings and the fact that traders best serve their interests by rapid turnover of stock, Waldstein asks, where then is the storage?

In rural Niger, grain for long-term storage is kept in village granaries in small quantities. Within a village, staple food grains pass from household to household. At some point, a householder, for his own reasons, sells to traders in the national food staple marketing system. From there, transactions take place in relatively rapid succession to the consumer. The length of time it takes food staples to go from village to consumer is apparently more a function of the number of intervening transactions than it is of a group of traders manipulating the supply.

Waldstein's work suggests that national institutions can better protect the public by promoting easy entry into the trading profession. The more

traders there are, the harder it is for an oligopoly to get started. The greater the competition, the less likely that speculative hoarding and storage of food staples will be profitable, and the less likely that the consumer can be exploited by the traders.

GLOBAL IRRIGATION CENTER: To solve some of the problems plaguing irrigation systems, a consortium of fifteen governments and aid agencies are forming the International Irrigation Management Institute (IIMI). IIMI will conduct research, train specialists, and spread information on ways to ensure efficient and equitable water distribution. IIMI also will assess the environmental and health effects of irrigation projects. Although headquartered in Sri Lanka, the Institute plans to work with local organizations in other developing countries to carry out research and training. At least initially, the center will concentrate primarily on Asian countries. Center funding is projected at $12 million for the first five years.

BUSINESS IS BLOOMING in Colombia where 59,000 people depend on the international cut-flower trade for their livelihood. With earnings topping $120 million in 1982, it's the fifth-largest foreign exchange earner for the country. Only the Netherlands earns more from flowers, reports *South* magazine.

The United States is the major buyer, importing more than 70% of Colombia's pickings. Europe accounts for only 20% because transportation to market is difficult. Neighboring Latin American countries account for the remaining 10%.

The flower industry is backed by the Export Promotion Fund of Colombia, set up to boost nontraditional exports. The fund offers credit lines to set up nurseries and helps Colombian companies that want to export to new markets.

SURVIVAL IN A BIDONVILLE: Bidonville is a French term for a spontaneous community where bits and pieces of tin, wood, and cardboard are used for housing materials. One such bidonville in St. Martin, a neighborhood in the heart of Haiti's capital of Port-au-Prince, is the scene of a self-help housing effort spearheaded by the Haitian National Housing Office. The UN Development Program finances technical assistance provided by the Cooperative Housing Foundation. Capital inputs are provided by the UN Capital Development Fund.

A new Cooperative Housing Foundation study, *From Survival to Development: A Self-Help Approach to Community Upgrading*, looks at a squatter upgrading project in St. Martin. The story of St. Martin is significant in that it conveys lessons about effecting a squatter upgrading project under trying physical and socioeconomic conditions. The booklet, funded by AID, assesses the project after four years' effort in Haiti.

Progress in St. Martin has occurred gradually. Residents, along with government and other donors, have been working toward incremental solutions. As a result, better conditions of life are now available to former squatters as well as to future generations.

This is one case study in a series. Others include *African Enterprise: New Business in the Mountain Kingdom of Lesotho* and *Mansion in the Sky: A Lesson in Self-Help Housing from Bagonrone, Botswana.*

For a copy of the study, write the Publications Division, Cooperative Housing Foundation, 2501 M St. NW, Suite 450, Washington, DC 20037.

A VILLAGE WOMAN ASKED, "What can I do about the worms in the cabbage?" and so launched integrated rural development in the southern part of the Philippines' Negros Oriental province. The question was directed to Dr. Fe Sycip-Wale, who was running "mothers' groups" there to promote maternal and pediatric care.

"The person who asked that question was not even sure she should ask it," recalls Sycip-Wale. "She apologized that the question was not related to health, but stressed that it was very important to her. It was then I realized that if we were to respond to what the villagers really wanted we would have to help them in matters other than health."

That was in the late 1960s. Time, patience, commitment, and funds have seen the mothers' groups grow to parents' associations. The associations led to the founding in 1972 of the HAND—health, agriculture, nutrition, and community development—program at the Marina Clinic in the Negros Oriental town of Dauin. Today, the clinic is part of Silliman University's extension program in Dumaguete City. By 1982, about 260 people a month were being treated at the clinic.

While the main clinic is the most visible project in the HAND program, nine HAND outposts—tiny shack clinics erected by the villagers—have been the main outreach to rural communities. Permanent health workers are trained to handle complaints such as coughs and colds, give simple injections, and recognize serious ailments that should be referred to doctors.

The clinics are self-supporting, being funded in

most cases from cooperative stores staffed and managed by the villagers. Because of funding problems outposts in only four of the nine villages are fully active—paying medical workers and restocking medicine shelves from profits, according to Sycip-Wale.

The HAND program has been expanding. A pre-school program has been set up in Bolok Bolok. HAND continues to train traditional midwives, to develop drinking water projects for villages, and to promote the values of nutrition. HAND also enables villagers to discuss other problems with agricultural workers, nutritionists, social workers, and other staff at the clinics.

Since the first mothers' groups were launched, Negros Oriental has moved from the bottom rung on the "most depressed province" ladder to third from the bottom. Not a dramatic move, writes Goh Siew Ching for the International Development Research Center, but the work being done at the clinic and outposts plays its part—an important one—in such progress.

CORN BRED: A staple crop for at least 500 million people in developing countries, corn historically has been plagued with low protein content and, therefore, limited nutritional value. In the 1960s, however, researchers at Purdue University discovered "OPAQUE-2," a gene that considerably increases corn's lysine—a basic amino acid—content.

So started a remarkable scientific journey to breed high-yielding corn varieties with greater lysine content for developing countries. After 10 years of research, scientists at the International Maize and Wheat Improvement Center (CIMMYT) in Mexico have been successful. They have incorporated OPAQUE-2 in a hybrid corn, which greatly increases lysine despite differences in growing conditions in developing countries. During the early phase of this research, the gene for OPAQUE-2 depressed yields. Researchers have now been able to produce hybrids with OPAQUE-2 which yield equal to that of hybrids without this gene.

CHANGING SEASONS: Kabuli chickpea yields might be doubled by advancing the date of sowing from spring to winter. So say researchers at the International Center for Agricultural Research in the Dry Areas (ICARDA) in Aleppo, Syria. Yields up to 4,000 kilograms a hectare are possible from winter-sown crops. This should be a boost to chickpea-growing countries in West Asia, North Africa, and South Europe, where production has remained static over the past 30 years, reports the center.

Field trials show that freezing temperature and ascochyta blight disease are the two major problems faced by the winter-sown chickpeas. ICARDA has developed cultivars capable of overcoming both problems. One successful cultivar, ILC 482, was recently released for general cultivation. More work on winter cultivars is underway and promising material is being tested on farmers' fields in Jordan, Lebanon, Morocco, Syria, and Tunisia.

ICARDA and the University of Reading in the United Kingdom are studying the physiologic races of the ascochyta fungus responsible for causing blight on winter chickpeas.

The center also is working on developing tall cultivars of chickpeas suitable for mechanical harvesting.

Farmers in the ICARDA region are interested in the new practice of winter sowing. Estimates are that when experience in Syria spreads to other Middle East countries, chickpea production could rise to one million tons from the present 500,000 tons a year.

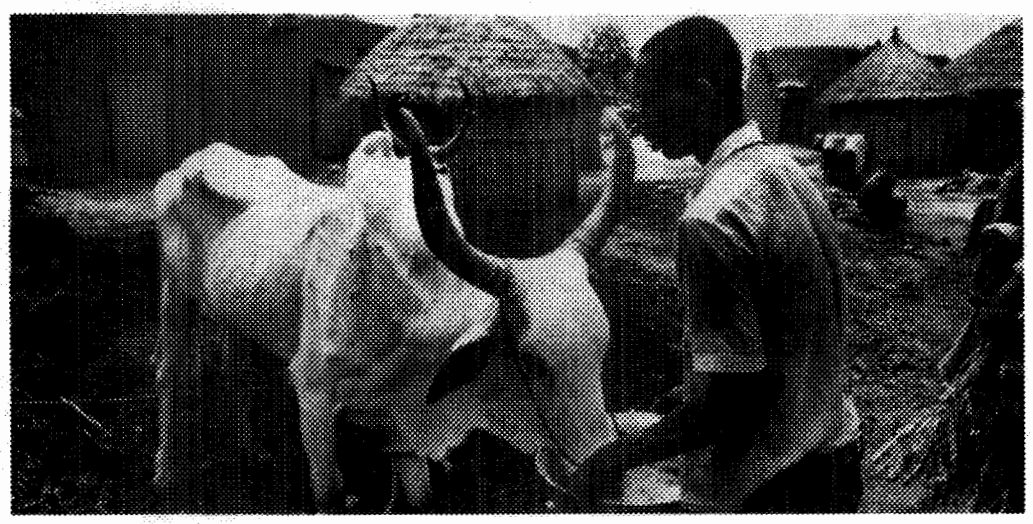
WOMEN-TO-WOMEN: A group of Moroccan women who graduated in 1982 from the Peace Corps' vocational education program wanted to start a small manufacturing business using their newly learned carpentry and welding skills. They needed some help getting started and turned to a Peace Corps volunteer. The volunteer got in touch with Peace Corps' newly formed women-to-women partnership program. The Moroccan entrepreneurs were then matched with the women's network of the Northern Connecticut Chamber of Commerce which provided financial support to launch their business.

This is just one example of Peace Corps' program which aims to assist women in developing countries while broadening U.S. participants' understanding of development issues. Here is how it works. A Peace Corps volunteer works with a group of Third World women to identify and solve their most pressing problems. Projects are determined on the basis of what the women decide they need most to help them feed, educate, or protect their families. A U.S. partner then provides all or part of the necessary financial support—full sponsorship is about $1,000—after every source of local assistance has been exhausted.

A film about the Peace Corps' women-to-women partnership program is available to interested groups. For more information contact the Peace Corps, Private Sector Development Office, 806 Connecticut Ave. NW, Washington, DC 20526; telephone (202) 254-8406.

Africa's Crisis Prompts Two-Pronged Plan for U.S. Assistance

Long-term decline in agricultural production compounded by a recent drought has critically reduced the food supply in much of sub-Saharan Africa. AID is responding to Africa's needs with a two-pronged plan which will address emergency food needs as well as its long-term economic crisis, announced Secretary of State George Shultz and AID Administrator M. Peter McPherson at a joint press conference last January. "The message is when people are hungry and dying, America responds," said Shultz.



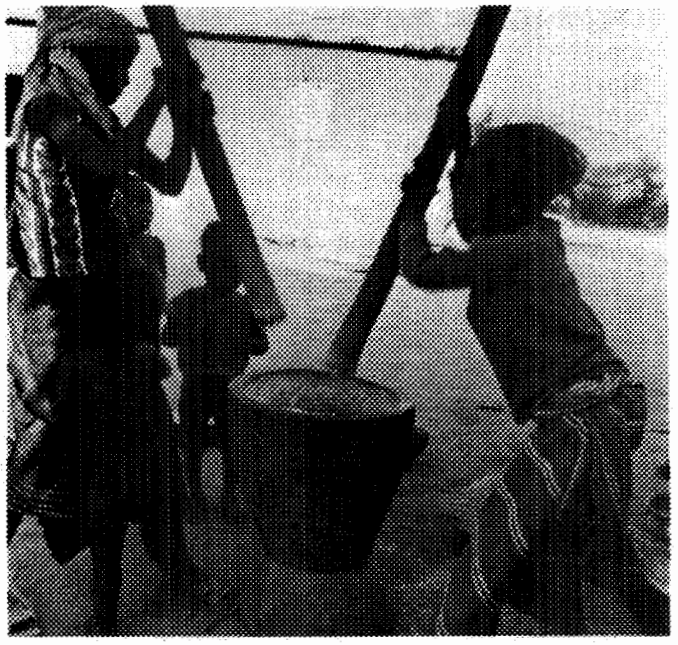
Africa needs emergency food aid and to alleviate constraints on agricultural production.

The Reagan Administration will ask Congress to approve a $90 million supplemental for fiscal 1984. The additional appropriations would fund a P.L. 480 Title II emergency food assistance program. Severe African drought has depleted most Title II food reserved for emergencies.

In the first four months of fiscal 1984, AID approved shipment of 218,000 metric tons of emergency food—a 38% increase in tonnage over the 157,000 metric tons distributed in the previous fiscal year. Part of the $90 million supplemental would cover the cost of an additional 215,000 metric tons that already have been requested or that AID's Bureau for Food for Peace and Voluntary Assistance (FVA) anticipates will be requested later this year.

Of the first quarter allotment, McPherson announced that 30,000 metric tons in immediate emergency food assistance, valued at $10.8 million, was sent to Upper Volta, Mali, and Zambia.

According to a recent UN Food and Agriculture Organization (FAO) report, southern Africa is suffering the worst drought in a century. "The stocks which had been accumulated in 1981, when crop growing conditions were more favorable, had cushioned the production shortfalls; however, by early 1983 these stocks had been used up in most of the affected countries," the report says.



Food stocks that accumulated when growing conditions were more favorable were used up by early 1983 in most of the affected countries.

Due to world recession and oil price increases, drought-stricken countries cannot now afford to cover shortages by importing food on the open market, according to the FAO report. Political instability and difficulties with food distribution also have added to the present crisis, FAO points out.

FAO estimates that 9 million people are suffering from severe malnutrition. In sub-Saharan Africa, some are starving. McPherson noted that per capita food production has declined 20% in the past 20 years and African caloric intake also has dropped.

Twelve countries have requested emergency food assistance that cannot be provided without the sup-

plemental. They are Benin, Chad, Ethiopia, the Gambia, Guinea-Bissau, Mali, Mauritania, Senegal, Somalia, Upper Volta, Zaire, and Zimbabwe.

"In Senegal, the food problem is not the result of mismanagement but severe drought—particularly on its northern tier," said Catherine Gordon of FVA's Food for Peace Title II office. Gordon accompanied Sen. John Danforth (R-MO) and Congressional staff on a recent fact-finding trip through Africa's drought-stricken areas. "We saw large meteor-like craters that turned out to have been lakes at one time," she reported.

The Office of U.S. Foreign Disaster Assistance will provide $2 million to CARE to help with inland transportation for food distribution in Mozambique. "Given the poor transportation infrastructure in Africa," reported McPherson, "it is important that AID work closely with these organizations to ensure the delivery of the food."

To improve the long-term outlook of the African economy, AID plans to request Congress to authorize funds for a $500 million, five-year Economic Policy Initiative (EPI) program above current funding plans. In the fiscal 1985 budget, the Agency requested $75 million for the program.

With Congressional approval, AID will begin considering African nations eligible for EPI funds. "This money will be directed to those countries which have indicated a willingness and ability to implement comprehensive growth-oriented policies," said McPherson. A second feature of EPI will aim at strengthening donor coordination to provide broader support for policy reform, according to the Administrator.

EPI funds would be used to help carry out reform at a sectoral level, particularly in agriculture. Funds might be used, for example, to strengthen the private sector's capacity to market crops in a country where government-controlled marketing boards have dominated, according to a statement by AID Assistant Administrator for Africa Frank Donatelli before the House Foreign Affairs Subcommittee on Africa in February.

"The United States is inviting other donors and institutions to join us in the EPI effort," said McPherson. "Increased donor coordination should help African governments develop more comprehensive approaches to the range of their short-, medium- and long-term economic problems and objectives. The World Bank is willing to play a leadership role in this effort. The EPI will help to improve other bilateral and multilateral assistance programs by being a catalyst."

Said Donatelli, "We believe the time has ripened for the Economic Policy Initiative. Even though Africa's economic performance has deteriorated in the recent past and a large number of countries face extremely serious macroeconomic problems, we see reasons for optimism about Africa's prospects over the next several years," the Assistant Administrator said.

"The very recognition of the crisis provides reason for optimism," Donatelli continued. "It shows that African countries have become increasingly aware of the need for massive changes in the way they conduct their economic affairs. We have begun to see a significant shift in policy in countries that only a year or two ago we would have considered intransigent. The next few years will be crucial in determining whether Africa can set the stage for sustainable economic growth after a generation of false starts. The request for a special authorization for EPI demonstrates our commitment to Africa at this critical turning point." ■

This article was prepared by Paul Olkhovsky, staff writer in AID's Bureau for External Affairs.

AID Submits Budget for Fiscal 1985

President Reagan on Feb. 17 submitted to Congress legislation to carry out the Administration's $11.9 billion foreign assistance program for fiscal 1985. The program is contained in two separate bills which would mean significant new assistance for Africa and Central America. One legislative package would authorize appropriations for economic and security assistance programs worldwide—except for Central America.

All assistance for Central America is contained in a separate piece of legislation, the Central America Democracy, Peace and Development Initiative Act of 1984. This bill would authorize supplemental appropriations for fiscal 1984, as well as specific authorizations for fiscal 1985 and a general authorization for fiscal 1986-89.

The larger of the two bills—the worldwide bill—authorizes a total of $10.7 billion for fiscal 1985, of which $1.41 billion is for AID's functional development assistance accounts and the Sahel, $2.8 billion is for the Economic Support Fund (ESF), and $398.1 million is for operating expenses.

Figure 1 provides an account-by-account comparison of:

- Fiscal 1984 continuing resolution levels (including aid for Central America).
- The amount requested for fiscal 1985 (excluding Central America).
- A separate column outlining the 1985 request for Central America.

The fiscal 1984 supplemental appropriations request of $634 million for Central America is shown in Figure 2.

Increases over 1984 continuing resolution levels are being proposed for each functional account. The largest increases are for Selected Development Activities (SDA) and Agriculture. Taking both the Central America and worldwide bills together, SDA totals $236.2 million—an increase of $95.9 million. Agriculture ($752.6 million) reflects a total increase of $27.5 million.

BILATERAL ASSISTANCE

Figure 1
($000,000)

Account	FY 1984 Continuing Resolution*	FY 1985* Request	FY 1985 Central America
Functional Development Assistance	1,419.9	1,312.9	272.8
Agriculture, Rural Development & Nutrition	725.1	682.8	69.8
Population	245.0	235.0	15.0
Health	143.0	118.1	40.0
Education & Human Resources	126.5	124.8	64.0
Selected Development Activities	170.3	152.2	84.0
Science & Technology	10.0	(10.0)	–
Sahel Program	103.0	97.5	–
EPI	–	75.0	–
Operating Expenses	361.5	398.1	6.0
Disaster Assistance	25.0	25.0	–
American Schools & Hospitals Abroad	30.0	10.0	–
Economic Support Fund	3,183.7	2,797.5	640.6
Housing Guaranty Reserve	–	–	10.0
Military	2,135.6	5,829.5	255.9
Other Agencies and Activities	–	144.0	69.6
Subtotal		**10,689.5**	**1,254.9**
Grand total		**11,944.4**	

*Includes proposed supplemental amounts contained in the fiscal 1985 worldwide budget request bill.
*Contains no request for Central America.

