CPSS

CENTRAL PROGRAM STRATEGY STATEMENT

FY 1987 - 1991

BUREAU FOR SCIENCE AND TECHNOLOGY

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Agency for International Development
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AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

SENIOR ASSISTANT ADMINISTRATOR

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CPSS

BUREAU FOR SCIENCE AND TECHNOLOGY

I am pleased to distribute the first CPSS for the Bureau for Science and Technology.

Much effort of many individuals went into the preparation of the CPSS. Each of our Technical Offices prepared strategy statements which were shared with and discussed by the respective Sector Councils. The Bureau strategy -- the CPSS -- is based on those statements.

I chaired the Agency review of the document on May 12 and was impressed with the constructive reaction to the document. During the review, we agreed to make some revisions to the CPSS and this version contains those changes.

There was concern at the review that the CPSS did not contain a clear sense of priorities either within or between problem areas.

As to the concern with program priority within problem areas, we have revised the CPSS to make more explicit those elements of our program which are, in general, our first order of priority.

I would like to briefly highlight those priorities by problem areas:

Inadequate Income Growth

-- Increased farmer income through better technologies and farm management.

-- Increased employment in rural, labor-intensive enterprises.

-- Expanded use of indigenous fuels.

Hunger

-- Improved stress tolerance of plants and animals.

-- Maintaining the natural resource base for sustained food and income production.

-- Expanding the supply of energy for agriculture.

Health Deficiencies

-- Programs which support the Agency's Child Survival efforts.

-- Malaria vaccine research.

Lack of Education

-- Improving the efficiency of educational systems.

-- Increased cost-effectiveness of the participant training program.

Unmanageable Population Growth

-- Developing improved contraceptives.

-- Improved cost-effective service delivery.

-- Enhanced availability of family planning services in Africa.

On the concern with priority among problem areas, as the CPSS states, we perceive that our function is to support the Agency's Strategic Plan with basic and applied research and with appropriate technical support activities. We believe that S&T has a responsibility to help the Agency work to alleviate the development problems spelled out in the Strategic Plan and, therefore, need to maintain programs that address key aspects of all five problem areas.

There was also concern expressed about how we select our projects - the criteria we use. I believe that the CPSS lays that out pretty well. The Bureau, working closely with the Sector Councils, conceives, plans and implements: (1) future-oriented, technology development activities that cannot be undertaken by an individual mission or geographic bureau; (2) R&D that

is planned and implemented in collaboration with missions; (3) service programs which can best be administered centrally; and, (4) specialized technical assistance activities that can best be managed centrally. On balance, at least 70 percent of the Bureau's program goes to direct field operations. S&T believes that this proportion is appropriate.

N. C. Brady
Senior Assistant Administrator
for Science and Technology

ENCLOSURE:
S&T CPSS

June 18, 1986

BUREAU FOR SCIENCE AND TECHNOLOGY
CENTRAL PROGRAM STRATEGY STATEMENT
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S&T BUREAU

1. Executive Summary

The creation and use of improved technologies are requisites for economic progress. No country -- industrialized or Third-World -- has moved up the economic development ladder without such technologies, either borrowed or self-created. Helping the developing countries create and use improved technologies applicable to their circumstances is a primary AID responsibility, and the Bureau for Science and Technology plays a major role in carrying out that responsibility.

Some industrial world technologies can be applied directly in low income countries. But creating improved technologies specifically suited to tropical and sub-tropical LDCs must be an important part of our program because their diseases, ecologies, plant and animal species, and societies differ greatly from ours. Accelerated well-targeted R&D -- adapting science and technology to treat current development programs -- can contribute greatly to the ultimate goal of a healthy, productive life for all people.

AID has been instrumental in technological progress already made. The Green Revolution, India's self-sufficiency in food, the emerging malaria vaccine, productive onchocerciasis campaigns, smallpox eradication, the NORPLANT^{R} contraceptive implant, and radical improvement in rural credit and savings strategies are science-based successes that AID participated in and can be proud of. But much more is needed to help lift large numbers of people out of poverty. Hundreds of millions are still underfed, undernourished, sick, illiterate and unable to earn adequate incomes. Better contraceptives and family planning delivery

systems are urgently required. The deterioration of forests and other natural resources must be curtailed. Means of enhancing employment, especially in the private sector, must be sought.

The Bureau for Science and Technology (S&T) plays a dual role in enhancing the Agency's focus on science and technology. First, it plays an Agency-wide leadership role in stimulating and encouraging the creation and use of improved technologies to remove development constraints. This role is implemented by interactions with Agency leadership, missions, and regional bureaus on the one hand, and with the external scientific and educational community on the other. These interactions increase the Agency's awareness of ways that science can be more effectively used in the development process. They also attract the interest in development problems of the scientists and technical personnel outside the Agency.

The second role of the Bureau for Science and Technology is to plan and carry out specific scientific and development activities which either cannot be done by the field missions, or which can be done more effectively and efficiently through a centrally-managed bureau. These activities can be classified into four principal types of activities:

> Basic and applied research aimed at creating new and improved technologies of generic or global significance. These activities are not specific to any particular location (example: the malaria vaccine).
>
> Collaborative research and development activities which are planned, funded and implemented jointly with host countries, missions, regional bureaus and other donors and which are carried out primarily in developing countries and regions (example: improving efficiency of educational systems).

Technical field services that are most effectively managed centrally and that are not specific to any particular country (example: grants to population intermediaries).

Technical field support to specific country mission projects with science and technology components (example: Child Survival program assistance).

The S&T portfolio in the 1980s has consisted of technology generation through worldwide and collaborative research and development (35%), worldwide technical field services (40-45%), and technical field support (20-25%). Considering the latter together with the heavy field operational content of collaborative R&D and worldwide services, at least 70 percent of the S&T budget goes to direct field operations. The Bureau finds these proportions appropriate and plans to continue them in the CPSS period.

Through both its roles, the Bureau for Science and Technology directly supports the key global development problems analyzed in AID's Strategic Plan:

Inadequate income growth
Hunger
Health deficiencies
Illiteracy and lack of education
Unmanageable population pressures

For each problem, S&T works catalytically with geographic bureaus, missions, host countries and other donors to ensure that the best of science and technology is used to complement and support operational country-development programs. The Bureau provides broad scientific and technological expertise to analyze and attack development problems, and finances selected S&T activities which can help the Agency and the developing world meet

the Strategic Plan's targets. Within the broad context of the Plan, priorities are established through close collaboration with regional bureaus and the Agency Sector Councils, and through consultations with S&T's wide network of outside technical experts. S&T provides field support in selected priority areas of the missions and regional bureaus' interest - areas for which S&T has a comparative advantage, e.g. where specific problems cut across regions or can best be treated centrally.

Collaborative research and development will concentrate on important themes developed jointly with geographic bureaus and missions. Basic research will be problem oriented, addressing needs established by technical networks or through deliberations within the Agency and the development community.

The S&T Bureau's strategic purpose, in partnership with geographic bureaus and missions, is to guide scientific research and technological development, along with associated investment, services and networks, in a worldwide attack upon the key development problems. These problems embrace universal development issues that share many features despite country and continental manifestations.