Figure 2

Central America Supplemental Fiscal 1984
($000,000)

Functional Development Assistance	73.0
Operating Expenses	2.5
Economic Support Fund	290.5
Peace Corps	2.0
USIA	7.0
Military	259.0
Total	**634.0**

As was the case in fiscal 1984, AID proposes using up to $20 million of funds authorized for development assistance for the Private Sector Revolving Fund. The fund was authorized in the fiscal 1984 continuing resolution.

The regular fiscal 1985 authorization (worldwide) bill also authorizes $75 million for an Economic Policy Initiative (EPI) for Africa to assist countries that are willing to undertake growth-oriented policy reforms necessary for economic development. (See article on page 5.)

EPI funds are not earmarked by functional account, nor are beneficiary countries designated by statute. It is anticipated that the EPI will be a multiyear effort involving coordination with the World Bank and other donors.

Other elements of the worldwide bill include:

- A proposal that eliminates the Congressional notification requirement for development projects when the proposed fiscal year obligation would not exceed the amount shown in the Congressional Presentation by more than 10%.
- A proposal to continue authorization to Sept. 30, 1985 of the Agricultural and Productive Credit and Self-Help Community Development Program (Section 222A of the Foreign Assistance Act).
- A proposal to increase from $2 million to $3 million the amount of funds that can be used to assist disadvantaged children in Asia (Section 241 of the Foreign Assistance Act).
- A proposal to remove the People's Republic of China from the list of communist countries now excluded from U.S. foreign assistance (Section 620(f) of the Foreign Assistance Act).
- A proposal that AID be authorized to borrow funds from the Treasury for the reserve fund of the Housing Guaranty Program if the working level of that fund declines to a level inadequate to meet potential claims against it.

The Central America bill contains most of the recommendations of the National Bipartisan Commission on Central America. It is designed to promote the establishment of a long-

term framework to build democracy, restore peace, and improve living conditions in Central America. It authorizes a total of $7.7 billion in economic assistance for fiscal 1984 through 1989. An additional $600 million in guaranties authorized in other legislation, such as the Export-Import Bank Act, also forms a part of this comprehensive economic assistance package for Central America. Fiscal 1984 and 1985 military assistance for the region totals $514.9 million.

The bill represents not only a multiyear, but also a multi-agency effort to address the economic problems of Central America. Such agencies as the Export-Import Bank, the U.S. Information Agency, Peace Corps, the Overseas Private Investment Corp., and the National Endowment for Democracy will play roles in this comprehensive program.

The bill contains an in-depth statement of policy and findings that recognize both the need for significantly greater amounts of economic assistance and the interrelationship of economic, political, and security considerations in order to achieve a democratic and economically secure Central America. The bill reflects the commission's support of certain basic principles in the economic development of Central American countries:

- Growth-oriented economic policies are fundamental to increased production, investment, trade, and regional cooperation.
- Similarly, increased participation and promotion of the private sector, and the creation and strengthening of private and public sector institutions are all necessary to provide the people of the region with the tools for development.
- The issues of hunger, health deficiencies, infant and child mortality, population growth, illiteracy, underemployment, and financial instability are related to each other. Each must be addressed if equitable economic growth is to occur.

In addition to the fiscal 1984 supplemental and fiscal 1985 requests for Central America, the bill authorizes $1.2 billion for each of fiscal years 1986 through 1989 for non-military assistance for Central America. The particular funding accounts or agencies that would receive these funds would be determined by the President at a later date.

In addition, the Central America bill contains several substantive provisions aimed at administration of justice, land reform, and trade credits, as well as suggesting the establishment of a Central American Development Organization (CADO).

The bill authorizes using up to $20 million in each fiscal year for a program designed to strengthen the administration of justice in Central American countries and the Caribbean. The program would provide technical assistance, training, and material resources to strengthen the courts, prosecutors, justice ministries, law schools, and bar associations to carry out their functions in a manner that contributes to increased respect for the rule of law.

In fiscal 1984, the program would expand activities already under way. These include a scholarship program for specialized gradnate studies in criminal, administrative, and agrarian law at the University of Costa Rica and a regional training program for judges.

The program also would support development of specific plans and programs in several countries in Central America and the Caribbean, facilitated by ILANUD, a UN-affiliated, Latin American regional institution whose primary purpose is to seek improvements in the criminal justice systems of Latin American and Caribbean countries.

With regard to land reform, the bill amends section 620(g) of the Foreign Assistance Act to authorize the use of foreign aid funds to compensate a country's citizens, in accordance with a land reform program, if the President determines that such assistance would be in the interest of the United States.

The provision builds on a similar measure adopted by the House Foreign Affairs Committee during markup of last year's foreign assistance bill. At that time, the committee agreed, in the context of the land reform program in El Salvador, that compensating owners for expropriated property was permissible. The provision proposed in the Central America bill would not be limited to Central America.

In view of the difficulty that many Central American importers have in obtaining short-term trade credits, the bill authorizes a new Trade Credit Insurance Program. Under this program, ESF funds would be used to guarantee U.S. lenders in cases where the risk of loss or non-payment is such that the Export-Import Bank would not be able to guarantee the loan.

Finally, the bill encourages the President to enter into negotiations with representatives from Central American countries to establish a CADO. The organization would be comprised of public and private sector representatives from those Central American countries committed to progress on human rights, building democratic institutions, and encouraging economic growth through policy reforms.

CADO would meet periodically to make recommendations concerning political, economic, and social development objectives; mobilization of resources and external assistance needs, and reform of economic policies and structures. One of its functions would be to monitor country performance in these matters. ■

This article was prepared by Robert Lester, AID's assistant general counsel for legislation and policy. John Wilkinson of AID's Bureau for Program and Policy Coordination's Office of Planning and Budget also contributed to this article.

tracts. They also help AID bureaus and missions carve a role for small and minority businesses in AID projects and recommend possible firms.

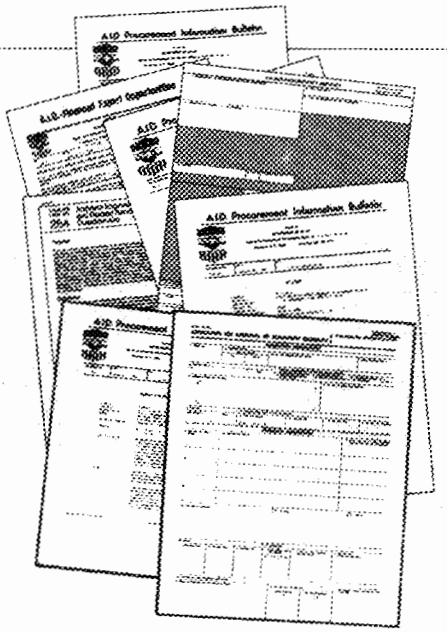
Last year, OBR reorganized to improve its service and to better carry out the Gray Amendment, a legislative mandate requiring that 10% of AID's total fiscal year 1984 development assistance budget be earmarked for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, and minority-managed private voluntary organizations. AID is in the process of implementing the amendment.

"AID is making great strides in carrying out the Gray Amendment," says Barbara Otis, OBR's director, "and OBR's organizational responsibility has been heightened to ensure Agency implementation and compliance with its mandate."

Annual goals for participation in AID contracting by small and disadvantaged businesses are developed by OBR in conjunction with various AID bureaus and offices. OBR monitors the progress toward these goals and reports to the Small Business Administration. To help the Agency meet its goals, OBR set up the early alert system.

The early alert system identifies, at the project design stage, contract opportunities for small, minority, and women-owned firms, thus increasing their potential for participation in a wider range of AID-funded projects and programs.

"Many small and minority firms have not been involved internationally. They are generally inexperienced when it comes to living overseas, and many do not have sufficient language capabilities or financial assets necessary for effective operations," explains Otis. "Being involved at the project design stage gives OBR time to alert firms of potential opportunities one to two years in advance. Its a great advantage in that it gives small and minority firms the time they need to prepare in order to compete on the international market."



An integral part of the early alert system is the AID Consultant Registry Information System (ACRIS). ACRIS is a newly automated registry—by industry and service—of technical service contractors. From this data base, OBR compiles source lists that support its recommendations for small and minority business participation in AID-financed projects. The data in the ACRIS system—which clearly shows the firms' capabilities— illustrate the existence of such firms able to meet project and program requirements and strengthens OBR recommendations. OBR plans to promote ACRIS to better inform the small and minority business community of opportunities at AID.

Informing U.S. suppliers of export opportunities resulting from AID loans and grants to developing countries also is a focus of OBR's operations. Some 5,000 U.S. suppliers are kept informed of formal and informal AID-financed public sector commodity and project procurement opportunities. U.S. suppliers are kept up-to-date on changes in procurement requirements and Agency regulations. In addition, OBR's automated supplier system for export trade, or ASSET, lists 33,000 U.S. businesses that are available to do business with AID missions and host country governments and businesses.

Counselors are the cornerstone of OBR's network of support services. Using automated systems in tandem with various other Agency materials, OBR counselors guide their constituencies through the Agency systems and acquisition procedures. Counselors introduce new firms to the Agency. They also identify and solve problems encountered in the acquisition process.

The Minority Resource Center's mandate is to meet the specific needs of minority firms. The MRC staff helps formulate AID policy and procedures, provides information and guidance about AID technical service contract opportunities, participates in conferences conducted by minority associations, and identifies minority firms able to take part in AID projects.

OBR oversees AID's participation in technology fairs to determine if they are a cost-effective way to transfer appropriate technologies. OBR also supports the World Trade Institute, particularly its educational and training components.

This year OBR will conduct a series of conferences throughout the United States to educate small and minority business on what it takes to do business with AID and in developing countries. The conferences will include information about purchasing activities and international assistance carried out by AID and other organizations, including the World Bank, Export-Import Bank, Overseas Private Investment Corp., and the Trade and Development Program.

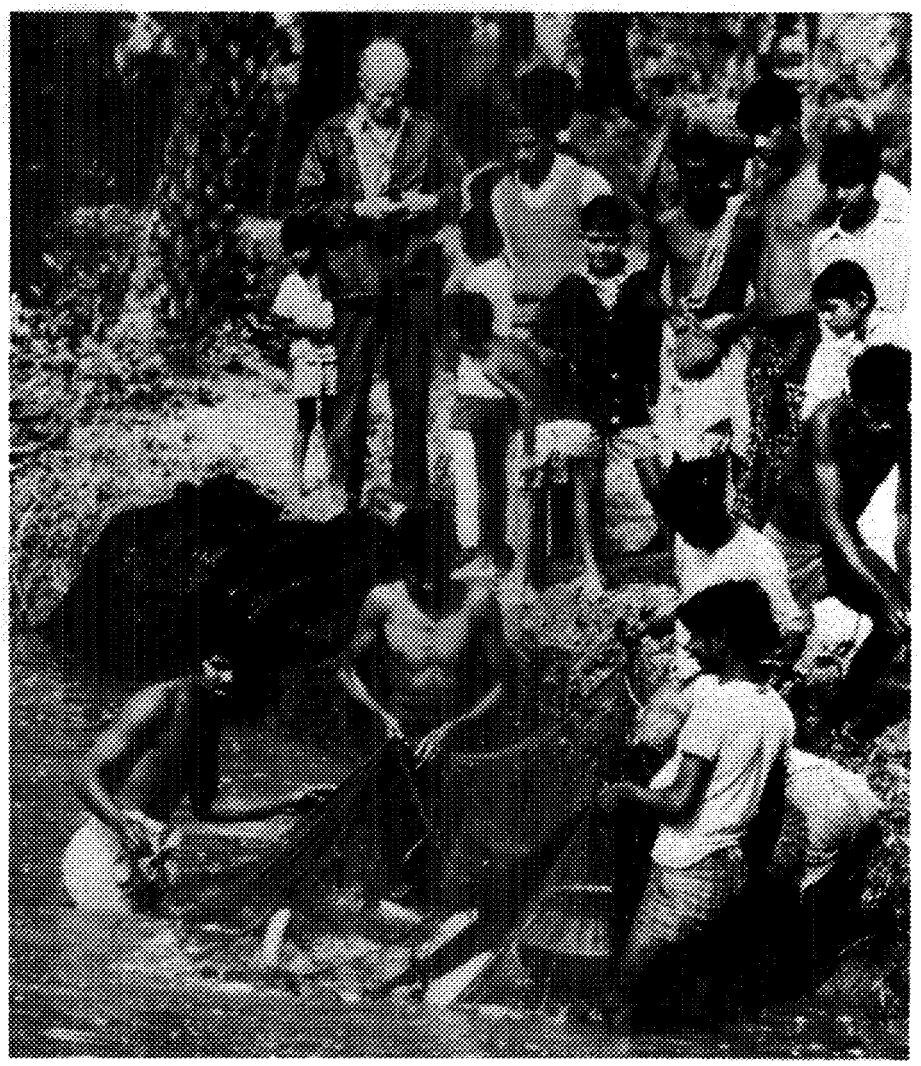
For information about international trade opportunities, or for conference dates, write AID/PRE/OBR, Room 648, State Annex 14, Washington, DC 20523, or phone (703) 235-1720 or (703) 235-1840. ■

AID and U.S. Universities Collaborate on Fisheries Research

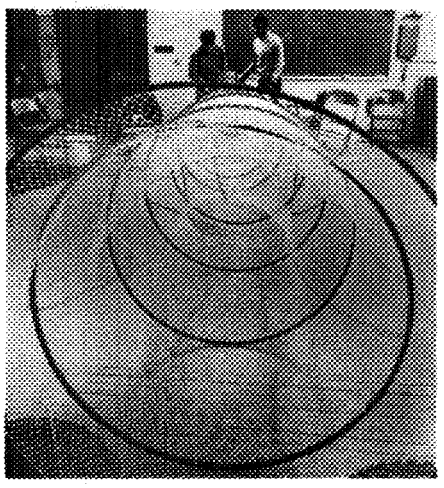
AID's long-term support of fisheries research to help develop protein sources for developing countries continues with help from U.S. universities. AID missions and Washington regional bureaus support fisheries programs through various means. Auburn University and the University of Rhode Island, for instance, have cooperative agreements with AID to provide technical assistance and training for developing country nationals. Oregon State University is the principal contractor of a Cooperative Research Support Program (CRSP) on pond dynamics; the University of Maryland is leading the development of a CRSP for stock assessment technology.

Fish are an important protein source and are a staple food in many developing countries. Native artisanal fishermen annually catch half the world's production of 72.5 million metric tons. Fish were once considered the ultimate source of food for an ever-increasing world population. Yet now it is apparent that the seas can produce only 100 million metric tons a year. The seafood supply for developing nations can be increased, however, through aquaculture, proper management of existing aquatic resources, and better handling techniques. Half the catch in tropical countries, for example, is lost because of spoilage and other factors.

Aquaculture, or fish farming, shows increasing promise. The greatest food yield from aquaculture is with fresh-water fish—carp and tilapia, a ubiquitous species native to Africa but grown with great success worldwide. Auburn researchers have shown that four crops of tilapia can be produced annually yielding up to 9,000 kilograms a hectare to make fish farming a real contributor to a developing nation's economy.



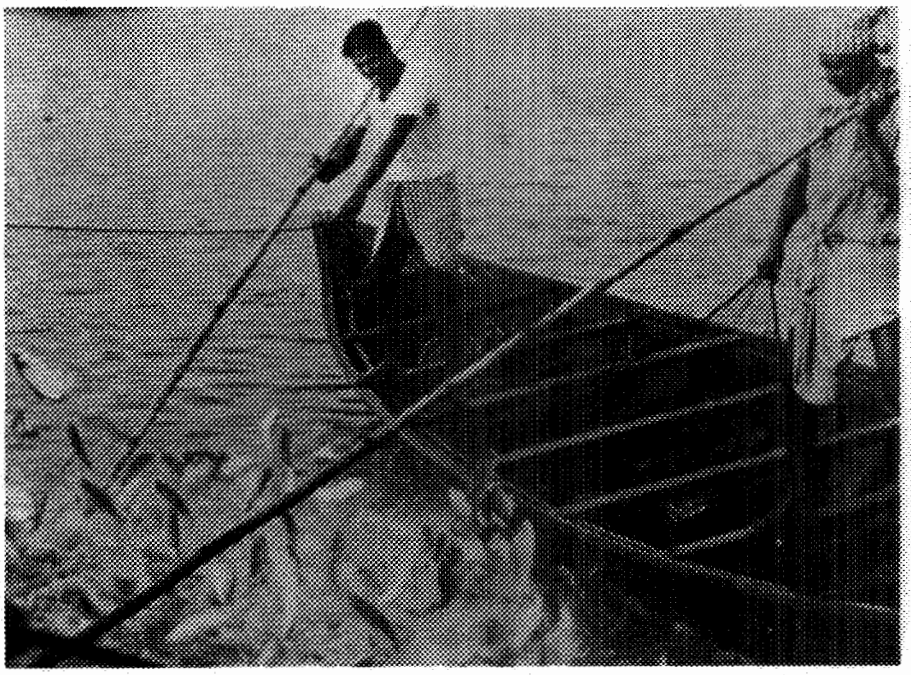
Auburn University's John Richard Snow evaluates an inland fisheries project in India aimed at improving fish culture, methodology, and marketing.



A student from Guinea-Bissau learns how to construct a fyke net at the University of Rhode Island.

Auburn University provides training and assistance, mainly in tropical aquaculture. More than 50 foreign nationals are in graduate programs at Auburn's International Center for Aquaculture. Also offered is an annual 15-week special techniques course in aquaculture.

Oregon State University coordinates research in pond dynamics. Collaborators include the University of Hawaii, working in the Philippines; Auburn in Honduras and Panama; Michigan State University

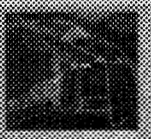


Aquaculture, or fish farming, is a promising source of food and income for developing countries.

in Indonesia; Oregon State University in Rwanda; and the University of Michigan in Thailand. The group has prepared a state-of-the-art document, "Principles and Practices of Pond Aquaculture," available from Oregon State University.

The University of Rhode Island provides technical assistance and training in marine fisheries. The university's International Center for Marine Resource Development helped several African countries develop marine fisheries strategies. Guinea-Bissau, for example, received advice on harvesting and processing little used products, such as the triggerfish. Skinned, smoked, and properly packaged, triggerfish (*Balistes*) have commercial potential and can provide large amounts of fish protein for West Africans. (See article, p.30.)

Other U.S. universities have AID fisheries research projects which AID's Bureau for Science and Technology helps manage. The Agency's Science Advisor sponsors innovative projects such as a giant clam culture study by the University of California at Santa Barbara. The project studies ways to enhance giant clam populations in areas where stocks have been depleted because of overfishing for food or for sale in curio shops. The University of Michigan is completing a project to help strengthen aquaculture capabilities in Southeast Asia, concentrating its efforts in Thailand. ■



Though it has been practiced for centuries, aquaculture as a science is less than 100 years old. *Fish Farming Research* by E. W. Shell, head of Auburn University's Department of Fisheries and Allied Aquacultures, takes a look at the application of the scientific method to fish farming research. Shell emphasizes research on the production of fish in earthen ponds and solving farmers' problems. He also discusses other aspects of aquacultural research, such as administration and staff motivation.