In its broadest sense, the S&T Bureau's strategy recognizes technical research and adaptation as primary requisites for economic development. It affirms ongoing experimentation, testing, adaptation, field trials and in-country application as the steps in development progress. It confirms that progress on the large issues of development must be catalyzed in a manner and from an organizational format that can (1) marshall resources to tackle universal problems and (2) disseminate scientific and technological results widely and efficiently so that developing nations can reap their full benefits.

As an Agency, AID is appropriately organized along country lines, with scores of highly decentralized field offices developing programs responsive to the needs of their respective host countries. This very structure makes it essential to have a central point in the Agency for promoting and supporting the broad application of science and technology to development problems, for taking the long view of development requirements. That point is the Bureau for Science and Technology.

To carry out that mission, the S&T Bureau proposes the following orders of budget magnitude over the five fiscal years of the CPSS period.

FY '87 CP	FY '88	FY '89	FY '90	FY '91
235,350	273,200	277,292	280,719	283,673

Subsequent to the initial drafting of the CPSS, the Administrator approved an FY 1988 budget planning level for S&T some 16 percent over the FY 1987 CP to help compensate for drastic budget reductions in 1986 and severe funding shortages in FY 1987. The proposed rate of increase declines each year thereafter.

While we do not expect significant increases in direct-hire staff ceilings over the CPSS period, we shall continue to obtain the advisory services of outside consultants.

2. Analysis

2.1 Role and Importance of Science and Technology in Development

The creation and use of improved technologies are requisites for economic progress. No country has moved up the economic development ladder without such technologies, either borrowed or self-created. All industrial countries have been and are critically dependent on science-based technologies. Those Third World countries that have moved into middle income status have done so using new science-based technological and institutional tools. Even low income countries have begun to develop and use improved technologies to accelerate their economic development. Scientific research and technological development are essential to the ultimate goal of a healthy, productive life for all people.

Helping the developing countries create and use improved technologies applicable to their climatic, economic and social conditions is a primary responsibility of AID, which is looked to throughout the world as a major source of new ideas, knowledge and experience. The Bureau for Science and Technology is the Agency's principal organization for systematically examining development problems and applying science and technology to solve them.

Developing countries have yet to benefit fully from the science-and-technology-based advances of the last two centuries. Accelerated R&D -- adapting science and technology to treat current developments -- can make a significant contribution to overcoming that gap in a reasonable period of time. As the number of people living in absolute poverty increases in the last years of the twentieth century, the development of improved technologies adapted to low income countries becomes more urgent than ever before.

Some new technologies needed by the developing nations have been created in the industrial world and need only be applied in the low income countries. Modern medicines, fertilizers, agricultural chemicals and contraceptives are examples of such technological products which the Agency is helping the Third World use.

But the creation of improved technologies suitable specifically for Third World countries must also be a part of our programs. Most developing countries are located in tropical and sub-tropical areas that have problems which are not likely to be solved by temperate zone technologies. We do not have onchocerciasis, filiariasis or trypanosomiasis in the United States, so the cures for these diseases will not come as a by-product of domestic biomedical research. Likewise, most of the plant diseases and insects in tropical countries, the species and properties of their forest trees, and their institutional modes of operation differ drastically from ours. Even in the delivery of services such as contraceptives, oral rehydration, and basic education methods used in the United States must be modified and adapted to developing country conditions.

Since the inception of the Point Four program in 1949, the United States has consistently supported the creation and use of improved technologies to accelerate development in every sector. American scientists have focused their own efforts on the solution of major development problems. Just as importantly, they have helped strengthen the capacity of developing countries to solve their own problems.

The payoff for these collaborative efforts has been impressive. For example, medical science has provided miracle drugs and vaccines which have helped bring under control several dreaded diseases of the tropics; as a result, life expectancy has

increased dramatically in many developing countries. In addition, medical technology has given parents tools to limit their family size.

Science has also underpinned the Green Revolution in food production in Asia and Latin America. Massive human hunger and starvation predicted in the 1960s have been averted and the need for food imports minimized. Annual economic benefits from the Green Revolution are in the billions of dollars.

AID support helped to bring these scientific and technological benefits to the developing world. Since 1969, the Agency has provided direct budget financing to the International Agricultural Research Centers (IARCs), organized with the principal donors into the World Bank-sponsored Consultative Group for International Agricultural Research (CGIAR). Two specific consequences of the IARCs' work: Acreage planted to modern wheat varieties rose from virtually nothing in 1965 to 52 percent by 1983; the comparable percentages for modern rice varieties, primarily irrigated, are 8 percent and 54 percent over the same period. These advances increased production by more than 50 million tons, enough to meet the grain needs of over 500 million people in developing countries. The work of these centers is now being complemented by Collaborative Research Support Programs (CRSPs) which are implemented by Title XII institutions.

Another technological change supported by AID was India's establishment, starting in the 1950s, of a strong agricultural education and research capacity through agricultural universities modeled on the U.S. land grant pattern. It is no accident that India today is self-sufficient in food despite rapid population growth and is able, using its own scientific resources, to sustain technological innovation in agriculture.

AID-funded progress on a malaria vaccine--now so close to reality--goes back a number of years. A key step along the way was Rockefeller University's 1977 breakthrough on in-vitro culture, followed by the greatly accelerated progress in the 1980s at the New York University and elsewhere, using genetic engineering techniques. AID also supported the research that led to today's lifesaving oral rehydration therapy (ORT) for dehydration caused by diarrhea. In close collaboration with other donors and host countries, AID contributed significantly to an effective campaign against onchocerciasis (river blindness) that ravaged West African river valleys and to the great efforts that eradicated smallpox.

In population, the World Fertility Survey that studied 42 developing countries and pioneered survey design to yield comparable demographic data across countries was a major AID-financed achievement. More recently, AID helped to develop the NORPLANT^{R} implant, delivering a five-year, progestin-only low dose that may prove to be the most effective long-acting reversible contraceptive developed to date.

LDC rural credit and savings are undergoing major changes based on AID-financed social science research. Studying failed country credit programs, Ohio State University found that dependency on outside funding along with credit strategies that were subsidy-based, sector-specific, and supply-driven led to counterproductive growth of foreign debt, no incentives for domestic resource mobilization, and costly, one-sided, delinquent-prone financial institutions which offered poor services to their rural clientele. As a direct consequence, AID has led a shift in donor policy on rural credit and savings. AID missions are successfully negotiating changes in host country macro-economic policies governing credit and savings. With OSU's assistance, they are

promoting development of local savings and credit intermediaries that are significantly improving savings mobilization and financial services.

Some progress has been made in increasing the awareness of developing countries to the need for energy conservation and to the dangers of environmental deterioration. Steps are being taken to move from the awareness state to one of action. For example, the Agency has been given a leadership role to enhance biological diversity and must use that leadership to assure such diversity.

The remarkable achievements of AID-supported science are matched by innovative programs to use the products of science to enhance development. The Agency's worldwide family planning program, which makes available to couples a variety of methods to determine family size, has had a significant effect on population growth. Likewise, the enhanced effective use of improved technologies, such as water and sanitation, oral rehydration therapy and indigenous energy supplies, are examples.

These past accomplishments, however, are only a fraction of those that must be realized if the Third World is to achieve even modest development goals. Sustained growth has occurred in only a few developing countries. Most have barely held their own or have made only limited gains. In fact, several countries, especially those in Sub-Saharan Africa, have actually lost ground. Their capacity to provide adequate food, shelter, education, and health care and to sustain the natural resource base has not matched their unprecedented increases in human population.

Science and technology must be used to provide more effective means of stemming the world's increase in population which is higher today than at any time in history. An appalling number of infants and children still die each year from diseases which

science and technology could prevent or control. Hundreds of millions of people are starving or are nutritionally deprived because science-based Green Revolution types of technologies are not yet available to them.

Science is also developing technologies to stem the alarming deterioration of forests and other natural resources, providing such benefits as the enhancement of energy supplies, increased water conservation and improved soil productivity. Social science is providing a better understanding of how human and institutional resources can be more effectively used for development. This work must be sustained and accelerated. In all cases, we must help meet the need for educated and trained person-power to carry out critical science and technology activities.

In many instances, available technologies do not fit LDC circumstances. Vaccines that are not heat-stable, for example, or that have short shelf lives, are not well suited to LDC conditions. New problems, such as the mite now attacking the fast-growing Leucaena tree, need solutions. Better contraceptives that last for longer periods are needed to help parents plan their families more effectively.

The particular emphasis is on finding solutions through inexpensive methods that can be widely disseminated. Scientific research and technological development can make significant progress against the key problems cited in AID's Strategic Plan: inadequate income growth, hunger, health deficiencies (especially infant and child mortality), illiteracy and lack of education, and unmanageable population pressures. Through associated investment, services and networks, the benefits of this R&D can be made widely available in the developing world.

The Bureau for Science and Technology plays a fulcrum role in guiding and monitoring the scientific and technological engine of development in AID. Amid the inevitable budget maneuvers and political pressures, the Bureau takes the lead to assure that the technological substance of this decentralized Agency's mission remains in the forefront of all considerations.

In particular, the Bureau gives AID a central means of grappling with global development issues that are not readily dealt with country by country or geographic bureau by geographic bureau. There are two major aspects:

First, the S&T Bureau is the primary focal point and technical resource for science and technology within the Agency, as well as between AID and outside development and scientific communities. In this leadership position, it serves as AID's science and technology conscience, lending its unique perspective to help the entire Agency give maximum attention to R&D in international development. The importance to the Agency as a whole of interaction with the outside scientific and development community cannot be overemphasized. This interaction alerts the Agency to modern scientific breakthroughs with significance for development. It also attracts the attention of the country's best minds to development problems the Agency is trying to solve.

Second, the Bureau through its own portfolio conceives, plans, implements and evaluates specific science and technology programs that assist AID, the donor community and developing countries to stimulate economic and social development in LDCs. Some of these activities support essential R&D that an individual country mission or geographic bureau cannot or should not undertake itself. Examples are a malaria vaccine, development of oral rehydration therapy or tissue culture work on stress-tolerant food crop varieties. Other activities are R&D planned and conducted in

collaboration with missions and regional bureaus, such as analyses that lay the groundwork for policy reform. Some activities are implemented through service projects carried out in the developing countries, projects that can be best administered centrally. The Bureau's field family planning projects are examples. Still others provide specialized technical services to AID missions and developing countries, services that cannot be independently maintained for each mission or geographic bureau. Examples abound in agriculture (such as seed development or aquaculture), health and nutrition (primary health care support or technical assistance for nutrition education and for water and sanitation) and energy (cooking fuels or electricity for rural industries).

It is a primary responsibility of the Bureau to keep the Agency on the cutting edge of development awareness and practice through R&D-fortified services and information to field missions. Global and collaborative research are keys to strong field programs and to the Bureau's ability to maintain a high standard of field support to missions. High quality, relevant services to missions rely on a continuing stream of new discoveries and improved approaches and techniques as conditions evolve and new problems develop.

In carrying out specific programs, the S&T Bureau finances or helps to stimulate the investments needed for technological progress in development. It promotes worldwide and region-wide networks of organizations and individual scientists that permit greater efficiencies in the conduct of research and development while helping to extend valuable information on the latest scientific and technological advances.

The Bureau performs its functions through five major types of activities (program examples are in parentheses):

General Technical Leadership:	General technical advice and leadership for the Agency as a whole that encourage greater involvement in science and technology programs and more cooperation with the scientific community in and outside the United States.
Worldwide Research and Development: (Malaria vaccine, NORPLANT(R), foodcrop research)	Basic and applied research aimed at creating new and improved technologies of generic or global significance. These activities are not specific to any particular location.
Collaborative Research and Development: (Improving Efficiency of Education Systems, Forestry/Fuelwood Research and Development, Impact of Vitamin A on Disease Prevention)	Research and development activities which are planned, funded and implemented jointly with host countries, missions, regional bureaus and other donors and which are carried out primarily in developing countries and regions.
Worldwide Services: (Grants to population intermediaries, international training support)	Technical field services that are more effectively managed centrally and that are not specific to any particular country.
Technical Field Support: (Improved Seed Production and Utilization, Nutrition Education Field Support, Employment and Enterprise Policy Support, Child Survival Program Assistance)	Technical field support to specific country mission projects with science and technology components.

All five activities relate to allocation of S&T Bureau staff time; all but the first are linked to specific proportions of the Bureau's budget.

2.2 Key Global Development Problems and Concerns That Are the Basis for the S&T Bureau Program

The Bureau is working in concert with the geographic bureaus to address, in varying degrees, all of the key problems identified in the Agency's Strategic Plan. While these problems are treated separately in the paper, in reality they are closely interrelated. Efforts to reduce hunger by increasing food production also increase economic growth; efforts to promote economic growth lead to higher employment and incomes, increased effective demand for food including U.S. exports, and less hunger.

2.2.1 Inadequate Income Growth

The Strategic Plan provides a detailed analysis of the causes of slow economic growth in LDCs. Resource deficiencies, inadequate technologies, minimal human resources training, inappropriate prices and a poor policy framework are key factors. At the same time, fundamental structural weakness, inadequate exports, and unfavorable external economic conditions have led to a climate of financial instability.

Sustained economic growth requires a strong expansion of agricultural output in order to: (a) provide a sufficient and dependable supply of quality food at low cost; (b) provide opportunities for productive employment of the largest share of the population, men and women, either through farming or rural-non-farm enterprises; (c) provide investment resources for non-agriculture business from profits, savings, and foreign exchange earnings; and (d) create demand for goods and services from non-agricultural businesses dependent upon earnings and profits from productive agriculture.

The serious high un- and under-employment problem in developing countries directly affects both economic growth and food consumption. Private initiative and entrepreneurship can be fostered by improving access to more relevant and productive technologies and by providing basic education. Policies directly responsible for the employment problem must be adjusted. The problem of weak local financial institutions and systems also need to be addressed. In many countries these include a major public sector financial burden on the economy and generally weak and ineffective domestic financial and resource-generating systems overly dependent on external sources of capital. Poor public policies have adverse effects on income generation, savings mobilization and credit availability particularly in rural areas. In some cases, in-country analyses and research will be necessary to encourage governments to change these policies so as to stimulate agricultural production and in turn increase rural incomes. In other cases, macro-economic benefits from yield-increasing new technologies can serve as this stimulus, for example, the introduction of IR-8 in Asia had this effect.