Fish Farming Research is available in paperback for $6.00 from the Department of Fisheries and Allied Aquacultures, Auburn, AL 36849.

Funding for the book was provided by AID's Bureau of Science and Technology, Office of Agriculture.

BIFAD IN BRIEF

"A Guide to Title XII and BIFAD" is a new publication of the Board for International Food and Agricultural Development. It explains what AID and the universities are doing to carry out Title XII legislation. Passed by Congress in 1975, Title XII calls for strengthening the role of universities in the international network of agricultural science and development.

BIFAD brings together AID and U.S. universities to carry out the programs authorized by Title XII. The Board is responsible for increasing university involvement in AID, for strengthening university capabilities, for facilitating cooperation in research, and for monitoring Title XII projects.

Copies of the pamphlet are available from BIFAD, Room 5318, Washington, DC 20523; telephone (202) 632-9048. ■

Innovative Study Looks at PVO-Assisted Small Enterprises

By Judith W. Gilmore

Small enterprises are major contributors to overall economic growth in developing countries. This is one of the key findings of a comparative analysis of AID-funded microenterprise lending projects carried out by private and voluntary organizations (PVOs). These findings refute commonly held misconceptions about PVOs—that they are "do-gooders" and cannot help promote profit-making activities. On the contrary, PVOs are particularly well-suited to carry out projects to help small entrepreneurs.

During fiscal years 1982 and 1983, AID's Bureau for Food for Peace and Voluntary Assistance (FVA) evaluated several small enterprise projects involving the following PVOs: Accion International/AITEC, Partnership for Productivity, Institute for International Development, Opportunities Industrialization Centers International, and Technoserve. FVA was interested in understanding the strengths and weaknesses of current implementation strategies, their cost-effectiveness, and the comparative advantage of PVOs in this sector. While each PVO had its own approach to the design and implementation of these projects, there were, nevertheless, many commonalities.

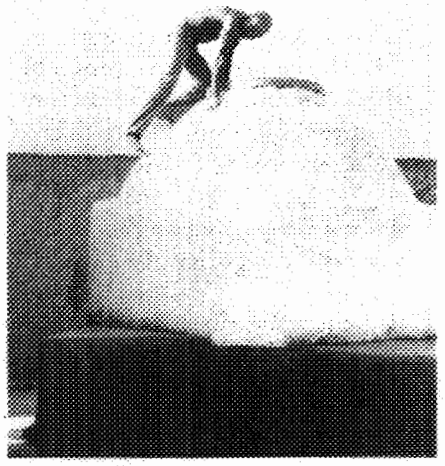
Searching for Benefits by economist Peter Kilby, with the assistance of David D'Zmura, is an AID-funded comparative analysis of PVO project evaluations and other studies of government and multilateral programs. Using secondary sources, the authors adapt standard benefit/cost methods to assess the impact of small enterprise projects on individual firms and the broader marketplace. The report notes what has worked and what has not in projects in Brazil, Dominican Republic, Honduras, Peru, and Upper Volta, and concludes that many of the projects are contributing significantly to their country's growth.

Santo Domingo's cargo vendors form "solidarity groups" to get loans to buy tricycles. Dominican Development Foundation set up the loan program with a grant from AID and technical assistance from Accion International/AITEC.

Kilby's findings were presented at a workshop in November 1983 and produced a healthy debate. FVA expects continuing discussion of the issues presented in the report.

A Profile of Small Enterprises

Small enterprises provide part- or full-time employment for many non-farm laborers in developing countries. These one- to five-person operations—found in villages and towns—use simple artisan technology, frequently working in make-shift quarters with an investment ranging from a few hundred to a few thousand dollars. They operate in the areas of services, transportation, manufacturing, and trading. Because of their large numbers, relatively modest incomes, and lack of access to scarce developmental resources, small entrepreneurs are good candidates for AID assistance.



With Partnership for Productivity's assistance, Upper Voltans have made granaries rat proof and airtight.

A household may undertake many commercial activities. In addition to the small business funded by the project, the family may also farm, trade other goods, or produce other crafts. It is the interchangeability of capital and labor between the family firm's diversified activities that keeps the small business alive. This also makes it difficult to evaluate lending projects because of the problems in estimating benefits from non-designated uses of project funds.

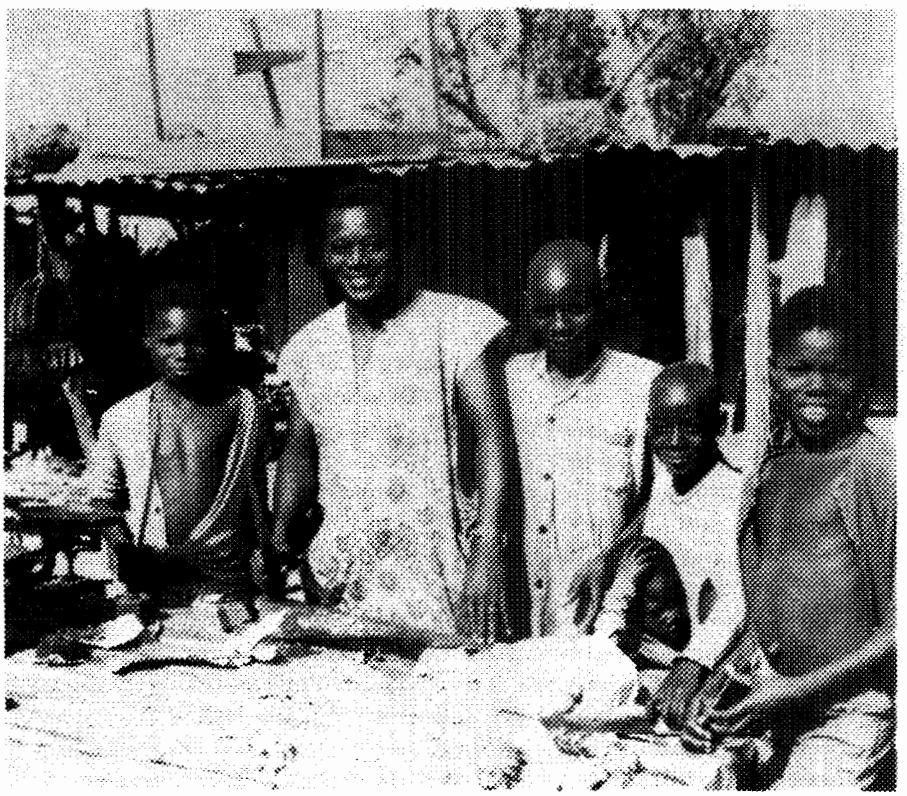
Measuring Project Performance

One of the major results of Kilby's work is the pioneering approach he developed to measure small enterprise projects. Kilby's benefit/cost framework recognizes three levels of analysis: a financial analysis of the lending institutions; a financial

analysis of the individual small businesses; and an economic analysis of the benefits of the projects locally, regionally, or nationally.

Rather than measuring the individual lending projects in conventional terms such as loan default levels and project sustainability, Kilby looks at performance in terms of impact on the country's overall economy. He takes into account economic activities supported, location of project, type of delivery system, extent of complementary technical assistance, and the special role of PVOs.

The innovation lies in the technique of estimating the upper and lower limits of benefits in terms of returns to the individual firms and contribution to the economy at large. The "most likely" value is then determined by taking into account environmental factors, such as the influence of a new road or a balance of payments crisis, equity concerns, or possible biases in the data. FVA will be testing this and other methodologies in future evaluation work.



A loan from Partnership for Productivity helps Thombiano Yempabou, a butcher in Upper Volta, buy top quality animals. Other butchers have been lowering prices or buying better quality meat to compete with him.

Lessons Learned

Some of Kilby's findings are:

1. All the projects are profitable with economic returns on investment ranging from 19% to over 200%. According to Kilby, these rates of return place microenterprise lending projects among the most successful categories of foreign aid programs.

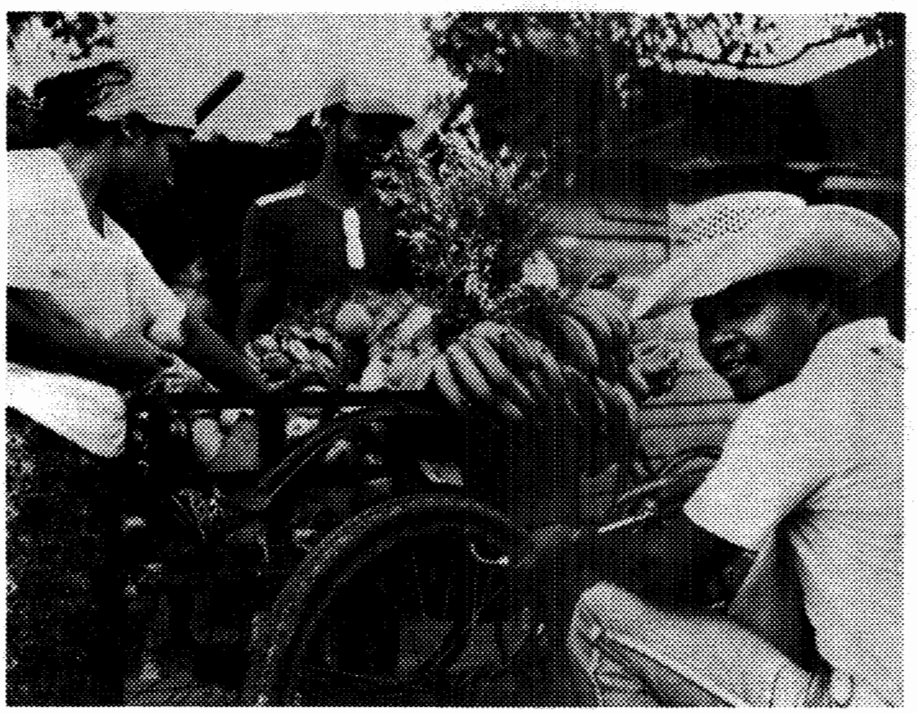
2. When measured in conventional financial terms, the lending projects, in general, are not self-sustaining. That is, the income earned from interest paid on the loans does not exceed expenses or loss to inflation. Indeed, in only one case, the Rural Development Fund Program of the Industrial Bank of Peru, does the interest income fully cover administrative costs. The lesson to be drawn is that small enterprise lending projects generate substantial economic benefits even though they are not self-sufficient or totally financially viable—at least in the short-term.

3. It is normally the impact of a project beyond the assisted firms that determines its ultimate economic success or failure. When looking at the benefit-cost ratio of projects with extremely high performance levels, benefits resulting from increased production within the firms that have received loans are more than sufficient to cover costs. In cases where wages and profits do not outweigh costs, it is critical to factor in economic benefits that occur outside the assisted firms in order to evaluate the overall success of the project.

These external economies include: more business for other firms as raw materials and inputs are purchased (called backward linkages); additional demand for consumer goods, or income multiplier; and, in some cases, reduced prices to consumers (called consumer benefits) because of increased competition.

There is an important lesson for project design with respect to the backward linkages and consumer benefits. Because retail trade businesses do not normally buy raw materials or other inputs, they generate less economic benefits than other firms. Therefore, projects that provide fewer loans to trading firms will be more successful. For example, in Honduras where the largest share of available financing was directed to non-retail operations, backward linkages were equal to 58% of project cost. By contrast, in the Dominican Republic where a high percentage of loans was distributed to vendors, backward linkages covered only 10% of total project cost.

Institutions lending to small firms located near each other—boosting competition—have a higher benefit-



The informal sector employs many urban workers and supplies a surprisingly large amount of goods and services.

cost ratio. Consumer prices are reduced only where the small enterprises make up a significant proportion (say 20%) of the suppliers in the market in which they compete. In the case of Upper Volta, where substantial loan activity in two remote villages generated a significant increase in competition, savings to consumers equalled 89% of project cost. In Honduras, Brazil, and Peru, consumer benefits were negative. In these countries, microenterprises receiving loans were dispersed and accounted for only a small part of the total supply in their areas. As a result, they did not foster sufficient competition to stimulate price reductions.

4. High rates of inflation seriously affect project performance. In most cases where inflation is over 40%, governments or PVOs are reluctant to charge interest on loans equal to the rate of inflation. Negative real interest rates impose a heavy cost to the lending institutions. In Brazil, for example, capital erosion (the real cost of capital in terms of purchasing or production power) during 1981 was more than double the cost of administering the project. At the same time, negative real interest rates reduce measurable benefits because borrowers may use loan proceeds for non-productive inflation hedges.

5. Small enterprise loans yield benefits during belt-tightening periods as well as in periods of rising demand. However, benefits to the overall economy are greater during expansionary periods. When there is more demand for goods or services, wages and production are higher, and it is less important to reduce costs within the firm to have a profitable enterprise.

6. Simple loan delivery systems are the most cost-effective. This is because they involve relatively few visits for the entrepreneur, do not require that his past business performance be extensively documented, and do not attempt an in-depth analysis of how he proposes to use the funds. Loans can, therefore, be processed more quickly, providing greater benefits to borrowers. Strict policies of repayment are essential and, if necessary, Kilby recommends using the law courts as a recourse. Other incentives for prompt loan repayment include the prospect for future loans, loss of national consumer credit standing, and the use of collateral.

7. Kilby's findings on technical assistance are mixed. Even though technical assistance is a way to strengthen the borrowers' managerial and technical skills, the comparative analysis of these projects shows that such assistance did not reduce the cost or permit more rapid expansion for most small enterprises. In Brazil, for example, where 30% of project expenditures were devoted to management training seminars and teaching bookkeeping skills, no perceptible change in the microenterprises' behavior was observed. On the other hand, management assistance appears useful in preventing the failure of new firms and for assisting larger microenterprises which are involved in major organizational changes or expansion. In the Dominican Republic, the most profitable firms were those most likely to have adopted improved management practices.

8. While PVOs are not the only agencies to design and carry out successful microenterprise projects, they do have an impressive comparative advantage in this area. Some attributes are: experience, strong motivation to work at the local level with the poor and unorganized, a good reputation with beneficiaries, distance from local political pressures, and a strong cost advantage gained by using expatriate and local personnel.

Copies of the paper and the report of the workshop on small enterprise development are available from AID/FVA/PPE, Room 205, SA-8, Washington, DC 20523. ■

Judith W. Gilmore is chief of the evaluation unit in AID's Bureau for Food for Peace and Voluntary Assistance.

BUILDING FOR A HEALTHY TOMORROW

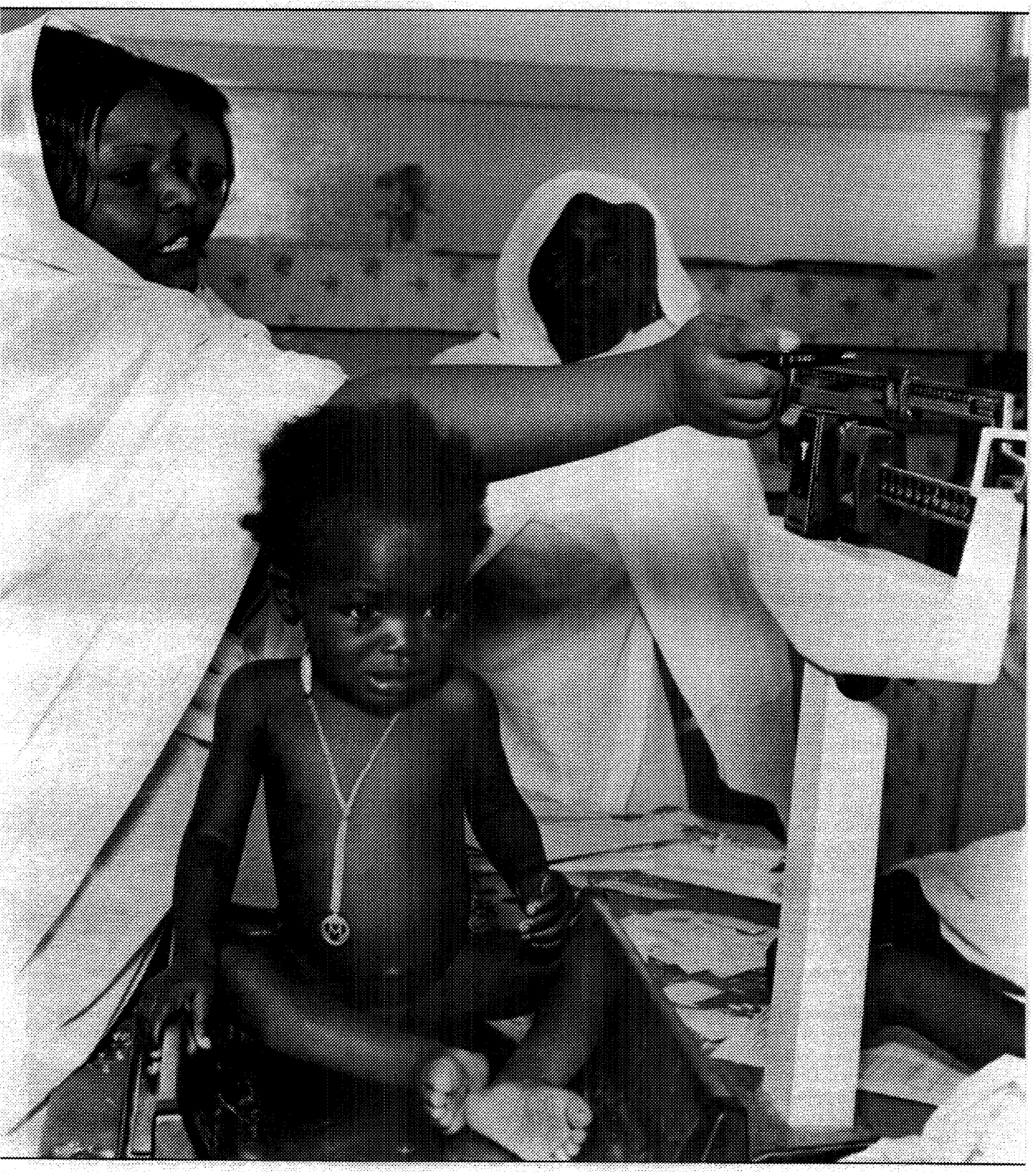
A basic package of proven, cost-effective technologies delivered by primary health care programs is the heart of AID's health strategy.

By George Carlin

On April 7, nations throughout the world will observe World Health Day 1984. The theme, "Children's Health, Tomorrow's Wealth," is an appropriate focus for a development agency such as AID. It presents the Agency's health program in economic terms, and identifies the program's target group.

The pace of advancement in health care in developing countries—beginning with the introduction of antibiotics and modern health care—has slowed as the poorer and less accessible populations of the world have not benefited fully from modern medicine. The small gains that have been made are steadily eroded by high population growth rates. And the fragile economies of developing countries cannot pursue expensive, high-tech Western health goals.

At the turn of the century, however, U.S. health statistics were similar to those of developing countries



today. New York City's infant mortality rate, an indicator of the overall health of a population, was 140 per thousand live births in 1900. Diarrhea, the leading killer of children, faded from the scene because of modern plumbing, refrigeration, and adequate supplies of potable water, not because of medical advances.

Yet there is little room for optimism in similar statistics from developing countries today. Developing countries cannot afford to wait half a century to allow health to be part of general economic improvement. For the millions of children in developing countries who will die of preventable diseases while the health sectors of their countries slowly improve, a cautious approach would be a tragedy.

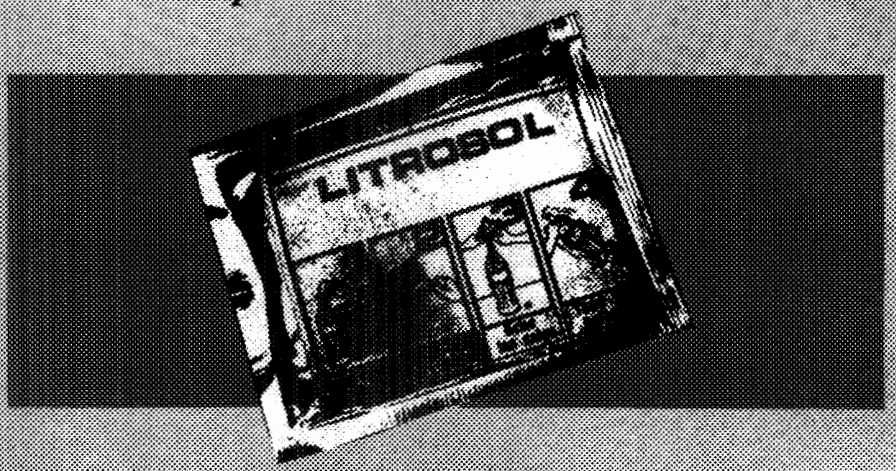
"Children's Health, Tomorrow's Wealth" presents the concept of healthy children as an investment in the future. Their health and survival are essential.

The theme of World Health Day fits well with the strategic approach AID is taking in health. An underlying principle of the foreign assistance legislation is to improve life expectancy. The Agency's strategy to achieve this goal is to focus on reducing infant and child mortality.

In most developing countries, children under the age of five account for more than half of all deaths. If life expectancy is to be prolonged, the infant mortality must decrease. In Bangladesh, for instance, the infant mortality rate was 140 per thousand a decade ago, and a newborn could expect to live only about 45 years. Today, life expectancy is 56 years, but if a baby survives that precarious first year, when more than 10% die, the child can expect to live to age 63.

AID's health program focuses on the major killers of children and it promotes the use of existing technologies known to be effective in developing countries. This pared-down, action-oriented approach is our best bet for reducing child mortality. At the same time, AID is pursuing the development of new technologies to

Diarrheal Dehydration: Simple Solution Saves Lives



Litrosol is the name of locally packaged ORT salts in Honduras. Mass media campaigns, combined with village-level training, promote the technology.

In the time it takes to read this, ten children will have died unnecessarily from dehydration caused by diarrhea. That's about 5 million deaths a year or about one of every 10 children born in developing countries under the age of 5.

Oral rehydration therapy (ORT) counteracts dehydration which causes the diarrheal deaths. ORT is an inexpensive solution of water, sugar, and mineral salts that can be prepared and administered by local health workers or mothers. The oral rehydration solution can be prepared in the clinic or home from a pre-mixed package of ingredients or from market-bought salts and sugar.

Work being carried out in the 1960's at the AID-sponsored International Center for Diarrhoeal Disease Research, Bangladesh (ICDDR/B) first brought public attention to oral rehydration.

Today, 71 AID activities in 53 developing countries focus on diarrheal disease. In rural Egypt, for example, AID's Control of Diarrheal Diseases project funds research to determine the most effective way to deliver ORT. The project works with existing institutions delivering health services to create increased awareness of and support for ORT. AID's Mass Media and Health Practices project designs health campaign messages, sensitive to local traditions and cultural practices, that teach mothers in Honduras and the Gambia how to administer oral rehydration in the home. In Indonesia, AID supports community-based programs that make rehydration solution packets or instructions for home mixtures available throughout the country.

Other AID programs include:

- Technology for Primary Health Care (PRITECH) to provide technical resources to promote and integrate ORT into AID's health projects;
- Combatting Childhood Communicable Diseases, a major health effort using a combined approach of ORT, immunization, and malaria prophylaxis; and
- Oral Rehydration Therapy Health Education and Long-Term Planning (ORT-HELP), to provide leaders and health workers in developing countries with the information they need to incorporate ORT in their national health policies and programs.

Controlling Malaria: There's Hope on the Horizon

The first prototype human vaccine developed through genetic engineering techniques has been created by AID-supported researchers at New York University. The research on an antimalaria vaccine started more than a decade ago and is now producing dramatic results against the mosquito form of the disease. The vaccine is effective against *P. falciparum*, the most deadly form of malaria. However to be fully effective, vaccines against the blood stage of malaria and against other types of malaria must be developed.

AID plans to double support for research on the malaria vaccine. This will bring the total AID commitment to $22.7 million between fiscal 1983 and 1985. "We anticipate that this increased level of effort will cut in half the length of time required to prepare the vaccine for U.S. Food and Drug Administration approval for human testing," said AID Administrator M. Peter McPherson.

Human trials could begin as early as 1985.

Before the end of the 20th century, AID could provide the developing world an effective vaccine for malaria —a scourge that afflicts hundreds of millions of people and kills millions of children each year.

Experts say that the quality of health in many developing countries will not be improved until malaria is controlled. It is one of the most widespread diseases in the world, and in some countries it is the primary public health problem. The World Health Organization estimates that 400 million cases of malaria occur annually and that over 1.8 billion people in 107 countries are potentially threatened by the disease. Africa alone loses one million children each year to malaria. The social and economic impact of this disease affects the well-being of millions of people in the developing world.

A Thai mother gives a blood sample in a check for malaria during the 1960s. Drug-resistant parasites are threatening Thailand where malaria had been significantly reduced and is now resurging. Years ago, it was the No. 1 killer.

AID has provided approximately $1 billion to combat malaria worldwide since the early 1950s. This assistance has opened thousands of

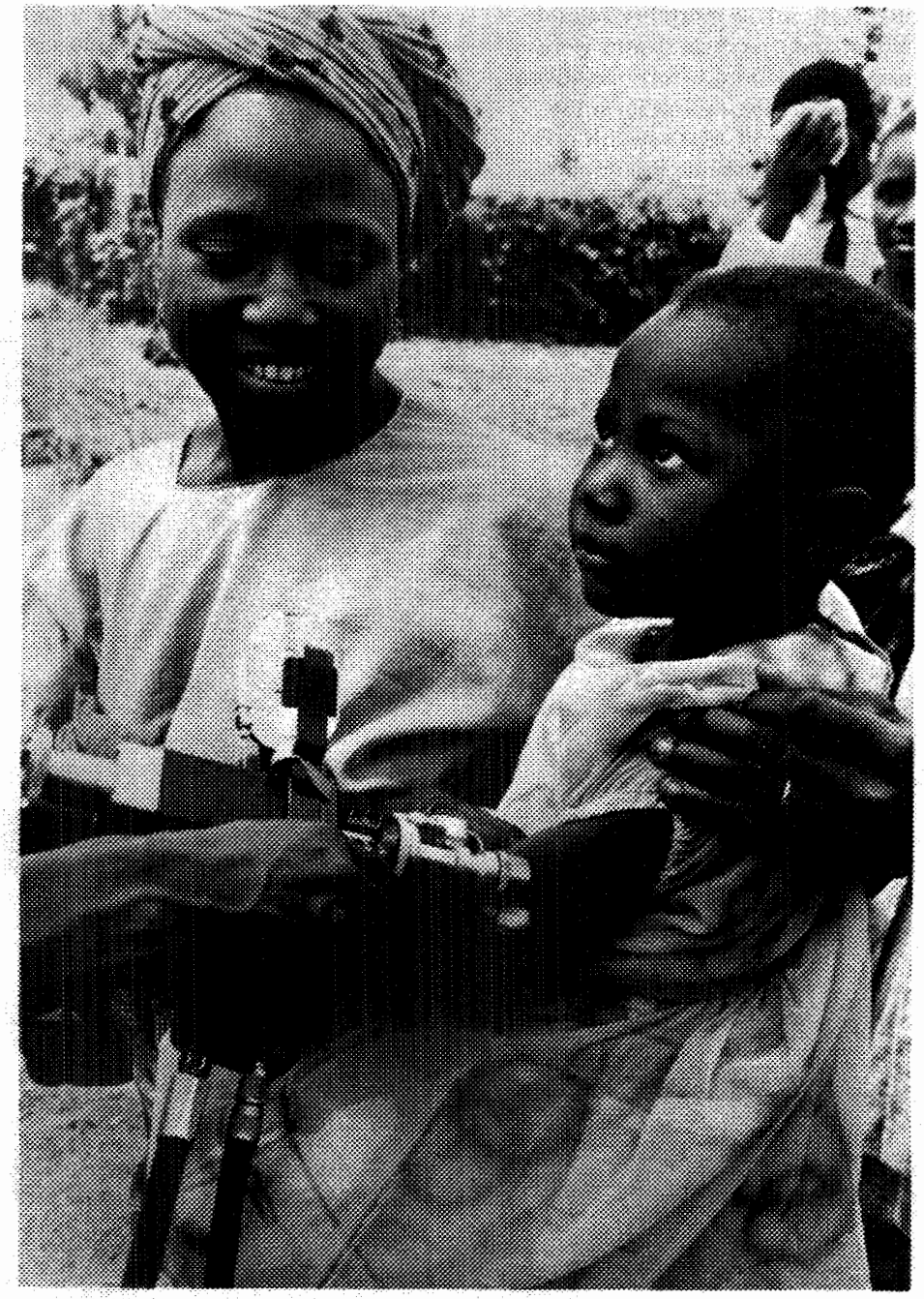
hectares of land for farming and settlement, and has trained personnel who now play major roles in developing country health programs.

Malaria is especially severe in tropical Africa, the outer islands of Indonesia, southeast Asia, southwest Pacific, and portions of Central and South America. In many parts of Asia the number of malaria cases has risen in 1983 due to increasing drug-resistant strains of malaria parasites and inadequate vector control methodologies. In 1946, for example, only two species of malaria-carrying mosquitos were resistant to DDT. By 1976, 43 species of *Anopheles* had some degree of resistance to insecticides.

AID has malaria control programs in Nepal, Sri Lanka, Haiti, Pakistan, Tanzania, Thailand, and Indonesia. A major AID-assisted activity is malaria vaccine research with a network of 14 cooperating institutions working on its development. Such a vaccine would be an important tool in malaria control activities worldwide.

AID's Bureau for Science and Technology supports research at several American universities and private laboratories. Laboratories at the University of Missouri, University of Hawaii, and Scripps Institute recently isolated potentially protective antigens against the blood form of malaria.

AID recently held a workshop to develop a new strategy for support to malaria control. The workshop emphasized the link between controlling malaria and reduced infant and child mortality and morbidity, labor force productivity, and economic development. Even if a suitable vaccine is developed over the next ten years, to maintain hard-won gains further efforts are required in training; operational research, especially in vector control and anti-malaria drugs; and technical assistance.



High-speed injectors can vaccinate 500 to 1,000 people per hour. The technology has made it possible to inoculate millions of children against measles and other diseases.

basic package in insuring the survival of children.

Although these basic technologies exist today, putting them into action effectively takes a major effort. The primary health care approach through which AID's health program operates needs strengthening in many developing countries. Technologies such as ORT and immunizations provide the leading thrust of effective health services. But the health services must not neglect management and planning requirements, the specific disease control approaches to keep malaria and other endemic tropical diseases at manageable levels, or the provision of safe water and sanitation.

It is important to remember that in the United States, life expectancy

increased, infant mortality rates declined, and diarrheal deaths were markedly reduced before the advent of the technologies that form the basic package of AID's health program. We can assume the important role that basic public health played in American history will continue to be the foundation of sustained solutions to the health problems facing developing countries today. The AID strategy recognizes there is no justification for failing to use the currently available tools to accelerate the process. The future of a developing country—its children—deserves nothing less than the best we have to offer. ■

George Curlin is director of the Office of Health in AID's Bureau for Science and Technology.

Water and Sanitation-Related Diseases: Closing the Lid on Pandora's Box

Cholera. Hookworm. Leprosy. Typhoid. Sleeping-sickness. These are but a few of the many water and sanitation related diseases that threaten the well-being of millions and challenge even the best-laid plans. About 100 million more people in the developing world were drinking dirty water in 1981 than in 1975; 400 million more did without sanitation than in 1975. In 1980, approximately three out of every five people did not have easy access to safe drinking water, and three of out every four had no sanitary facility—not even a simple pit latrine.

Control measures to reduce water and sanitation related diseases can be relatively simple. Some are improving water quality and sanitation practices; protecting water sources from contamination and avoiding contact with infecting organisms in the water; killing insect larvae and shielding water sources from insects that spread disease; and educating the public about the dangers of contaminating the soil with human waste and the merit of wearing shoes.

The U.N. International Drinking Water Supply and Sanitation Decade is 1981-1990. The goal is clean water and adequate sanitation for all by the year 1990. AID's current expenditure of $200 million for such activities reflects the United States' support of the water decade.

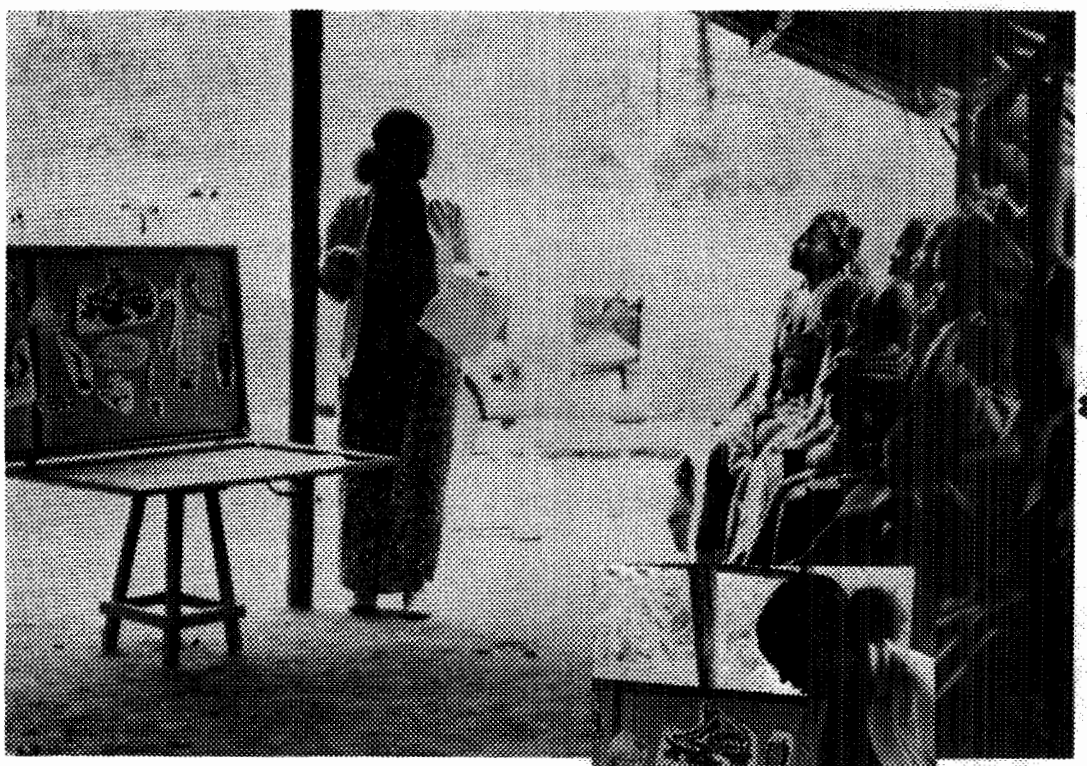
AID has been working on solving water supply and sanitation problems in developing countries since 1942 when the Institute of Inter-American Affairs was established. Since 1973, AID has worked on 700 water supply and sanitation projects.

Piped water systems can do much to reduce the incidence of water-related disease.

Current AID efforts are to:

- provide a minimum of 20 to 40 liters of relatively safe water per capita per day;
- improve water quality at reasonable cost;
- introduce technologies that can be maintained and operated easily and that are acceptable within local cultures;
- offer technical assistance or training to improve the administration of water supply and sanitation systems, and to maintain, operate and repair systems;
- promote water conservation and reuse;
- involve communities in designing and carrying out water projects; and
- carry out educational programs to instruct users in proper water use and hygiene.

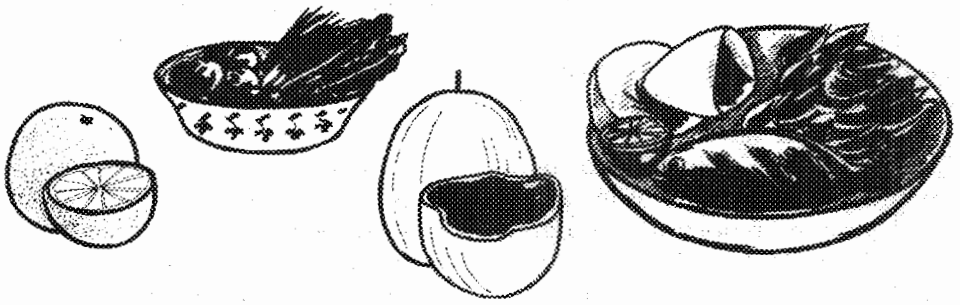
In 1980, AID's Office of Health created WASH—the Water and Sanitation for Health project. WASH provides AID managers with short-term, interdisciplinary technical assistance and information on water supply for rural and suburban settlements, sanitation, and environmental health. Over its first three years of operation, the WASH Project has worked on 170 projects in or for 54 countries. In addition to engineering assistance, WASH consultants have addressed the issues of technology transfer, training, institutional development and financing, community education and participation, and women in development.



FIGURES AND FELTBOARDS

By Dale Huntington

An AID-funded CARE project brings lessons in preventive health care and nutrition to rural villages in the Congo.