In general, payments for imported fuel remain a major obstacle to adequate income growth. The recent oil price decline will help, but at $15 per barrel it still leaves 22 AID-recipient countries spending over 26 percent of their foreign exchange earnings on oil and another 25 countries spending 11 - 22 percent. At $10 per barrel, the hardest hit 22 countries would still spend about 15 percent of their foreign exchange on oil. The Bureau strategy is placing increasing emphasis on the need for LDCs to plan rationally their energy investments. This need is becoming more urgent as oil prices become more volatile and uncertain. Energy investments to support agriculture and industry require long lead times -- ten years is not unusual. Since LDCs often devote between 15 and 30 percent of their entire national budgets to energy, (for example, 30 percent of India's 7th five year plan is for

energy--mostly for capital expenditures in the power sector) rash decisions to curtail energy investments could prove to be unacceptably expensive. Poor decisions now could cause LDCs five years from now to fall ten years behind in their efforts to cut these staggering energy costs.

Insufficient energy supplies limit growth. Each increase of 1 percent in gross domestic product (GDP) requires an increase of 1.3 percent or more in energy inputs. Attaining AID's goal of a 2 percent real increase in per capita annual income will, given expected population growth rates, require energy growth rates of 5.3 to 6.6 percent at minimum.

2.2.2 Hunger

Hunger persists in many LDCs because of inadequate technologies, inappropriate policies, weak institutions, lack of access by the majority of farmers to inputs and productive resources, and a deteriorating natural resource base, all of which affect supply of and demand for food. Effected by all of this are the individual decisions and behavior of people with respect to technology and resource use, food production, and food consumption. On the production side, individual farmer decisions, both men and women, are made in light of the incentives and constraints posed by existing technologies, policies, and institutions.

-- Farmers may adhere to low-yield farming practices and cropping patterns that are also destructive of the soils on which they depend for a livelihood. Existing pricing, credit, and land tenure policies make it difficult if not impossible for them to realize an economic surplus, obtain credit for improvements, use land for collateral or acquire more land.

-- Farmers need crop varieties which are tolerant to environmental stresses, low soil fertility and disruptive diseases and insect pests.

-- African livestock farmers need heat-stable, polyvalent vaccines against rinderpest, anaplasmosis, babesiosis and heartwater. In selected areas small scale irrigation can bring about remarkable increases in yields in the dry areas of this continent.

-- Asian farmers need access to new techniques for increasing lowland rice yields, now almost stagnant in India and Bangladesh. Improved soil and water management practices need to be developed for many areas of the world. Improved land clearing techniques are essential for currently unpopulated areas being opened up for agriculture (as in Indonesia and Africa). Research is needed to try to maintain the advances of the past two generations against ever changing pest attacks.

-- Better grazing lands are being converted to crop lands and forests are being converted to grazing lands on a global scale that is causing increasing problems of rangeland and forest deterioration, and degradation of the productive natural resource base.

-- Fuelwood is acutely scarce in 57 LDCs which contain a total of more than 1 billion people, making it necessary to burn 400 million tons of animal dung a year--that much manure used as fertilizer could raise grain production by 20 million tons.

-- A significant portion of the unique genetic resources contained in tropical forests are becoming extinct. By the year 2000 a further 100 million hectares of forests will be destroyed causing a further loss of genetic resources.

-- The Agency's goal of increasing caloric intake requires agricultural production growth of 3.7 percent per year. History shows that each increase of 1 percent in agricultural output requires an additional energy input of more than 2 percent. This suggests that energy supplies must grow at a rate of over 7 percent per year if hunger is to be eliminated.

On the consumption side, lack of effective demand is a major problem behind the persistence of hunger in many regions. Food production alone will not solve the hunger problem for poor people who often lack the financial and other resources to meet their minimum dietary needs. For these people, the hunger problem can only be solved by increasing their employment and incomes and, thereby, increasing their ability to buy food. Literacy and the provision of basic education are critical for long-term self-sustenance. Further, inappropriate food-preparation practices and the high incidence of disease interfere with achieving necessary improvements in food-nutrient consumption and absorption.

Working on either the supply or demand side of the hunger problem requires an understanding of the constraints and inducements that guide people's decisions and behavior. This is true in adapting and introducing new technologies for improved, sustainable production; working to improve marketing systems; finding ways to permit farmers better access to land, water, or credit; increased attention to the role that women can and do play in bringing about development; stimulating mobilization of local

private initiative for employment and enterprise development; adjusting food price and import policies to favor local production; or improving general health status and educational levels in order to increase effective demand.

2.2.3 Health Deficiencies

Despite progress toward increasing life expectancy in recent years, the health and nutritional status of the majority of people in most developing countries remains poor. In many countries life expectancy does not exceed 50 years, one-quarter of all children die before the age of five, and hundreds of millions of adults suffer from chronic debilitating illnesses. Chronic illness and malnutrition lead to higher mortality, less working time, and lower productivity among both children and adults.

In the developing world, the most common health problems are infectious diseases (including common diarrheal diseases, respiratory illnesses, measles, polio, and tetanus), parasitic diseases, and malnutrition. Respiratory and diarrheal diseases are associated with high rates of mortality, the parasitic diseases more often with long-term illness. Diseases of infancy and childhood that are virtually unknown today in the West, such as polio, diphtheria, whooping cough and tetanus, still take a heavy toll in the developing world. Other diseases, particularly measles, which are not typically fatal in developed countries, are significant and preventable causes of death among children in LDCs.

Serious vector-borne diseases are endemic throughout whole regions of the developing world. Malaria kills an estimated 5 million people each year. One million of these deaths are among African children alone. Trypanosomiasis (sleeping sickness) has once again become a serious problem in Africa. Onchocerciasis

(river blindness) is endemic in West Africa and is responsible in part for the abandonment of fertile lands. And schistosomiasis (snail fever), a gradually debilitating disease, is believed to afflict 180 million people in LDCs.

In fact, the picture of illness and poor health which characterizes much of the developing world is caused by a series of interrelated factors:

-- undernutrition;

-- numerous, closely-spaced births that, coupled with malnutrition, debilitate mothers and result in underweight infants with poor chances of survival;

-- unhealthful environments (including contaminated water and inadequate sanitation) that encourage the spread of disease;

-- ignorance of the causes of disease, and of simple means of preventing or curing common illnesses;

-- uneven distribution of effective health services; and

-- the absence of mechanisms for monitoring health and nutritional status; and

-- poverty.

AID's development assistance efforts represent a multi-sectoral response to these complex and multi-faceted causes of poor health. Efforts to expand agricultural production and to improve the distribution of food are important not only to combat undernutrition but also to generate income for rural and urban families with which to pay for health care. AID's highly

successful international population assistance program is doing much to encourage birth spacing to improve the health and well-being of both mothers and children. AID's education and training efforts, and in particular its expanded social marketing focus, are having a major impact on reducing basic ignorance or misinformation about sound health practices. And, finally, AID's broad health programs, encompassing improvements in basic service delivery through public and private channels, support for a variety of environmental health programs (malaria control, improvements in domestic water supply and sanitation), and strong continued support for the development of the next generation of health technology, are designed to improve the quality, quantity and cost-effectiveness of health programs worldwide.