On the shores of the Congo River, which separates the People's Republic of the Congo from Zaire, a mother brings her baby to a small clinic to be weighed and measured. It is, perhaps, the fifth time that the child's nutritional status is evaluated using a growth chart. The first few times showed a normal growth pattern, but now measurements show a sharp drop in the child's weight. The nurse measures the child and dutifully records the information. She then dismisses the mother and child. The mother leaves the clinic, knowing for certain what she had suspected—that her child is losing weight—but still not knowing how to stop it.

This scene was common throughout the rural areas of the Congo before a CARE project introduced training and educational materials for health care personnel. Until then, nurses rarely knew how to counsel their patients, nor did they have any educational material to assist them.

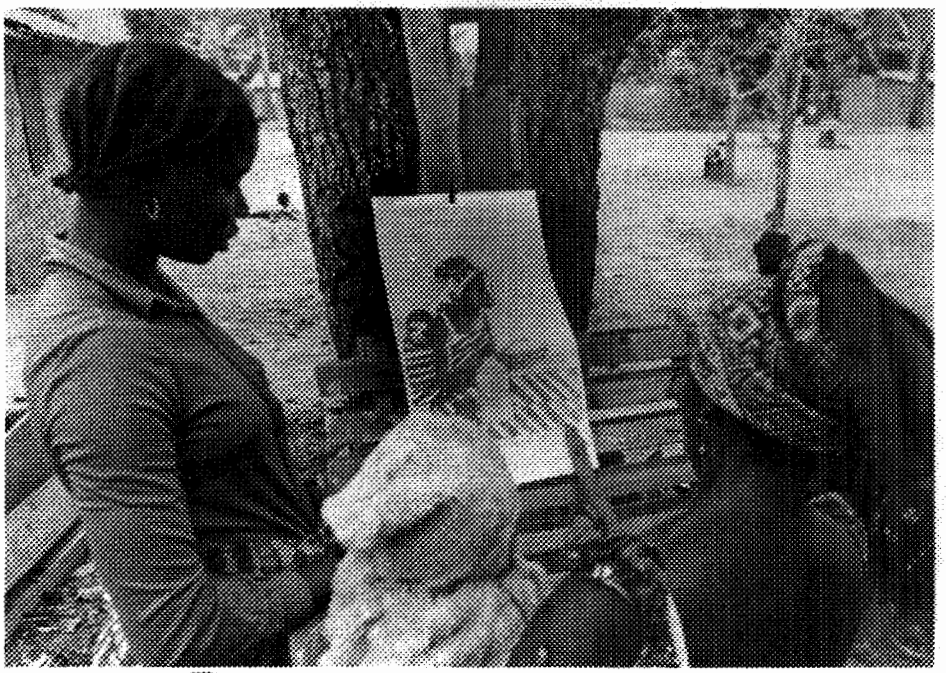
The CARE nutrition education project has changed this picture. Nutritional workers have been trained, new teaching aids are being used, and

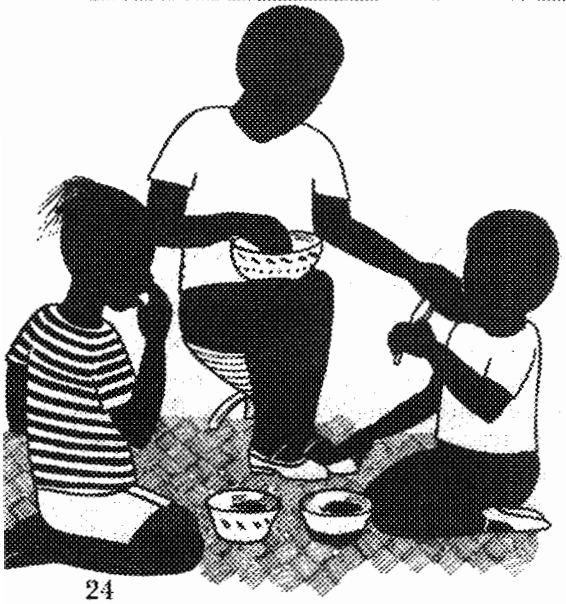
Posters illustrating better nutritional practices were pre-tested to make sure they could be easily understood.

a small media campaign is reinforcing sound nutritional practices.

In 1980, AID provided CARE with a $225,000 grant to work in the Congo to improve the nutritional practices of mothers weaning children. To launch the program, CARE and the Congolese Ministry of Health and Social Affairs surveyed nutritional habits in four of the country's regions. Target areas were identified using the collected data. An assessment of nutrition education activities, as well as facilities to produce educational materials, followed.

Several government services—the Ministry of Education's Adult Literacy Group, Maternal-Child Health Clinics, the Department of Agriculture's "Radio Rural" program, the Ministry of Health and Social Affairs, and the Women's Union—joined together to expand the nutritional campaign into areas not already reached by health care services.





The project triggered a chain of training activities, introducing important advances in preventive health care. From 1966 to 1977, when U.S. diplomatic relations with the Congo were broken, few health advances had reached the Congo, especially its rural areas. The CARE project, for example, helped bring the practice of oral rehydration therapy to villages. Prior to the project, babies who had severe diarrhea were starved of fluids or given a mush of manioc *fou-fou*, a common African staple. Some 90% of those trained under the CARE project had witnessed babies dying of severe diarrhea overnight as they stood by helplessly, not knowing how to prevent the fatal dehydration. The sugar-salt solution was immediately recognized as practical and adoptable.

To date, CARE recruited, then trained 300 regional supervisors and trainers from the participating government agencies who, in turn, train others, such as village-level nutrition workers.

Training manuals and visual aids were developed for use in the regional training programs for village nutrition workers. The CARE project identified the lack of educational materials designed specifically for use in the Congo as a major roadblock to successful village-level nutrition education projects. Also missing was the technical know-how to develop these materials and train nutrition workers.

So CARE, along with nutrition workers, developed and locally produced a package of educational material. Material promoting proper nutrition practices was produced in a variety of forms, including flannelgraphs, posters, and radio announcements. Topics included how to use local food in the daily diet, prenatal care, breastfeeding, personal hygiene, diarrheal treatment, and disease diagnosis.

To reinforce each message, the slogans or images are repeated in many forms. The figures used on the flannelgraph also appear on posters. Postcards with the same figures are used as "mini-posters," sent directly into homes. And children's coloring books carry the same pictures the mothers see in the flannelgraphs.

Visual aids—particularly the flannelgraph—play an important role. The flannelgraph kit was conceived as an

"image bank," from which "withdrawals" could be made for use in other educational programs. The kit presents a large combination of images that can be adapted to specific lessons. New ones can be created easily from material in the kits.

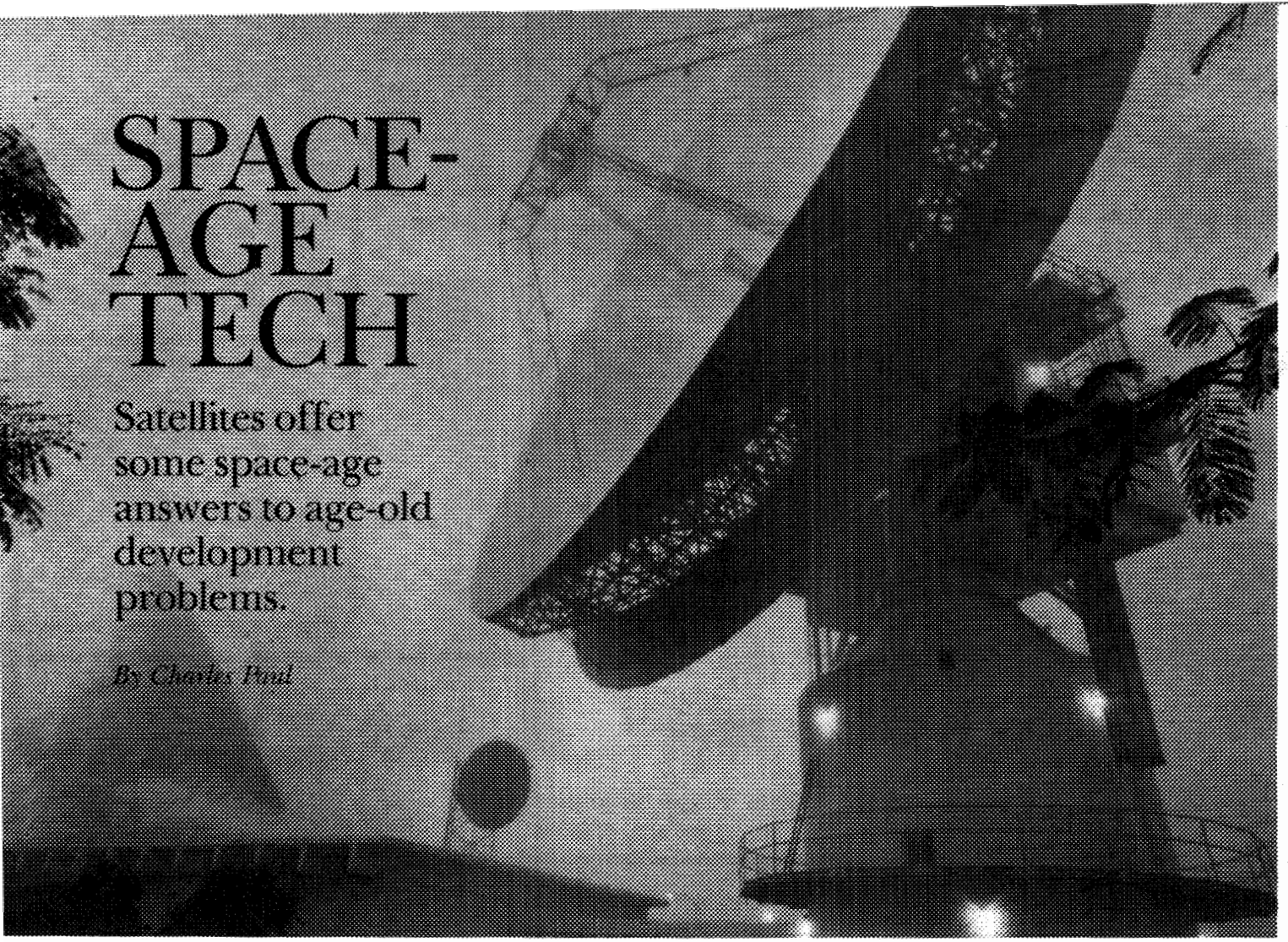
The images and posters were pretested to make sure that they could be easily read by the villagers. Some had to be modified. For example, a T-bone steak was identified as a shoe by some villagers and peanuts were only recognized when the whole plant was illustrated.

The flannelgraph kit also includes a lesson book with 10 lessons for the village nutrition education worker to use as a guide. Based on a theme, each lesson encourages participation by the villagers—by telling a story, creating a dialogue, or role playing. Each lesson's extensive reference section provides the local nutrition educator with in-depth material for his or her own use, and a source for new lesson materials. Village educators, for example, wrote their own songs about proper nutrition practices and taught them to groups of women. The women sing the song to open or close community meetings.

Suggested improvements or modifications of the educational material come from the village nutrition workers working with CARE's headquarters in Brazzaville. There, information is collected and disseminated back to the field. The CARE staff meets bi-monthly with collaborating Congolese organizations to review nutrition education activities and to develop new projects.

In this manner the CARE project assures for local production of materials. By making the concept of local development of educational materials a part of the village workers' training, CARE's AID-supported nutrition education project established a continuous source of participatory, reuseable educational materials for groups throughout the Congo. ■

Dale Huntington was CARE's director for this project.



SPACE-AGE TECH

Satellites offer some space-age answers to age-old development problems.

By Charles Pind

If we want a bigger payoff for our international development dollar—and who doesn't?—we'd do well to cast our gaze upward, toward our remote sensing satellites.

Satellites can help solve some big development problems. In fact, thanks in large part to AID's leadership, satellites already have done so, and at far less cost than more down-to-earth technologies.

Take for example an agricultural census. If a developing country were to undertake such a project using traditional methods, it would not only be expensive but time consuming so that the data obtained would lose considerable value. With the help of satellites, the job can be done both faster and less expensively.

The same goes for other functions for which satellites are particularly well suited. They can tell us—within limits—what kind of natural resources a country has, and in what quantity. They can reveal, also within limits, how a country's land is being used. They can determine sea conditions, surface temperatures, and amounts of precipitation; measure several kinds of air and water pollutants; advance weather forecasting. They can—very accurately—update the maps of developing countries. And they can inventory the water resources that many countries depend on.

Remote sensing is the detection of phenomena on earth from high above. It is a practical technique today because of growing concern for environmental protection and the extraordinary advances in space flight.

The Technology of Remote Sensing

Aerial photography from balloons got under way in the late 1850s on a small scale. Around 1906, Alfred Maul made successful photographs of the earth from rocket-lofted cameras. Both airplanes and balloons became platforms for photography by both sides in World War I. The U.S. Department of Agriculture assessed croplands with aerial photography in the 1930s and 1940s. World War II brought tremendous advances in this technology; overlapping aerial photos for stereoscopic viewing of elevation differences became routine.

In the postwar period rapid developments in such fields as television, telemetry, and computers led to the use of data that translated into both color and black-and-white photographs for military intelligence. Then came manned satellite missions, the declassification of military sensing systems and the environmental movement. All these brought about earth resource satellites in the early 1970s and along with them a complete earth observation system to assess the environmental impact of human activities and to manage natural resources.

Two kinds of satellites are most useful for development: so-called environmental satellites and the land-sensing satellites.

Environmental satellites enhanced our understanding of meteorology and climate. Their data can be used to determine wind speeds at cloud level and profiles of air temperature and humidity. Future applications include identifying air and water pollutants and measuring their concentration, drift, and dispersion. Satellite sensors are being designed to measure global amounts of carbon dioxide, chlorofluorocarbons, ozone, and dust. Microwave systems flown on environmental satellites measure sea conditions and surface temperature, and precipitation. Environmental satellites also relay ground-, air- and sea-based measurements from data collection platforms to central locations for improving weather forecasts.

The U.S. Landsat system provides an example of land sensing by satellite. Of the four satellites launched by the United States during the past 11 years, only one still functions. Although television cameras were flown on early Landsats, the main imaging sensor currently used on Landsat is the multi-spectral scanner (MSS). It measures the brightness of sunlight reflected from the earth. Data on solar energy levels are sent to Landsat receiving stations in the United States, Canada, Argentina, Australia, Brazil, China, India, Indonesia, Italy, Japan, Romania, South Africa, Sweden, and Thailand. Color photos of land use are produced.

The first three Landsats used tape recorders to store imagery data acquired over areas of the world not covered by receiving stations. The data were "dumped" to receiving stations in the United States (at Fairbanks, AK; Goldstone, CA; and Greenbelt, MD), and were processed and made available for public use at the U.S. Geological Survey's EROS Data Center in Sioux Falls, SD. The tape recorder essentially made global data available worldwide and led to several countries' investing in their own receiving stations. In 1973, Brazil became the first country besides the United States and Canada to buy and install a Landsat receiving station. It directly provides Brazil with images of areas within 1,700 miles of the station. Foreign stations have and continue to maintain data they collect in their own archives.

Landsat-4 does not carry a recorder. Data acquired over areas beyond the ranges of receiving stations are transmitted through the Tracking and Data Relay Satellite System to a U.S. receiving station.

"Remote sensing uniquely lends itself to fostering international cooperation."

Navigation and Positioning

Generally, the developing countries are not well mapped, a fact that inhibits civil engineering projects, environmental planning, natural resource monitoring and management, and transportation development.

Maps depend on thousands of control points, the precise coordinates of which have been traditionally determined by surveying. Periodically, resurveying, though costly, is needed because of shifts in the earth's crust.

Satellites can reduce the cost and complexity of resurveying because they can pinpoint relevant positions anywhere in the world. Satellites are a viable way for most developing countries to maintain geodetic networks for mapping and navigation.

For navigation and positioning, the United States operates the Global Positioning System. By 1986, it will include 18 satellites, at least four of which, at any given time, will be in view of portable receivers that can be located anywhere on earth.

Satellite positioning techniques consist of laser ranging, radio interferometry, and doppler radio.

Direct laser ranging from satellites using high-power, short-pulse lasers with accurate time and frequency standards can determine point positions within one to two centimeters. This accuracy is useful for determining regional crustal deformation and tectonic plate movements. These applications employ computer models that take into account the earth's gravity, tides, ocean loading, and other effects.

Very Long Baseline Interferometry is a technique for accurately determining distances over thousands of kilometers by simultaneously measuring round-trip radio signals from a satellite to earth receivers at the ends of baselines.

Doppler radio signals broadcast a satellite's orbital data and measure the relative velocity difference between a satellite and a ground receiver. With a few passes of a satellite or a single pass by several satellites, the position of fixed and mobile receivers on land, on sea, or in the air can be ascertained.

Doppler has relevance to search and rescue. AID has used doppler positioning in east Africa to reference Landsat natural resource data to a common map projection. The tie-in between resource mapping and geodetic positioning was made in east Africa deliberately because the AID Regional Remote Sensing Facility is located within the Pan-African Regional Mapping Center, where both technologies are effectively integrated.

Evolution of the Technology for International Development

AID helped initiate the use of satellite imagery to assist developing countries in the exploration and identification of natural resources. A year before Landsat-1 was launched in 1972, the Agency convened a symposium in Panama to prepare Latin American nations to interpret the soon-to-be-available satellite imagery. When Landsat was launched, AID funds brought developing country resource planners to the first international

training workshop at the EROS center. The workshops have become a regular feature of the center, where hundreds of developing country scientists and planners have been trained.

AID explored several applications of Landsat data between 1972 and 1976, ranging from successfully monitoring nomadic migrations in Bolivia and Kenya, to unsuccessfully trying to locate minerals by their effect on the chlorophyll content of vegetation. By 1976, the Agency had become fairly proficient in the use of remote sensing technology. Funds to promote and use the technology jumped from several hundred thousand dollars a year to $15 million. Responsible for the increased support were AIDSAT—a joint AID-NASA demonstration of space technology using an experimental communications satellite to beam down video presentations of space technology at work—and a report by the National Academy of Sciences, "Resource Sensing from Space," which urged AID to increase its financial commitment to satellite remote sensing tenfold.

AID held conferences to encourage other donors to develop remote sensing programs. The principal donors providing funding for the application of remote sensing technology to development are France, Canada, the World Bank, the UN Food and Agriculture Organization, the Inter-American Development Bank, the UN Development Program, the Netherlands, West Germany, Switzerland, Sweden, the UN Environment Program, Japan, and the Economic Commission for Africa.

Between 1977 and 1980, most of AID's commitment was in technology transfer. AID helped support the development of regional remote sensing training centers in Nairobi, Kenya; Ouagadougou, Upper Volta; and Bangkok, Thailand; and national centers with photo processing laboratories in Peru, Bolivia, Egypt, Tunisia, Nepal, Bangladesh, Thailand, and Zaire. Many were funded in cooperation with other donors.