2.2.4 Illiteracy and Lack of Education

The Agency's Strategic Plan identifies illiteracy and lack of education as one of the key problems constraining economic and social development in all sectors. Lack of basic education and skills training impedes productivity and technological advances, lessens the chances for improvements in health, nutrition, family planning and agricultural productivity and exacerbates the problem of unemployment. No other activity has had a greater impact on the advancement of women than their inclusion in basic education programs. Underlying this major focus on education are concerns about: increasing access to poor, rural and female segments of the population; improving the quality and efficiency of existing education and training systems; and providing technical information in all development sectors through competent and effective extension systems.

AID and other major donors agree that a literate population and skilled workforce are absolutely critical to implementing development programs. As the level of education for each country's population rises and as the availability of specialized training increases, the prospects for successful implementation of all development programs improve. Both general literacy and special skills are needed. However, until the basic education systems are operating effectively, specialized training programs will have a poor basis upon which to build and critical human resources will be wasted.

Improving the efficiency of basic education continues to be a primary AID objective. The Bureau's recent involvement in country education sector assessments aimed at improving all aspects of formal education systems; its investment in the use of radio as a tool for basic education; and its application of communication and social marketing principles to technology transfer within all sectors are evidence of this commitment.

To augment indigenous efforts to provide skilled policymakers, managers and senior technicians, overseas-higher education will continue to play an important role. AID's Participant Training program has gained a reputation for excellence and impact over the years. The Bureau for Science and Technology will continue to provide leadership in this area.

The need to strengthen institutions of higher learning still exists in many developing countries, especially in Africa. The lack of indigenous quality universities is a severe constraint on economic development. The experiences gained by the Agency in Asia and Latin America in the 1960s can and should be used to help Africa develop and maintain quality universities focused on the

indigenous culture and needs of the countries. The Bureau for Science and Technology can help the Africa Bureau plan and implement a university-building program.

The Bureau will concentrate on assisting countries both to expand and to improve their primary school systems by making more efficient use of existing resources and implementing educational technology. Participant training and programs supporting technology transfer will continue to provide educational inputs across all sectors.

2.2.5 Unmanageable Population Pressures

The developing world's rate of growth has declined from 2.3 to 2.0 percent in the last fifteen years. However, if China's population is excluded, the decline is much more modest, from 2.5 to 2.4 percent. At its present rate of growth, the developing world's population will double within the next 34 (excluding China) or 29 (including China) years. By the year 2000 it will reach 3.7 (excluding China) to 4.9 (including China) billion. This growth rate hampers health and socio-economic development in the following ways:

-- 500,000 mothers die each year during pregnancy or childbirth;

-- due to inadequate child-spacing and maternal malnutrition, many children are born under high risk health conditions and between 10 to 20 percent of children die before they reach their first birthday;

-- increased pressure on already overtaxed public health, sanitation and housing facilities and increased demand for energy;

-- during the 1970s, food production did not keep pace with population growth in 27 of 45 Sub-Saharan countries;

-- each year, population pressure changes an additional 200,000 square kilometers (an area larger than Senegal) into unproductive desert land; and

-- in developing countries, 10 million children are being added to the school-aged population annually. In Africa the school-aged population will double in just 23 years, creating increasing demands for education and jobs.

Research supported by AID, such as the World Fertility Survey (WFS), and Contraceptive Prevalence Surveys (CPS), has clearly shown that good voluntary family planning programs lead to lower birth rates. The emergence of this information has been accompanied by a major shift in the appreciation by developing world governments of how rapid population growth influences socio-economic development. Today, almost 80 percent of the developing world population live in countries with policies designed to reduce population growth rates and over 90 percent live where governments provide direct financial support to family planning programs. The policy changes have been especially dramatic and noteworthy in Africa, a continent characterized by indifference or pronatalism until just a few years ago.

There has been much progress toward the goal of making family planning services available to at least 80 percent of the couples in each developing country. For instance, in 11 of 29 countries in

which AID conducted fertility surveys, the 80 percent objective has been approached or met. However, many fall well below this 80 percent objective.

The S&T Bureau manages a significant family planning service delivery program through private voluntary and nongovernmental organizations to complement, and in some cases, substitute for government-supported services in developing countries. Many countries prefer that family planning services be provided outside the formal governmental health system, and the S&T Bureau has proved to be an effective and appropriate management unit for responding to this reality.

2.3 Approaches of Others (AID's Geographic Bureaus, Missions, Other Donors) to These Problems and Concerns; How S&T Will Complement and Support Their Work

AID's basic pattern of operations is highly decentralized, with some 65 overseas posts engaged in developing on-the-ground programs that best meet host country needs while advancing the Agency's development objectives enunciated in the Strategic Plan. It is one of AID's great strengths that we have strong staffs in the field, in daily touch with the nuances of requirements in individual LDCs, working to find the most effective ways of investing AID resources in action programs for development.

As a central bureau in an Agency that is heavily decentralized, the Bureau for Science and Technology needs -- and the Agency is entitled to expect -- a strong analytical and strategic justification of its mission within AID. This CPSS is intended to explore that matter thoroughly, and it is found as a theme running throughout the document. In addition, Section 4 treats the relationship in considerable detail. The relationship theme has

been a constant companion in S&T's discussions of the many drafts of this CPSS with the sector councils and geographic bureaus. The S&T Bureau believes that the resulting document offers a compelling explanation of the S&T mission and role in AID.

Much of the Bureau for Science and Technology's program is aimed at direct collaboration with geographic bureaus and country missions. By bringing to bear S&T's research and development work as well as its concentration of technical services -- often in specialities that it is impractical for each mission to staff up for -- the Bureau offers an essential complement and support to mission field activities. Further the gradual but real reduction in the number of technical direct-hire personnel in field missions and regional bureaus, and in some cases lessening of up-to-date disciplinary technical expertise, reinforces the need of a competent technical support pool in S&T.

For example, all aspects of the Bureau's population strategy and portfolio are reviewed by the regional bureaus and missions. Review is a part of:

-- regular sector council meetings;
-- the circulation of MIS outputs;
-- development of the annual Resource Allocation Plan (RAP); and
-- approval of individual projects.

The most important reasons for a good working relationship with other Agency offices are: first, the historical collegiality among the Agency professionals, and second, the explicit design of the Bureau's activities to serve the field. Responsiveness to the field needs has paramount importance.

Many examples of existing collaboration can be cited; some involve mission financial contributions to S&T-funded programs while others follow parallel and closely coordinated tracks of mission and S&T activity. For example, S&T collaborates with several Africa missions in programs to improve the efficiency of educational, especially primary school, systems, using a core resource to carry out comprehensive analyses of LDC education systems and complete long-term plans. The mission and country then fund the programs to provide solutions.

In cooperation with S&T, USAID/Jamaica and USAID/Pakistan have made considerable progress in investigating the energy potential of sugar cane and local coal exploitation projects. The Bureau is actively engaged with many missions in local revenue generation, enterprise and employment development, and performance management programs. Its basic research on subsidized interest rates and targeted credit programs has substantially altered credit programs and policies in AID and other donor agencies. RAPID presentations were critical in encouraging several LDCs to begin active population programs.

S&T offers technical agricultural services to regional bureaus and country missions in many specialties ranging from seed development to crop protection to fruit and vegetable processing. S&T and collaborating missions engage in jointly-supported ORT, vaccination and water and sanitation activities. S&T and several missions cooperate on Vitamin A delivery and action research.