In the past three years, the Agency, the largest user of satellite remote sensing in the foreign assistance community, has put the technology to work in ways ranging from petroleum exploration in Egypt to forest assessment in Peru. AID-assisted countries that have incorporated the technology into their development goals are Ecuador, Peru, Bolivia, Morocco, Tunisia, Egypt, Mauritania, Senegal, Upper Volta, Sudan, Kenya, Tanzania, Zaire, Pakistan, Nepal, India, Bangladesh, Thailand, Indonesia, and the Philippines.

"Satellite images, and the ecological problems they pinpoint, transcend political boundaries."

Remote Sensing in Agriculture

Remote sensing provides basic data needed for more rapid agricultural progress in developing countries. This includes data on crop production, herd inventories, acreages planted and harvested, yields, prices, incomes, potential acreage that could be harvested, size and composition of the labor force, migration, and farm family living conditions.

A full agricultural census would provide this information, but would take almost 10 years and cost a great deal of money. An area frame sample survey can be accomplished less expensively and much faster. Sampling also targets resources and provides statistics to those areas where information needs are most urgent.

Here's how it works: Landsat data and aerial photography depict current land use, differentiate among uses, and permit a cost-efficient selection of a small number of fields; and it allows the areas to be precisely measured. Field crews then visit the sample fields, gathering statistics on crops and agricultural practices. These are later compiled, summarized, and scaled up to estimate district and national levels.

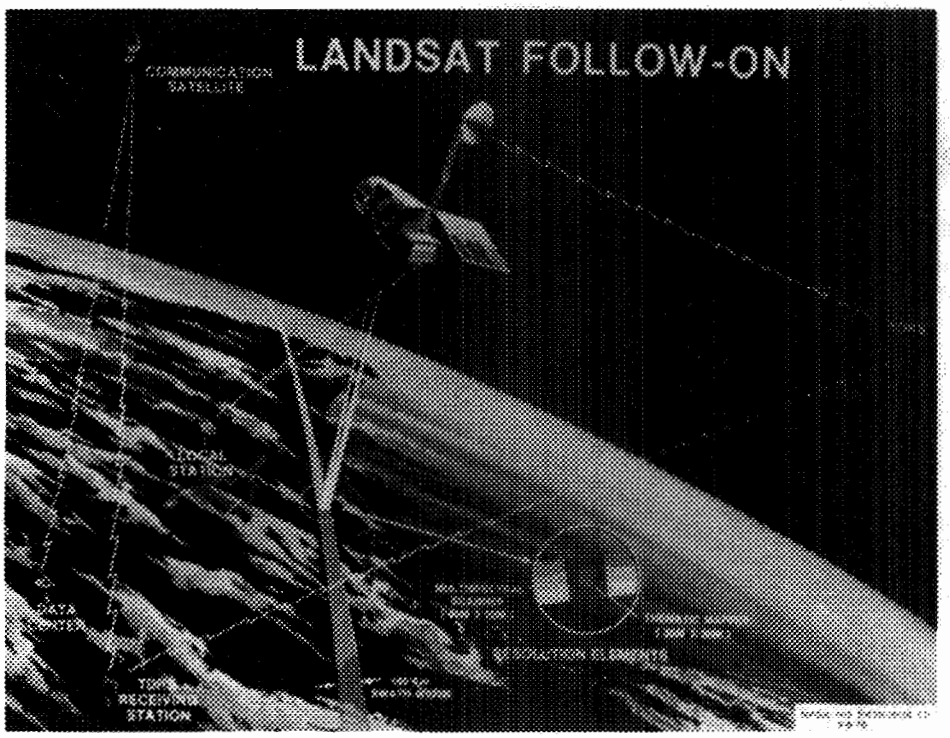
Area frame sampling is the most suitable remote sensing technology for use in the developing world. It relies on intermediate technology more likely to be found in developing countries. It is labor-intensive and thus helps provide additional employment. When properly conducted, area frame sampling is one of the most precise techniques for predicting crop production. AID has helped establish area frames in the Dominican Republic, Jamaica, Costa Rica, Ecuador, Peru, Bolivia, Morocco, Tunisia, Sierra Leone, Liberia, Sudan, Indonesia, and the Philippines.

Remote Sensing in Water Resource Development

Remote sensing data can be used to identify both surface and underground water. The amount of water available for irrigation and energy can be computed from area measurements and depth readings taken from topographical maps. When maps are not available, AID and cooperating nations have taken sample depth readings from boats. If the water is very clear, Landsat can discern depths of 10 meters or more.

Snow mapping is extremely important for assessing available surface water supplies in such AID-assisted countries as Bangladesh, Nepal, Pakistan, Morocco, Lesotho, Peru, Ecuador, and Bolivia. Because snow-covered areas stand out vividly on satellite imagery, the extent of mountain snow pack is easily measured. But the depth must be gleaned from on-the-spot measurements and correlated with topographical maps.

The most difficult water resource application of satellite imagery is the inference of underground water, since a multi-spectral scanner cannot "see" below the surface of the land. Radar



penetrates deeply into some substances, but radar systems are rare in space, and aircraft radar missions usually cost too much to permit wide application. Therefore, MSS and aerial cameras infer underground conditions by analyzing surface manifestations.

A photo hydrologist uses interpreted features such as faults, fracture patterns, lineaments, and structural geology to establish targets for further refined exploration for aquifers. By taking into account regional and local geology and groundwater movement, a competent photogeologist can delineate rather closely the area needed to carry out expensive exploration and drilling.

Remote Sensing in Forestry

Landsat also contributes to forestry. When stands of tree types are similar or identical, MSS imagery can discriminate and measure them. In California's Plumas Forest, for example, types of forest growth have been identified in this way. In Pennsylvania and New England, forests infested by gypsy moth and disease can be discerned by a reduction in chlorophyll production in the leaves. St. Regis Paper Co. and Weyerhauser Co. routinely process Landsat imagery for monitoring stands of loblolly pine in many parts of the United States. MSS imagery has allowed stands of aquaje palm to be mapped in eastern Peru, teak in northeast Thailand and mangrove in the Philippines.

With the exception of relatively large, homogeneous stands, satellite imagery generally can only discriminate forests from other land uses in the tropics—and sometimes fails to do so between forests and rangeland on the African savannah. The satellite's main contribution is to determine those areas from which forests are disappearing. Forest stand discrimination and timber volume estimates require a multi-stage approach, using satellites, aircraft, and field surveys—the latter providing most quantifiable data.

In spite of controversies about global deforestation, the amount of carbon dioxide in the upper air, and the availability of fuelwood, especially in developing countries, no organization is systematically tracking deforestation through data available from satellites.

Technology Transfer

Before 1976, AID brought scientists and resource planners from developing nations to the United States for training in remote sensing. Trainees returned home to offices where neither equipment nor appreciation for the technology existed; most shifted into jobs where remote sensing analysis was irrelevant. But things changed after the 1976 AIDSAT demonstration, which took the technology directly to the cultural and economic environments AID intended it for.

First came the Nairobi Regional Remote Sensing Center, a part of the Pan-African Center for Services in Surveying and Mapping. In 1977, the United States, France, and Canada established a corresponding West African Regional Remote Sensing Center in an old French satellite tracking station outside Ouagadougou. In 1982, classes started in the third regional center in Bangkok, which serves almost 30 Asian and Pacific nations. The centers are modeled on the EROS Data Center and provide training and assistance in project design and implementation.

In addition, AID has helped build nine national remote sensing laboratories in collaboration with host countries and, in some cases, with other donors. Many of the laboratories operate without external assistance. The six-year success of the African centers and the continued operation of almost all of the national centers confirm the strategy of incorporating the technological framework into developing country institutions.

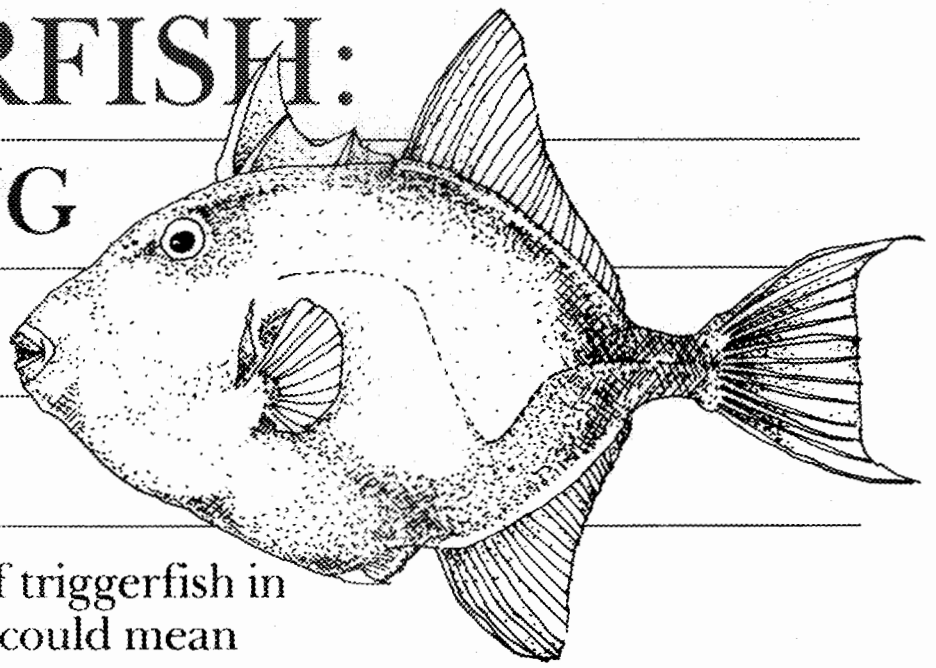
AID continues to support programs for developing country scientists receiving U.S. masters' and doctoral degrees. AID also conducts special seminars in developing countries.

The Agency has invested roughly $70 million in projects using remote sensing technology, with current funding running about $7 million a year.

The transfer of satellite technology is by no means easy. But the history of the application of satellite technology use for development shows that it can and does work successfully in no small part thanks to the receptivity and support of the developing nations themselves. ■

Charles Paul is a remote sensing specialist in AID's Office of Forestry, Environment, and Natural Resources, Bureau for Science and Technology. Edward Caplan of that bureau's Publication and Information Division contributed to this article.

TRIGGERFISH: A PROMISING NET PROFIT



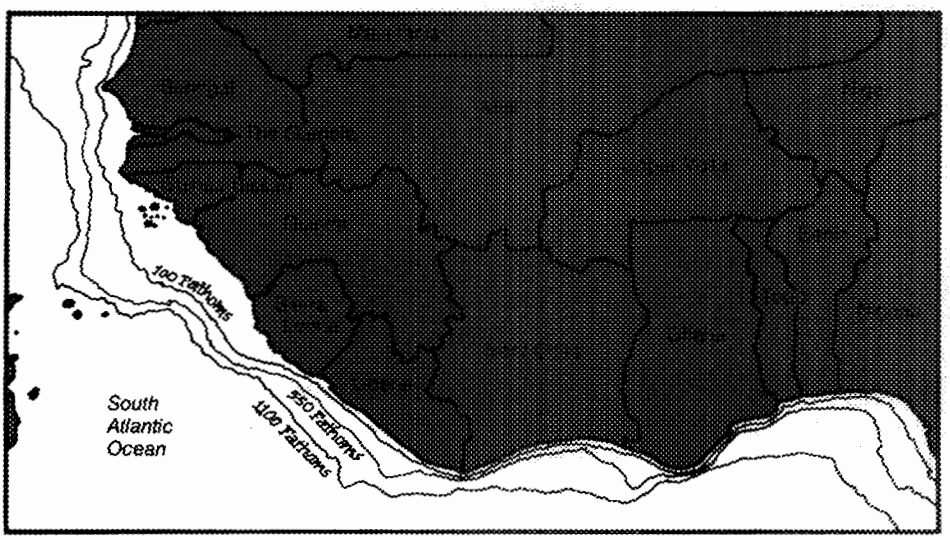
A "population explosion" of triggerfish in West Africa's coastal waters could mean protein and profits for Africans.

By Norman L. Pease

There is a new source of dietary protein off the coast of West Africa. Several surveys report that the population of triggerfish (*Balistes*) has boomed in the area. It is estimated that 1.5 million tons of the fish exist in the coastal waters between Senegal and Benin. The problem is how to convert this marine resource into food for West Africans.

West African coastal waters are rich in nutrients that provide for marine growth. Traditionally, coastal fisheries are a near-shore, canoe operation. Catches are landed at beach sites that have developed into processing communities where some of the catch is sold fresh and the rest is smoked or sun-dried.

About 25 years ago, fishermen from developed countries began fishing in West African waters. Foreign fishing was restricted during the 1970s when exclusive economic zones—up to 200 miles—were claimed. When fish production from the region declined from 3.7 million tons in 1977 to 2.7 million tons in 1979, fishing agreements were negotiated on bilateral bases with 17 countries. The UN Food and Agriculture Organization (FAO) in Rome reported that foreign vessels produced 56% of the total West African fish tonnage in 1980. One country, the USSR, produced 49% of the total foreign catch.



Growth of Triggerfish Stocks

AID funded a West African, Gulf of Guinea fishery survey in 1963-65, which established the presence of triggerfish but did not find them to be present in significant quantity. Ten years later, the triggerfish population showed signs of proliferation off Ghana, where 3,000 tons were landed by fishermen using 8- to

12-meter trawlers. This was the first evidence that an unusual growth pattern was occurring in a species that normally lives around reefs. The Ghanaian Fishery Research Unit conducted periodic surveys from 1972 to 1975, and reported where and when the heaviest concentrations were to be found.

By 1976, Ghanaian fishermen landed 8,826 tons of triggerfish. In 1978, FAO funded an acoustic survey aimed at estimating the biomass, spatial distribution, and species composition of fish stocks distributed over the continental shelf of Guinea-Bissau, Guinea, and Sierra Leone.

The survey identified 60% of the 730,000 tons of fish surveyed as triggerfish. In 1981, FAO funded a second survey covering the area from Mauritania to Togo, and found that two separate concentrations had developed—a western stock of one million tons extending from Senegal to Sierra Leone, and an eastern stock of 500,000 tons from the Ivory Coast to Togo. Over a 10-year period, a new 1.5 million-ton fish population developed as a potential source of dietary protein for food-short Africa. Will the triggerfish population continue to expand, or will environmental conditions contain the population at its current level?

Problems and Possibilities

A continent that has continually experienced shortages of animal protein might be expected to mount a serious effort to exploit this abundantly available new protein resource. However, triggerfish use by Africans is minimal.

Marketing of the triggerfish in Ghana is a problem. The triggerfish does not have the smooth, streamlined shape of most familiar species on the market. In addition, the fish's tough skin makes smoking—a traditional preservation method—difficult. Attempts to salt and dry the fish produce only a marginally successful product lacking uniform quality. It appears that other processing techniques are necessary if this fish is to become a part of the African diet.

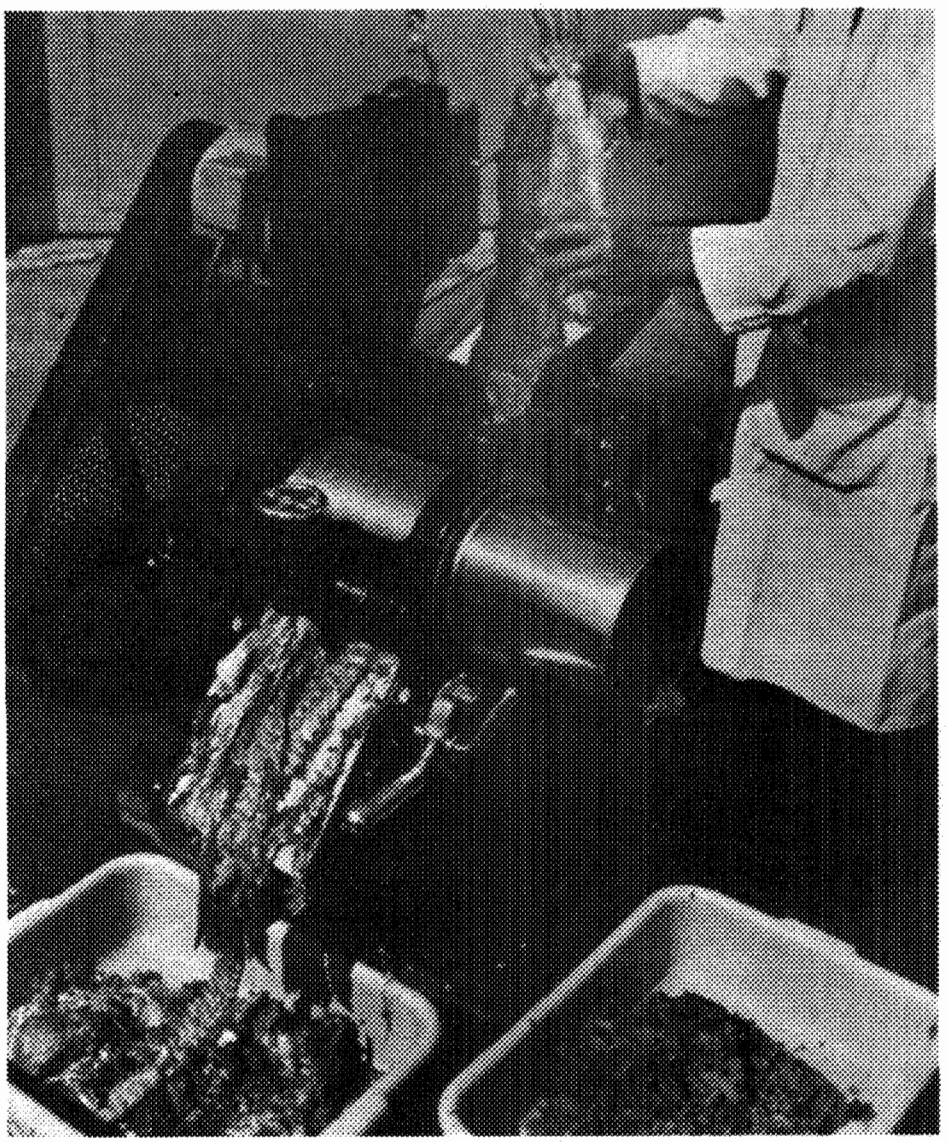
In tropical West Africa, distribution of fish for human consumption is limited. The lack of ice or refrigerated trucks at landing sites dictates that fresh fish be rapidly moved to the consumer, generally the same day they are landed. The lack of freezing or canning facilities makes drying or smoking at landing sites the most convenient way to preserve the catch. Unfortunately, dried or smoked fish in the hot and humid climate of the region undergoes bacterial decomposition or becomes infested with insects, rendering the fish inedible within a few days. About half of the unprocessed or inadequately processed fish spoils.