As the Agency works on the key development problems set forth in the Strategic Plan and plans programs that will help AID-assisted countries achieve the targets laid out in the Plan, even more cooperation between missions' operational programs and S&T's R&D, plus technical services, is possible, feasible and indeed essential. Within the broad context of the Plan, priorities

will be set through close collaboration with regional bureaus, sector council deliberations and studies, and consultations with S&T's wide network of technical experts. S&T's support to missions will match closely the priority needs expressed by the missions and regional bureaus in areas in which S&T has a comparative advantage, e.g., where specific problems cut across regions or can be best managed centrally. Collaborative research will concentrate on important themes developed jointly with regional bureaus and missions. Basic research will be problem oriented, addressing needs identified through AID-supported technical networks or through deliberations within the Agency and the development community.

Basically-oriented research will also be coordinated with AID's Office of the Science Advisor (SCI), whose program of small innovative research grants to LDC and U.S. scientists helps lead the way for scientific breakthroughs to come. S&T participates in the review and selection of proposals funded by SCI, and manages most of the projects that are funded.

The S&T Bureau maintains close contact and collaboration with the PRE Bureau where this produces payout for the two bureaus and the Agency. PRE has contributed to S&T projects in employment and small enterprise development and both bureaus participate on each other's project design or review groups where this is appropriate. Examples include projects in employment and enterprise, urban development, and rural credit and savings. Through these devices complementarity in the enterprise and urban development areas is assured.

The S&T Bureau works closely with FVA in health, nutrition and agricultural activities. Explicitly, S&T sponsors with FVA the maintenance by USDA of a Food and Agriculture Information System (FAIS) that provides AID and other donor decision-makers (e.g. IBRD

and FAO) with up-to-date assessments of food needs and availabilities as guides to managing short-run food relief efforts and focusing long-run food production efforts. S&T and FVA routinely and jointly review proposals from PVOs which touch on both Bureaus, such as Vitamin A activities.

2.3.1 Inadequate Income Growth

Under the broad rubric of inadequate income growth, the S&T-financed search for knowledge related to enterprise and employment programs will directly complement mission projects that seek to stimulate enterprise development and increased employment. Sound analysis contributes to policy reform which will lead to more efficient allocation of development resources, more productivity and increased employment. As missions work on action programs in this field, the problem of electric power often arises, since even relatively simple industries that process agricultural products (including textiles and wood) tend to be energy intensive. S&T's energy program is aimed at helping country missions find economical solutions to the increased need for power, so that rural industry can grow and offer additional employment and income. In the direct food sector, rising production itself may well offer more employment and income. All of S&T's agricultural work discussed under the heading of hunger that follows provides broad benefits for income growth while at the same time helping to meet the Strategic Plan's hunger targets.

2.3.2 Hunger

Hunger, another key problem cited in the Strategic Plan, is a major subject for S&T collaboration with country missions. Much food and agricultural research, whether funded directly by S&T

through Collaborative Research Support Programs (CRSPs) on major food concerns or supported through the International Agricultural Research Centers coordinated by the Consultative Group on International Agricultural Research (CGIAR), provides information for country operational programs. We anticipate future breakthroughs like drought-resistant hybrid sorghum recently developed in the Sudan. There ICRISAT and the Sorghum/Millet CRSP cooperated on the breeding work; USAID/Sudan and the CRSP then together developed a seed multiplication program to make the new variety available to farmers.

To build the kind of research and institutional structures Africa must have to sustain food production increases for the future, the S&T Bureau will work with the Africa Bureau, in further developing and implementing the African research and higher education strategy. Our two bureaus and the World Bank intend to cooperate in carrying out the new Africa Plan for improving faculties of agriculture in selected African countries. We will also cooperate with other donors in the newly initiated Special Program for African Agricultural Research (SPAAR). Irrigation, another key to growing more food and eliminating hunger, is leading to mission requests to S&T for technical services in agriculture and energy, and the development of new programs between S&T and AFR on water use and management. S&T is working with the Africa Bureau and ICRAF to develop agro-forestry systems which will sustain food crop production. Household fuel, as well, is an important element for meeting hunger targets: S&T's collaborative activities in forestry, natural resources, environment and energy assist host countries and missions in coping with their local problems in this domain. They also are continuing to help AID-assisted countries and their missions maintain the all-important natural resource base while raising the productivity of fragile or even marginal lands.

While the needs of Africa must take high priority, collaboration in Asia and Latin America will continue. This collaboration will emphasize linkage with U.S. scientific and educational institutions as well as a continuation of the CRSP and IARC research and development activities.

2.3.3 Health Deficiencies

No problem offers greater promise for fruitful regional bureau, mission and other donor cooperation than on health deficiencies. Indeed, AID's goals for its child survival efforts are predicated on collaborative activities among donors, and the program itself entails very close and intense collaboration between central and field staff on ORT, immunization, Vitamin A, and other child survival technologies. In the area of research on the development or improvement of basic health technologies, for example, AID works closely with WHO and ICDDR,B, as well as a host of U.S. universities,research institutions, and other government agencies. In the areas of program planning, service delivery and evalution, AID has taken the lead in establishing closer coordination with other donors, primarily UNICEF, WHO, PAHO, the World Bank, and UNDP. This well-established cooperation, ranging from laboratory research, policy planning, and systems organization to operations research, social marketing, and evaluation, will certainly increase as the goals of AID's child survival efforts gain increasing attention from the public, the media, the Congress, and LDC governments themselves.

2.3.4 Illiteracy and Lack of Education

Dramatic gains have been made in the past twenty years to reduce the problem of illiteracy caused by the lack of education. Worldwide, the number of children enrolled in school nearly tripled between 1960 and 1980 and the percentage of literates (age 15 and older) increased from 43.2 percent in 1970 to a projected 60.9 percent in 1990. Still much needs to be done. The strategy of the Bureau in collaboration with the regional bureaus and missions is to assist countries to use the already large share of national budgets allocated toward education more efficiently. A major initiative focusing on better analysis and planning and informed decision making about the allocation of fiscal and human resources began last year. The interest and enthusiasm of the eight participating countries has been remarkable. Other donors, especially the World Bank, have cooperated closely with this effort and in several countries the collaboration includes joint use of sector assessments and funding of agreed upon sections of the same project. The Bureau will also continue to experiment with educational technologies that show promise of delivering high quality education to the increasing number of students at costs countries can afford.

2.3.5 Unmanageable Population Pressures

Unmanageable population pressures will be approached in this FY 1987-1991 period by pressing ahead with AID's historical strategy while giving new emphasis to three key areas: involvement of the private, for-profit sector; emphasis on Africa; and greater collaboration and coordination. The Agency's population program differs somewhat from those in other sectors because of S&T's heavy direct involvement in delivering operational services in the field. That style will continue and be enlarged, especially in

Africa, while certain well-developed bilateral programs elsewhere will retain and even increase their integration into country mission management. Perhaps the most exciting aspect of the population program to missions and S&T alike is the prospect of finding ways to involve the for-profit sector in family planning. Since the for-profit sector is by nature self-financing, these initiatives have the potential of channeling considerable financial and human resources toward meeting the Strategic Plan's targets at little or no expense to hard-pressed host country governments.

The Bureau has recently developed an annual Resource Allocation Plan through which it carefully plans its population project assistance in collaboration with AID's regional bureaus and missions; other donors, including bilateral donors, the World Bank, and UN agencies; and U.S. PVOs and NGOs that receive AID funds. This system permits S&T to function in a highly collaborative resource and program planning manner with a broad range of other significant actors.