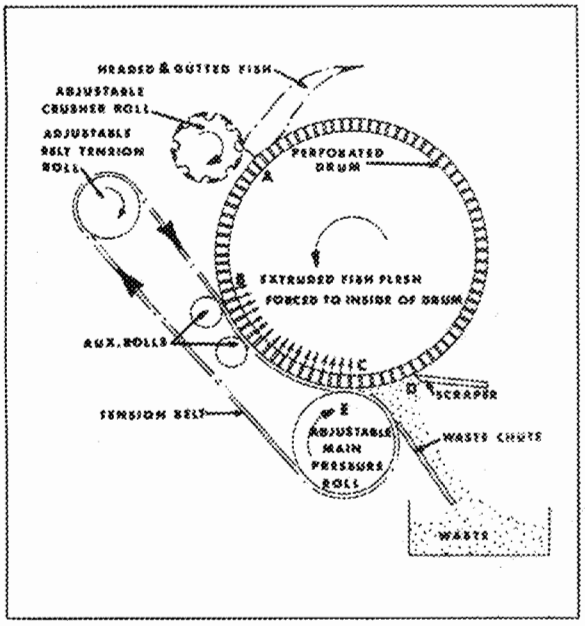
But there may be a way to preserve and market the triggerfish. A technique that will produce a highly nutritious product with a long shelf-life was developed at the U.S. Department of Commerce's Fishery Technology Laboratory in Seattle, WA. The laboratory staff and a visiting Nigerian scientist, recognizing the lack of adequate fish processing facilities in Africa, teamed up to develop a minced-smoked processing technique. The product's taste and smell will appeal to the people. It also keeps well and is easy to package.

In the Seattle process, the fish are beheaded, eviscerated, and washed, then passed through a machine that separates the edible muscle tissue from the skin and bones. The edible part is mixed with salt and a preservative, molded into desired shape, and smoked. Finally, it is sealed in polyethylene bags. All residue material can be used as a supplemental animal feed. Even the tough skin may have a use—a U.S. shoe company has indicated interest if it can obtain the skin in volume.

There is another method to preserve minced fish. In a rapid salting process that takes less than eight hours, the minced fish is immersed in a strong brine solution to bring about fluid loss. The salted product is mechanically pressed to remove excess liquid, or spread on plastic screening to drain and dry.

Triggerfish are dried and salted, then stored.





Source: Industrial Fishery Technology, 1976.

Sectional view of a fish-flesh separating machine.

Development Assistance

In September 1982, AID's Bureau for Africa funded a feasibility study to evaluate the opportunities for private sector investment to catch, process, and market triggerfish for human consumption. The study examined the potential exploitation rate of the fish, the possibilities of using the minced process, and the estimated capital outlay. It also provided an overview of markets and potential income.

The report concluded that the product would meet consumer acceptance, and that a processing plant could earn about 30% annual profit. A successful venture would generate new employment opportunities, increase capital flow, and provide a product high in protein (72%) that could be distributed to many areas where fish are not available.

Thus, in Africa, there is a large, unutilized, exploitable marine resource, and a processing technique that can convert the raw material into a nutritious product. The question is: "Can these components be combined to benefit the people who need it?"

Clearly, assistance is necessary for a pilot operation to demonstrate that triggerfish can be caught, processed, and marketed by Africans for Africans. Because of the wide geographic distribution of the species, it appears that processing facilities can be successfully operated in several coastal countries. The African feasibility study identified a high degree of interest in the Gambia and Guinea-Bissau. Other countries might well be interested, too.

As West African coastal countries become more aware of their marine resources, they are striving to develop the necessary infrastructure to exploit them. A successful triggerfish commercial fishery could show them how to reach their goals. ■

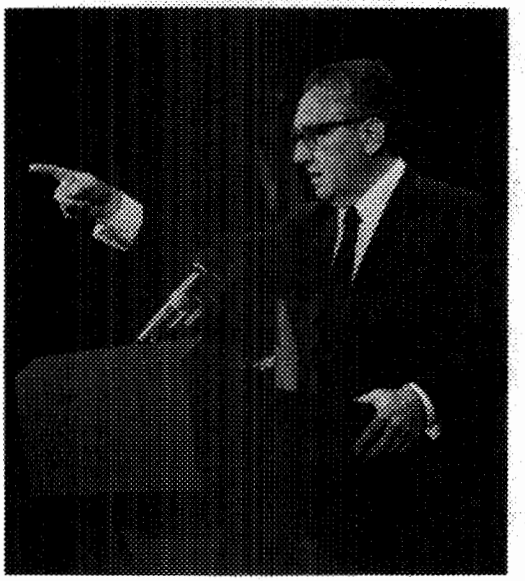
Norman L. Pease, now with the National Marine Fisheries Service, formerly was with AID's Office of Agriculture, Bureau for Science and Technology.

SPECIAL REPORT

The Kissinger Commission's Final Report

Bipartisan consensus urges doubling aid to Central America.

By Paul Olkhovsky



Henry Kissinger briefs reporters on the Commission's report.

The Reagan Administration has sent to the Congress a comprehensive plan for achieving the economic assistance objectives of the Kissinger Commission's final report, AID Administrator McPherson announced. Congressional allocation of the recommended increases in economic assistance over the next five years would dramatically expand U.S. programs in Central America.

The final report of the National Bipartisan Commission on Central America (Kissinger Commission), submitted to the President last January, calls for more than doubling U.S. economic assistance to Central America over a five-year period.

The 132-page report is the product of a 12-person committee appointed by the President in July 1983 to reach a bipartisan consensus on U.S. Central American policy. "There is a crisis in Central America, it's acute and it requires urgent attention," said Commission Chairman Henry Kissinger in a news conference after presenting the report.

The commission recommends a $400 million economic assistance supplemental in fiscal 1984 in addition to the $430 million in bilateral economic assistance now in the budget for Belize, Costa Rica, Honduras, Guatemala, El Salvador, Panama, and Central American regional programs. "The bulk of this additional assistance should be channeled through the Agency for International Development, with emphasis on creating productive jobs, providing general balance-of-payments support, and helping the recipient countries implement their economic stabilization programs," according to the report. With the increased funding, the commission calls for a summit among leaders of Central America and the United States to "initiate a comprehensive approach to the economic development of the region and the reinvigoration of the Central American Common Market."

The medium- and long-term economic objective of the commission is at least a 3% real growth rate in the region. The commission urges Congress to consider a multi-year funding of this program to ensure firm commitment to economic reconstruction and to build confidence in the private sector.

McPherson proposes a four-point program to implement the proposed increased funding:

- Economic stabilization.
- Restoration of long-term growth through the increase of jobs.
- Equity through increases in agriculture, health, and education programs.
- Promotion of democratic government and human rights.

"Deep recession is an immediate problem in the region," McPherson said. "The oil price increases of 1979 have meant more dollars were needed while commodity prices dropped in recent years, meaning less money coming in. Political instability and economic conditions have dried up short-term trade credit which was the lifeblood of importers.

"It is critical to stabilize this situation. A key component is a large trade credit or balance-of-payments program which will provide hard currency for necessary imports. This stabilization effort is intended to give breathing room for these economies to get about the business of economically restructuring their economies and dealing with poverty problems," the Administrator said.

One of the goals of the proposed increase in funding is to reduce infant mortality by 15%.

The 11 members of the National Bipartisan Commission on Central America, chaired by former Secretary of State Henry Kissinger:
Nicholas Brady, New Jersey businessman and former Republican senator from New Jersey.
Henry Cisneros, Democratic mayor of San Antonio, TX.
William Clements, former Republican governor of Texas.
Carlos Diaz-Alejandro, professor of economics at Yale University.
Wilson Johnson, president of the National Federation of Independent Business.
Lane Kirkland, president of the AFL-CIO.
Richard Scammon, Washington political consultant.
John Silber, president of Boston University.
Potter Stewart, former Supreme Court justice.
Robert Strauss, a Washington lawyer and a leader in the Democratic party.
William Walsh, president of Project Hope.

Not only is economic stabilization critical, but the economic structure of the countries poses problems, McPherson observed. "In recent decades there has been a population explosion. About 250,000 new job seekers come on the market every year and about 500,000 will be looking for employment by the turn of the century. The program we intend to follow will help to change the economic structure and make people more productive. Countries must provide growth/export-oriented policies, such as adjusting exchange rates so as to encourage industry and export. Our goal is to achieve 3.5% real growth in per capita incomes within five years, and to generate $1 billion in exports creating more than 250,000 new jobs per year," McPherson said.

"Poverty is a severe problem and must be tackled—there cannot be broad-based growth without the social investments that make people more productive. We propose a very substantial literacy and education-strengthening program as recommended by the report. Our major goal in five years is to get primary school enrollment above 95%. Adequate health and housing are also major tasks to accomplish. With the proposed increase in funding our goal is to reduce infant mortality by 15%, have 500,000 new users of family planning services, increase water and sewage coverage by 25%, and provide support for better housing for 100,000 families in the region," said McPherson.

The fourth point of the program deals with democratic institutions and human rights. "These fundamental concerns obviously are critical to quality of life and also help to determine whether economic growth is in fact broadly based. For example, a democracy tends to foster the political, social, and economic structure to make benefits more widely available. Our goal is to see progress in all countries toward democratic institutions, where individual rights are recognized, and where all strata of society participate in the political process," according to McPherson.

To give form and structure to the development effort, the commission suggests establishing a Central American Development Organization (CADO), that would consist of the United States and the countries receiving assistance. Twenty-five percent of U.S. aid to the region would flow through this organization. Participation would be conditioned on acceptance of and continued progress toward defined political, social, and economic goals.

The commission urges that recipient nations be required to pledge a firm commitment to reforming tax systems, encouraging private enterprise and individual initiative, creating favorable investment climates, curbing corruption where it exists, and spurring balanced trade.

The report also calls for an increase in P.L. 480 food aid. While specific figures are not given, the commission proposes an increase in food aid on an emergency basis.

AID's agreement with the International Executive Service Corps (IESC) was favorably reviewed by the commission. Expansion of IESC's program is urged with particular emphasis on training managers of small businesses.

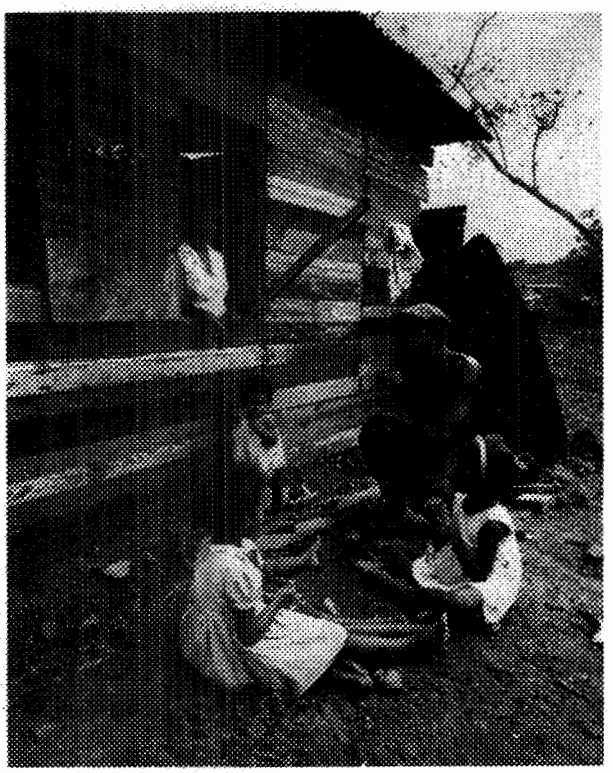
In the area of health, the commission report recommends resumption of AID-sponsored programs to eradicate vector-borne diseases such as malaria and dengue fever. The report urges expanding oral rehydration therapy and immunization programs to reduce the incidence of childhood disease and mortality in Central America during the next five years. Overpopulation presents a serious threat to the development and health of the region, contends the commission, which recommends "the continuation of the population and family planning programs currently supported by the Agency for International Development."

Pointing out that three-quarters of the region's population lacks sufficient housing, the commission urges expanding housing construction and improvement programs. However, the commission states, "Central Americans, in both the public and private sectors, must inevitably bear the major part of the burden of providing adequate shelter to their people." The commission recommends supporting accelerated education and training of professionals in public administration to improve the capabilities of Central Americans to design and carry out new programs.

"The time is right for the economic initiative described in the report of the Kissinger Commission for two reasons," McPherson said. "First, the economic trauma of the past several years has created a willingness in the region to act that has not existed before. Governments know that 'band-aids' are not enough, and are now willing to make major policy reforms necessary to make a new infusion of aid work. I stress that money alone will not improve the conditions in the region, sound economic policies are needed to make programs work.

"Second, the Caribbean Basin Initiative (CBI) has created an unprecedented opportunity for Central America," continued Administrator McPherson. "CBI will provide for a future increase of exports to the United States which, in turn, will create many of the productive jobs needed for new entrants into the Central American work force," he concluded. ■

Paul Olkhovsky is a staff writer in AID's Bureau for External Affairs.



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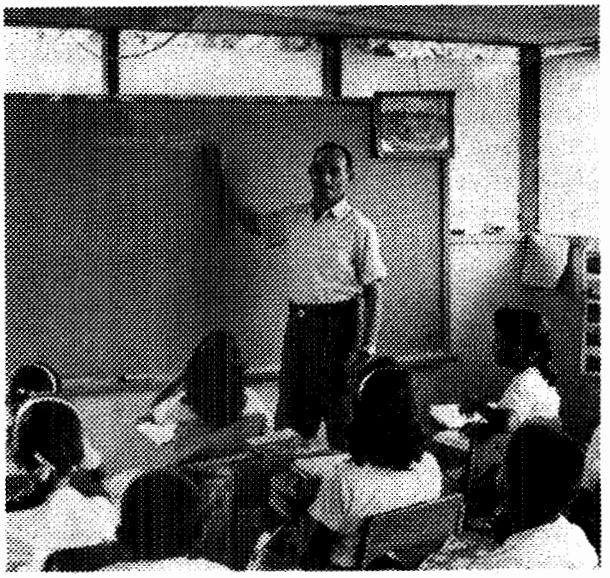


The panel recommends a substantial literacy and education-strengthening program.

Why Change a Good Thing?

By Jeff Wartluft

For centuries wood has been converted into charcoal by burning in earth-covered pits. On the eastern Caribbean island of Montserrat, as in many other countries of Africa, Asia, and Latin America, this technology is still the standard practice (fig. 1). One would think techniques this old must be slow and inefficient, and require lots of hard physical work.

Not according to Montserrat's coal burners (charcoal producers) Mary Irish and James Allen. "You can't make any more or better coal (charcoal) than we can in our pits," they say. Maybe they have something there. After all, they've had many years to work the bugs out of the system. However, according to some experts, metal or concrete kilns are more than twice as efficient as those old coal pits.

To find efficient ways to use local renewable energy from the forests, the island's government started the Montserrat Renewable Energy project with help from AID, the Caribbean Development Bank, and Volunteers in Technical Assistance (VITA). One of the project's studies designed and tested efficient ways of producing charcoal, a cooking fuel of increasing popularity in the Caribbean.

With the help of project assistant Stedford White and kiln operator James Silcott, both island natives, nine simple techniques for small-scale charcoal production were selected. These techniques were compared with the pit method operated by skilled Montserratians.

Scientifically controlled trials indicated that metal kilns and retorts —a type of kiln that uses some of the exhaust gases to heat the system—were faster and, in some cases, they required less work. But they were no more efficient in terms of yield than coal pits, and they were less economical.

As one coal burner put it, "Your coals don't have any substance." Fast carbonization of wood means higher temperatures, which drive more of the volatile gases out of the wood. The resulting charcoal is lightweight, crumbly, and harder to ignite—hence, has less "substance." Montserratian cooks consider that poor quality. Of course, kilns and retorts could produce a high quality product if they operate in a slower mode, but would thus lose their main advantage—speed.

In general, the newer techniques require less physical work. But the small models using single oil drums require almost constant attention. Also, more wood cutting is needed to fit pieces in the smaller models. Labor-saving technology is often desirable, but may not be as effective in developing countries where there is usually surplus labor.

In terms of charcoal yield (in pounds charcoal per 100 oven-dry pounds of wood raw material), retorts were the winners (fig. 2).

However, coal pits ranked a surprising second, averaging three and seven percentage points ahead of the New Hampshire and single drum (modified Costa Rican, Tongan, and three-pipe Mini CUSAB designs) kilns (fig. 3).

Economically, coal pits won hands down. In terms of return per dollar invested including labor, the coal pit was about twice as economical as the next closest method.

Using metal kilns in a small island economy is difficult to justify. Among the definite advantages of metal kilns and retorts are ease of operation, and control over position than is possible with coal pits. A group of 8- to 14-year-old boys from the Montserrat boys' home made a perfect run with a retort on their first try (fig. 2). Because control over carbonization is more positive in kilns and retorts, results are more predictable and the product can be more uniform. So, metal kilns and retorts are attractive alternatives to produce charcoal for

Comparison of Technologies Based on Charcoal Yields

Technique	Number of Trials	Average Efficiency in Percent Yield
retort	18	32
coal pit	7	29
New Hampshire kiln	6	26
single drum kiln	20	22

Comparison of Technologies Based on Return per Dollar Invested

Technique	Return per Dollar Invested including labor
retort	$1.05
coal pit	$8.60
New Hampshire kiln	$4.60
single drum kiln	$1.34

Figure 1

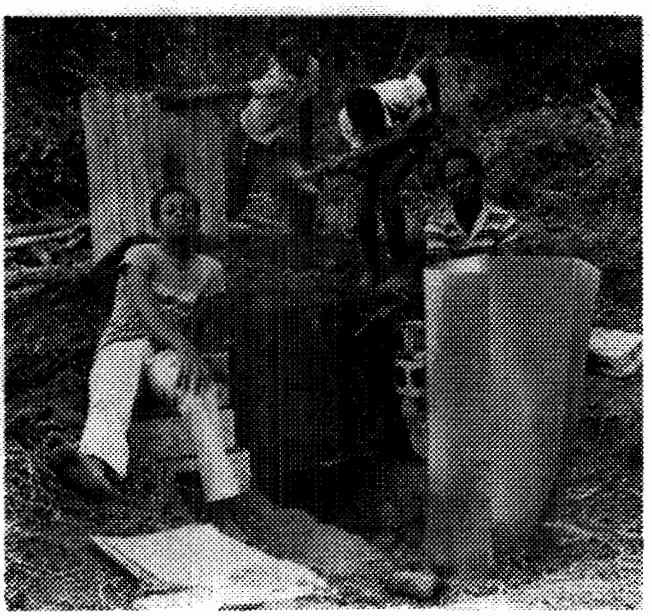


Figure 2

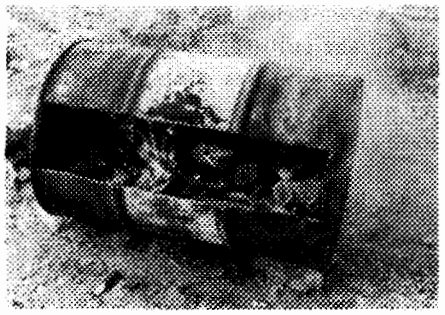


Figure 3

Figure 4

Different technologies used to produce charcoal are the coal pit (fig. 1), retort (fig. 2), single drum kiln (fig. 3), and New Hampshire kiln shown with a coal pit in the background (fig. 4).

industrial processes, which have stricter specifications, must maintain a production schedule, and require quick training.