2.4 The Main Policy and Program Issues in Attaining CPSS Objectives, and Actions to Resolve These Issues

The main policy and program issues facing the Bureau for Science and Technology as it strives to attain CPSS objectives are not greatly different from those confronting the rest of the Agency. Like the other AID bureaus, S&T has problems with adequate funding levels in this time of marked budget stress. Nevertheless, the complementary relationships among AID, U.S. constituencies, and international research groups must be sustained in the context of the Agency's development objectives. Performance of S&T's functions is made more difficult by repeated staff reductions both in S&T and in technical staff throughout the Agency and by the difficulty of gaining ready access to non-direct hire scientific

and technical advice. S&T is constantly seeking opportunities to help AID's structure and program mechanisms evolve to better accommodate and support the substantive needs of the Bureau.

Naturally, each of these points manifests itself in S&T in ways that may be particular to the Bureau. Nonetheless, each has a great deal in common with corresponding problems found commonly throughout AID.

2.4.1 Funding Levels

Scientific and technical R&D requires sustained support over the long haul if it is to be effective, for technological benefits usually appear at the far end of a long process which demands patience and commitment. They do not respond well to periodic spurts of enthusiasm followed by sharp declines of interest. At the same time, the Bureau appreciates fully the budget climate of the late 1980s that affects us all. There are no magical answers. S&T has some far-from-original suggestions for helping to cope with the times:

-- Slim down to the true essentials. There is simply no margin left for anything but the most crucial endeavors with high pay off.

-- When cuts must be made in activities we will examine each carefully. If we must reduce an activity to a less than critical level, we will phase it out.

-- On projects accorded mutual high priority by geographic bureaus and S&T, collaborate financially as well in the substance of the work.

-- Obtain increased support and collaboration for development programs from outside of AID, including the private sector, other donors and foundations.

2.4.2 U.S. Constituencies and International Research Groups

The Bureau for Science and Technology has a special role to play on the Agency's behalf with the particular U.S. constituencies associated with economic development and with international research groups. As the Agency's principal interlocutor with the scientific and development communities, S&T works especially closely with the U.S. universities, in particular the land grant universities, and with the international agricultural research centers (IARCs, e.g. CIMMYT, IITA and IRRI). It also serves as the Agency's principal focus for substantive coordination with the Board for International Food and Agricultural Development (BIFAD) in advising on and monitoring AID's responsibilities under Title XII legislation. It provides direct support for health research programs at WHO and the International Center for Diarrheal Disease Research in Bangladesh. In these roles, S&T has the task of ensuring that AID's objectives are met while at the same time assisting the Agency's university and international partners to achieve their goals as they contribute to those objectives. One of the purposes that S&T hopes this CPSS will serve is to help make such complementary relationships clearer within AID, as well as outside the Agency.

2.4.3 Staffing

S&T shares the Agency's staffing plight and would simply note here that just as adequate funding is critical to AID's scientific research and technological development, so is an adequate technical

staff critical for planning, guiding, managing and evaluating R&D technical services and networks. The need for technical personnel exists not only in S&T but throughout the Agency. With recurring direct hire reductions we require ready access to outside advice and services. This means the use of non-direct hire scientific and technical talent. The Bureau has experimented with a number of innovative mechanisms to access this pool, such as the Joint Career Corps. However, some mechanisms are no longer available. We request continuing support throughout the Agency as we seek better methods of drawing on the skills of the scientific and technological community to the mutual benefit of us all.

2.4.4 AID's Structure and Program Mechanisms

AID is a dynamic organization, adapting to current circumstances by constantly molding and adapting its structure and the mechanisms it uses to carry out its programs. S&T believes that opportunities exist to promote the evolution of better and more efficient ways of doing AID's business or to refine existing ways. Mechanisms that allow a mission or geographic bureau to purchase the services of an S&T-financed contract have now been functioning for several years. There have been problems as the Agency worked to refine the mechanisms, but this way of doing business is gradually becoming a more and more significant manifestation of collaborative working relationships in science and technology among S&T, the missions and geographic bureaus. We urge on-going cooperation to continue the tradition of improving our structure and mechanisms.

2.4.5 WID

The Bureau is acutely aware that the introduction of science and technology into a social system can bring about profound change in women's roles. In the Bureau's projects, women are viewed not as mere passive recipients of the benefits of science and technology, but rather as equal partners with men in developing their talents and supplying their skills to the job of shaping the economic and social context with the help of science and technology. In applying science and technology to the development process, the Bureau takes, as its departure point, the actual roles women are now playing in the LDC economy and seeks to strengthen these while opening up opportunities in entirely new roles. These changes can facilitate further adoption of science and technology. Women benefit from the general improvement in their lives brought about by labor-saving technology, better health care, family planning services, and other results of the Bureau's programs.

The S&T Bureau prepared an office-by-office, project-by-project report 18 months ago which detailed the commitment of the S&T Bureau to furthering the role of women in the development process. Although we cannot go into as much detail in this document, additional information in summary form is contained in the disucssions of key problem areas. Those reviewers wishing a comprehensive discussion are encouraged to examine the S&T Bureau's November, 10, 1984, contribution to the WID "1984 Report to the Congress."

3. Strategy

The Bureau for Science and Technology's overall strategy flows directly from the key role science and technology plays in historical and modern economic development. Section 2 of this document analyzed that role.

The S&T Bureau's strategic purpose in partnership with geographic bureaus and missions, is to guide scientific research and technological development, along with associated investment, services and networks, in a worldwide attack upon the key problems and concerns set forth in AID's Strategic Plan. Within this framework, the S&T Bureau's strategy is to help missions promote the sound policies, healthy institutions and human motivation needed to make technologies contribute to development on a sustained basis. The S&T strategy recognizes that progress on the key issues of development must be guided and stimulated in an integrated fashion to:

-- most efficiently marshall resources to tackle universal problems and concerns;

-- create improved technologies relevant to developing country conditions through generic research and development activities;

-- disseminate scientific and technological results widely and efficiently so that developing countries can reap their full benefits; and

-- build LDC capacity to utilize the results.

AID is properly organized as an Agency primarily along country lines, with scores of highly decentralized field missions developing programs responsive to the needs of their respective host countries. This very structure makes it essential to have a central point in the Agency for promoting and supporting the broad application of science and technology to development problems--for taking the long view of development requirements. That point is the Bureau for Science and Technology. The Bureau develops systematic approaches to development problems and works with regional bureaus, missions and other donors to apply those approaches.

The Bureau's strategic approach is organized in the five activities described in Part II:

General Technical Leadership
Generic Research and Development of Worldwide Significance
Collaborative Research and Development
Worldwide Services
Technical Field Support

Each of these aspects is interlocked with the others to help produce the full range of benefits available from the application of science and technology to development. Together they make it possible for S&T and AID as a whole to have a positive effect on the development issues facing the world in the remaining years of the twentieth century. Part IV of the CPSS explores the five categories of S&T Bureau work in further detail.

Examined against these categories, the Bureau for Science and Technology's portfolio has devoted fairly constant proportions of total dollars to the different types of activity. Worldwide research and development combined with collaborative research and development have consistently fallen in the 35 to 37 percent

range. Technical field support holds steady at 20 to 25 percent while worldwide services, largely accounted for by family planning programs, runs from 40 percent up to 45 percent. (We do not attempt to assign dollars to the "General Technical Leadership" category).