The size of the metal kilns and retorts used in the trials (the New Hampshire was the largest at about 90 cubic feet capacity) does not allow successful carbonization of large pieces of green wood. Coal pits, on the other hand, readily do. James Bradshaw, largest coal burner in Montserrat, currently is using both the New Hampshire kiln, which his neighbors have dubbed the "tank," and a coal pit for the larger chunks of wood (fig. 4). Further cutting and/or splitting of these larger chunks would be impractical with available tools and the branchy nature of the wood.

Many coal burners, including Mary Irish and James Allen, attended a demonstration of kilns and retorts. They did not, however, take up the offer to try the newer techniques.

For a detailed account of the Montserrat charcoal trials, see "Comparing Simple Charcoal Techniques for the Caribbean" by Jeff Wartluft, VITA, 1915 North Lynn St., Suite 200, Arlington, VA 22209. ■

Jeff Wartluft, a VITA volunteer, recently returned from Montserrat where he was project manager for the project's charcoal cookstove component.

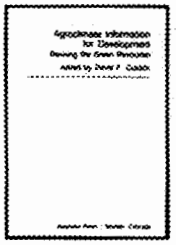
BOOKCASE

Climate is More Than An Uncontrollable Variable

Agroclimate Information for Development: Reviving the Green Revolution

Edited by David F. Cusack, Westview Press, Inc., 1983; 397 pp. $20.00

A review by Raymond E. Meyer



Agroclimatology or agrometeorology is the science of those climatic or weather factors important to agriculture. While its importance is often recognized, thorough understanding of the agroclimatic system is very limited and frequently misunderstood. Climate is generally thought of as an uncontrollable variable that results in good production or disaster rather than as a valuable resource. This book tries to make the reader realize that an understanding of the agroclimatic system can influence the success or failure of agricultural development activities.

Understanding a region's agroclimatic system may provide an excellent technical base for appropriate technology transfer. While climate in temperate and tropical zones differs, the differences may not be as great to a particular growing plant. Thus, although the average *annual* temperature of tropical areas may be higher than in temperate regions, the *daily* maximum often may often be much higher during the active crop growing season in temperate regions. The *annual* solar energy or radiation load may be higher in tropical regions, while the *daily* solar radiation may be much greater in temperate regions during the active summer growing season. In many temperate regions, actual *daily* evapotranspiration demand during the growing season is much higher than in most tropical regions.

Conventional wisdom often is at odds with this information and perhaps is part of the reason for the lack of success in many agroecological areas. Another example of agroclimate misunderstanding is the frequent statement that rainfall is below normal for a particular region—meaning that the *average* precipitation is not being obtained that particular year or for several years. An analysis of the precipitation data in semiarid areas reveals that, in fact, the probability of receiving the average rainfall may be, in many cases, only 20-30% and thus the normal or *expected* but not the *mean* precipitation is actually being obtained. This lack of understanding can have serious implications in the analysis of a particular farming system.

Therefore, it is important to know the agroclimate during the crop-growing season rather than during the calendar year. The high potential productivity of the tropics is due more to the possible two or three growing seasons rather than the productivity of any one growing season.

Agroclimatic models can contribute to the use of the scientific method and technology transfer for food production and improved agricultural development. Part of the strength of such a model in technology transfer is that it permits matching a growing season or crop calendar against an historical climatic record. A new variety with a 90-day maturity may actually yield more than a 150-day variety, over several years, even though it has a lower potential yield. Because of its decreased climatic exposure, the short-season crop may have a lower probability of failure or a lower risk factor in the dominant agroclimate of a geographical area.

The book is based on papers and presentations prepared for the "First Interamerican Symposium on Agroclimatic Models and Information Systems: Their Value and Adaptation in Developing Countries," held in Caracas, Venezuela Sept. 20-26, 1981, with participants from 26 nations. Some of the material was modified at a subsequent briefing for the international development community at the Inter-American Development Bank in Washington, DC.

The book is organized into four parts with 28 contributions. While its primary focus is on Latin America, most of what is presented has general applicability. There is a good mix of authors of different nationalities and with somewhat different viewpoints.

The first section gives a general overview of climatic information and world agriculture. The youthful development stage of the tropical agricultural sciences with possible gains is outlined. The tools available for advancing knowledge in the tropical agricultural sciences are more powerful than ever before. Venezuela and Peru serve as examples with some historical background of the Incan relationship with climate and weather provided. The UN Food and Agriculture Organization's experience in determining land use potentials through agroecological zoning is discussed. While the book stresses the need for a multidisciplinary effort, it also acknowledges that much can be done with relatively simple methods—expensive large computers are not essential.

Lloyd Slater of the Aspen Institute Food and Climate Forum/Academy of Independent Scholars presents an excellent wide-ranging chapter on how climate shapes the world food problem. He discusses reasons for instability in food production systems, effects of resource constraints, social and policy factors, and science and technology inputs. The impact of climatic anomalies is discussed, implying that the food system's structure, including its social and political

components, often may be more important than the anomaly itself. The food system's *sensitivity* to climate, as much as climate itself, may shape a food disaster.

Three strategies are proposed to minimize climate's influence on food production.

- Implement policies which reduce the food system's sensitivity to climatic impact and improve stability in world and local supplies.
- Apply scientific and technological methods of crop selection and tillage to reduce climatic impact at the producing or farming level.
- Increase knowledge of climate variability and its interaction with local food-growing environments so that farmers can better plan within the constraints of climatic and weather fluctuations.

Strategies for the next 20 years, involving priorities in both policy and research and development, are suggested that could improve "how abundantly food is produced and delivered."

The second section gives the more technical basis for agroclimatic modeling and its applicability. A fair degree of technical background is required to read this section with comprehension.

The models discussed include "mechanistic-type crop growth simulators, statistically based crop/weather analysis models, and multiple regression yield models." Using models to aid planners and decision makers in both short- and long-term predictions is emphasized. The overall implication is that there are enough models to answer many developmental questions but there is a shortage of qualified individuals in developing countries to make the most effective use of them. The use of crop zoning is discussed as a means of indicating climatic potential for food production.

George Hargreaves of Utah State University, with over 30 years' experience in international agricultural development, emphasizes the importance of matching data availability and reliability with the sophistication of the model. In much of the developing world, climatic data are limited or unreliable, making overly sophisticated models inappropriate. Using existent data with relatively simple empirical relationships can provide a considerable amount of useful information *now* rather than waiting for mechanistic model development and evaluation in new areas and crops.

Impact assessment programs with early warning information are discussed. The importance of such programs to allow short-term economic decisions for mitigating probable economic loss is outlined. The possible "misuse" by international marketers positioning themselves to take advantage of potential economic or food problems is not discussed. This can be a very sensitive political area for developing countries.

> "Understanding of a region's agroclimatic system can influence the success or failure of agricultural development activities."

The third section of the book presents examples of the use of agroclimatic modeling in a number of countries. The countries are all in Latin America except for Kenya. Unfortunately, the presentations are primarily descriptive of current situations or what might be future possibilities; there are no success stories. The use of modeling and simulation as a research tool for guiding research initiatives in Brazil is presented very ably and is a very important aspect. A more sophisticated model developed for Chile which includes soil considerations is discussed but seems rather complex for general use in most developing countries at the extension agent or farmer level. An excellent presentation of agrometeorological modeling in a dryland area of Kenya is the most useful example of actual use at the farmer level and of how management decisions can be influenced.

The last section addresses some of the more broad societal questions. User conflicts, public policy, and other social-political issues are discussed. How they can influence the type of communication and information delivery system needed is presented. Technology transfer as a process together with human interaction also is presented. A synopsis of four workshops, and a summary of the executive briefing held for the international development community is given at the end.

All in all, the book is quite useful as an introduction to the importance of agroclimatic information and its potential usefulness. More input and examples from the Asian and African continents would have been desirable.

U.S. agriculture is the prime example of the successful use of science to solve food production problems. Surely enough has been learned to enable us to develop production technologies appropriate for the many different and complex situations in tropical developing countries. Agroclimatic modeling is a part of that process but must be recognized for the tool that it is and not become an end to itself. AID has been involved, continues to be involved, and is expanding its efforts in the use of agroclimatic, as well as edaphoclimatic models for more efficient and effective technology transfer. ■

Raymond E. Meyer is a soil scientist in AID's Office of Agriculture in the Bureau for Science and Technology.

CARD CATALOGUE

Environmentally Sound Small-Scale Forestry Projects: Guidelines for Planning

Peter F. Ffolliott; John L. Thames
Coordination in Development, Inc.; Volunteers in Technical Assistance, Inc.
1983; 109 pp.

This manual presents guidelines to assist community development workers in planning environmentally sound small-scale forestry projects. Discussion centers on planning the relationship between forestry and ecology, and the difference between natural and man-made forests. Basic principles of good forestry practices are included. Appended are a bibliography and a set of ecological guidelines for use in evaluating small-scale community development projects.

Paper copy $15.47
Microfiche $ 2.16
PN-AAM-723

Discharge and Mechanical Efficiency of Egyptian Water-Lifting Wheels

Roger Slack; Hassan Wahby; Wayne Clyma
Colorado State University; Consortium for International Development
1983; 29 pp.

Data on 35 spiral-shaped waterwheels from Egypt's Mansuriya and Kafr El-Sheikh regions were used to develop a field procedure for calibrating the discharge per revolution relative to the percent of submergence of the wheel. A procedure was developed to determine a wheel's mechanical efficiency from field data. Data on 11 waterwheels from the Kafr El-Sheikh area were analyzed.

Paper copy $4.81
Microfiche $1.08
PN-AAM-711

Nutrition-Related Policies and Programs: Past Performance and Research Needs

Ellen T. Kennedy; Per Pinstrup-Anderson, et al.
International Food Policy Research Institute
1983, 104 pp.

Critical gaps in current nutrition research are identified and priority areas for future work are outlined. Chapter notes and a bibliography are provided.

Paper copy $14.17
Microfiche $ 2.16
PN-AAM-536

Fertilizer Bulk Blending in Costa Rica

Albert Soday; Howard Weir; Kirby B. Carpenter
Agricultural Cooperative Development International
1983, 25 pp.

The economic and technical feasibility of establishing a fertilizer bulk blend plant for Costa Rica's cooperative sector is the subject of this report. It concludes that a new bulk plant would be of marginal benefit to Costa Rica in the immediate future. Costa Rica's chemical process fertilizer plant is deemed adequate, and there are production and marketing advantages of chemical over bulk fertilizers. Marketing infrastructure, however, could be improved.

Paper copy $3.64
Microfiche $1.08
PD-AAM-401

Development Issues: U.S. Actions Affecting Developing Countries, the 1983 Annual Report of the Chairman of the Development Coordination Committee

M. Peter McPherson
AID, Development Coordination Committee
1983, 222 pp.

This report summarizes economic development issues and U.S. assistance programs in 1982. It reviews the status of developing countries in the world economy in terms of current levels of development, international trade and lending, private direct investment, economic policies, and the North-South dialogue in international economic systems. It explains the objectives and priorities of U.S. support for bilateral and multilateral programs and describes U.S. support for MDB programs.

Paper copy $30.16
Microfiche $ 3.24
PN-AAM-888

Proceedings: Panel Discussion on Science and Technology Planning and Forecasting for Indonesia: Special Emphasis on Manpower Development

National Academy of Sciences, National Research Council
1983, 143 pp.

In 1982, Indonesian and U.S. experts looked at the levels of scientific and technical manpower needed to ensure continued economic growth in Indonesia. The experts found that Indonesia must increase significantly the number of its trained personnel and the quality of their training within severe time and resource constraints. Technical working group reports on biotechnology and agro-industry, water and environment, industrial development and microelectronics, and marine science and underwater technology are included. Also included are two plenary session summaries, recommendations, many reports and background materials.

Paper copy $18.98
Microfiche $ 2.16
PN-AAM-800

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INTERNATIONAL CALENDAR

APRIL

2-June 8 Course on "Appropriate Technology and International Development Strategies," sponsored by the Farallones Institute. Contact: Glen Price, Director Farallones International, 15290 Coleman Valley Rd., Occidental, CA 95465

4-5 Board for International Food and Agricultural Development (BIFAD) meeting, sponsored by AID, Washington, DC. Contact: John Rothberg, AID/BIFAD, Room 5318, Washington, DC; telephone (202) 632-0228

15-17 The Association of Private Enterprise Education meeting on industrial policy, entrepreneurial management, and the Caribbean Basin Initiative, San Francisco, CA. Contact: Calvin Kent, Secretary-Treasurer, Association of Private Enterprise Education, Hankamer School of Business, Baylor University, Waco, TX 76798; telephone (817) 755-3766

16-18 National Council for International Visitors Program Training Institute II, Atlanta, GA. Contact: NCIV, 1630 Crescent Pl. NW, Washington, DC 20009; telephone (202) 332-1028

23-25 Workshop on "Universities and International Health: Building Partnerships," co-sponsored by the National Council for International Health and the University of North Carolina, Chapel Hill, NC. Contact: Barbara Kohl, Conference Coordinator, NCIH, 2100 Pennsylvania Ave. NW, Suite 740, Washington, DC 20037; telephone (202) 466-4740

30-June 17 Sixth International Course on Applied Taxonomy of Insects and Mites of Agricultural Importance, London, U.K. Contact: Director, Commonwealth Institute of Entomology, 56 Queen's Gate, London SW7 5JR, U.K.

MAY

The International Fertilizer Development Center will be hosting many programs both in the U.S. and abroad on fertilizer use. Contact: Donald McCune, Managing Director, IFDC, P.O. Box 2040, Muscle Shoals, AL 35660; telephone (205) 381-6600

7-8 Board for International Food and Agricultural Development (BIFAD) meeting, sponsored by AID, Washington, DC. Contact: John Rothberg, AID/BIFAD, Room 5318, Washington, DC; telephone (202) 632-0228

7-10 Third International Symposium on Parasitic Weeds, sponsored by ICARDA, Aleppo, Syria. Contact: C. Parker, Weed Research Organization, Begbroke Hill, Sandy Lane, Yarnton, Oxford OX5 1PF, U.K.

8 International Symposium on Crop Protection, sponsored by State University, Gent, Belgium. Contact: Dr. Welvaert, Faculty of Agricultural Sciences, State University, Coupure links 653, B-9000 Gent, Belgium

13-18 Second International Rangeland Congress, Adelaide, Australia. Contact: P.J. Joss, CSIRO, Division of Land Resource Management, Private Bag, PO, Deniliquin, New South Wales, Australia 2710

14-15 Joint Committee on Agricultural Research and Development (JCARD) meeting, sponsored by AID, Washington, DC. Contact: John Stovall, AID/BIFAD, Room 5316, Washington, DC 20523; telephone (202) 632-8532

15-18 Symposium on Biotechnology for Fuels and Chemicals, sponsored by the U.S. Department of Energy's Oak Ridge National Laboratory, Gatlinburg, TN. Contact: Charles D. Scott, ORLN, P.O. Box X, Oak Ridge TN 37830; telephone (615) 574-6775

17-19 "Global Cross Roads: Educating Americans for Responsible Choices," sponsored by the National Assembly Secretariat, Global Perspectives in Education. Topics range from international development to communications technologies. Contact: The National Assembly Secretariat, Global Perspectives in Education, Inc., Box 10, 218 East 18 St., New York, NY 10003

24-29 American Association for the Advancement of Science (AAAS) annual meeting, New York, NY. Contact: AAAS Meetings Office, 1776 Massachusetts Ave. NW, Washington, DC 20036

30-June 5 Fifty-eighth DLG-Ausstellung International Agricultural Show, Frankfurt am Main, West Germany. The 1984 show will present a comprehensive survey of worldwide products and inputs for the agricultural industry. Contact: Deutsche Landwirtschafts-Gesellschaft, Zimmerweg 16, D-6000 Frankfurt am Main 1, West Germany

JUNE

4-8 World Congress of Rehabilitation International. The theme is "Information, Awareness and Understanding for Integration," Lisbon, Portugal. Contact: National Secretary of Rehabilitation, 63-5 Av. Conde Valbom, 1000 Lisbon, Portugal

4-July 20 Course on Agricultural Research Methodology, sponsored by the U.S. Department of Agriculture, Washington, DC. Contact: David P. Winkelmann, Deputy Administrator for International Training, Room 4118, Auditor's Building, Office of International Cooperation and Development, USDA, Washington, DC 20250

6-7 Board for International Food and Agricultural Development (BIFAD) meeting, sponsored by AID, Washington, DC. Contact: John Rothberg, AID/BIFAD, Room 5318, Washington, DC; telephone (202) 632-0228

11-13 Annual National Council for International Health Conference. The theme is "International Health and Family Planning: Controversy and Consensus." Presentations will document successful programs in both developed and developing countries, as well as programs that evaluate both the short-term and long-range impact of international family planning projects, Washington, DC. Contact: Barbara Kohl, Conference Coordinator, NCIH, 2100 Pennsylvania Ave. NW, Suite 740, Washington, DC 20037; telephone (202) 466-4740

11-July 20 Course on Integrated Pest Management, sponsored by the U.S. Department of Agriculture, Washington, DC. Contact: David P. Winkelmann, Deputy Administrator for International Training, Room 4118 Auditor's Building, Office of International Cooperation and Development, USDA, Washington, DC 20250

JULY

9-20 International Training Course on Crop Loss Assessment, St. Paul, MN. Contact: Paul S. Teng, Department of Plant Pathology, University of Minnesota, St. Paul, MN 55108

15-18 Annual meeting of the Aquatic Plant Management Society, Richmond, VA. Contact: The Aquatic Plant Management Society, PO Box 06005, Ft. Myers, FL 33906

16-20 International Citrus Congress, Sao Paulo, Brazil. Contact: D. C. Giacometti, Cenargen, Caixa Postal 102372, 70770 Brasilia, Brazil

18-19 Board for International Food and Agricultural Development (BIFAD) meeting, sponsored by AID, Washington, DC. Contact: John Rothberg, AID/BIFAD, Room 5318, Washington, DC; telephone (202) 632-0228

19-20 International Symposium on Salmonella, New Orleans, LA. Emphasis on practical methods to prevent salmonella in food animals and their products and in humans. Contact: Dr. G.H. Snoeyenbos, Paige Laboratory, University of Massachusetts, Amherst, MA 01003

Any additions or corrections should be sent at least three months in advance of the event to International Calendar, Horizons, AID, Room 4890 NS, Washington, DC 20523 or telephone (202) 632-4330.

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