These numbers represent a far greater proportional share for operational field activities than may be apparent at first glance. Technical field support is the most obvious field item, but collaborative R&D activities, running at an average of 15-17 percent, also form an integral part of the mission-generated work in which S&T participates. The great bulk of worldwide services comprises field population programs that in other sectors would be managed by missions. The result is that easily 70 percent of S&T's dollars are used for operational field activities.

We find these broad proportions appropriate and intend to maintain them in the CPSS period. They represent a judicious balance between funding the scientific research and technological development that constitute the engine of future progress for the LDCs and getting the results of science and technology into application on the ground in the developing world through operational programs.

The sections below spell out the specific strategies this Bureau intends to follow over the next five years to meet the challenges expressed in AID's Strategic Plan. They also examine the results that the Bureau in collaboration with regional bureaus and missions expects to achieve over the CPSS period.

3.1 Inadequate Income Growth Strategy

The S&T Bureau's strategy for contributing to AID's efforts to solve this key development problem emphasizes four principal aspects:

-- Understanding people in developing countries, their cultures and institutions as the basis for the development and implementation of income enhancing policies and practices.

-- Raising rural incomes by enhancing the levels of productivity and efficiency of agriculture and forestry while simultaneously providing a steady supply of reasonably-priced food for urban dwellers.

-- Increasing individual, family, and national incomes through employment generation and the enhancement of small-scale enterprises and through innovative means of utilizing financial, biological, and physical resources.

-- Meeting the energy requirements of income generating economic activity in those sectors to which AID gives priority such as employment and enterprise development, agricultural production, and private sector development.

The S&T Bureau places priority emphasis on those programs which: enhance opportunities for rural employment; increase farmer income through better agricultural and forestry management practices and technologies; and expand the availability and use of indigenous fuels.

S&T Bureau programs will improve the scientific and technological basis for overcoming inadequate income growth by helping to improve the knowledge required for success in each of the above elements, using AID's four pillars:

Policy reform. The results of S&T's basic and collaborative research along with technical services will guide major policy and institutional improvements that must be made if income growth is to be achieved and sustained. Examples of continuing and proposed S&T activities include: (a) identifying and modifying policies that dampen enterprise development; (b) understanding tax policies and the changes that will offer inducements to income generation; (c) finding ways for missions to create the policy environment for strengthening of rural savings and credit institutions so as to increase savings mobilization and credit availability; and (d) assistance to missions in educating third world leaders to the needs for policy reform. This S&T generated knowledge of people and institutional factors is key to a mission persuading policymakers of the need for reform and guiding its content. AID needs to know much more about institutional strengthening and motivation of people in the LDC context, to encourage the entrepreneur, change energy price policies, mobilize local resources or liberate private marketing forces in agriculture.

Technology development and transfer. S&T programs will continue to lay the scientific base for those improvements in sustained agricultural production which will lead to increased rural incomes and simultaneous stable food prices for urban dwellers. These improvements will be in: agricultural production technology, forest management techniques, protection for the natural resource base, energy conservation, new and more efficient uses of local fuels to replace imported ones, adaptation of technology to increase employment opportunities and improved health measures and education opportunities to increase human

productivity. These will be followed by practical application on the ground in partnership with mission-funded country development programs.

Private sector involvement. S&T research programs help missions stimulate the LDC private sector to build the technology base and institutional structure that will create sound, vibrant economies in the Third World. Private initiative is the key to more employment, rising productivity and increasing income.

Institution building. S&T is making a special point of investigating and testing new ways to help missions strengthen decentralized LDC institutions. S&T believes that decentralized institutions based on local private initiative are essential in the emerging, freer LDC economies, whether the subject is decentralized sources of revenue or local facilities to provide energy for irrigation and lite industry. Such institutions must also become active in such endeavors as distributing agricultural inputs, marketing and production.

3.1.1 Employment, Enterprise Development and Decentralization

The activities in the S&T Bureau that specifically address the human and institutional factors necessary to overcome inadequate income growth are programs in employment, enterprise development, decentralization, and local private initiative.

During the planning period, S&T will continue collaborative research on employment and enterprise development and on decentralization and promotion of local private initiative which provides key support for the bilateral policy dialogues carried out by geographic bureaus and missions. In addition, basic research on policy and institutional questions that are priority

economic-growth concerns will be conducted. Research results are the lifeblood that will allow us to continue high-quality services to bilateral programs and regional bureaus as the economic environment evolves.

Field support and collaborative research activities in employment and enterprise development will focus on: better export market access; assessment and reform of the economic and regulatory environment to one that clearly promotes entrepreneurship; creation of more efficient domestic marketing channels and credit; and strengthening institutional infrastructure to support local private enterprise.

Field support and collaborative research activities in decentralization and local private initiative will focus on generating employment and creating functioning financial institutions at the local level. Sub-national approaches to employment and economic development, and mobilization of local resources, all critical to employment generation, will be major activities. Public sector reform and decentralized development finance methods will contribute to sound design approaches that reduce the public sector burden on economic growth.

Research on longer-term prospects for economic growth will focus on knowledge gaps in decentralized approaches to finance and management, non-agricultural macro-economic policies that stimulate employment growth, institutions to promote more efficient private commodity markets, and emerging employment and productivity problems.

3.1.2 Sustainable Agriculture and Forestry Production

S&T's activities that specifically promote sustainable agriculture and forestry production to enhance income growth in the CPSS period will concentrate principally on:

Better technologies for plant and animal production and use. This includes selecting, developing and adapting crop and tree varieties resistant to environmental stress, better cultural practices, better post-harvest techniques, improved marketing, agro-forestry improvements and vaccines and management practices that eliminate or reduce the negative effects of major animal diseases. Also included are improved technologies for the production and use of aquatic species.

Management of natural resources for sustained production. S&T will work with missions to plan, test and use analysis and management tools designed to stimulate development while preserving and enhancing the natural resource base. S&T will help farmers increase their income by developing improved multiple-purpose tree species, browse shrubs to increase protein for livestock and management techniques for natural forests and specialized plantations.

Policy analysis and development. Improved economic policies produce dramatic increases in agricultural productivity. S&T will help develop policy approaches that mesh with agriculture, forestry, watershed and natural resource concerns to boost economic payoffs in a sustainable way.

3.1.3 Energy

S&T Bureau priority is on activities which will markedly improve LDC economic conditions by reducing hard currency outflow to pay for imported energy, provide energy to increase rural incomes, and expand LDC private sector activities. Emphasis will be given to means for expanding the use of indigenous fuels, including biomass and agricultural sources, for energy generation. S&T programs will support development of small- and medium-sized power sources, having the potential for private ownership, to generate energy for rural industry and agriculture.

Closely coupled to this priority are the S&T efforts to provide needed planning assistance which becomes more urgent as oil prices become more volatile and uncertain, thus leading LDCs to postpone critically-needed energy investment decisions. Such planning assistance will include energy pricing analyses to support policy revisions to markedly increase private sector participation in the energy sector.

The Bureau will also monitor renewable energy (solar, wind, etc.) technical and economic developments to ascertain their effects on incomes. We will provide guidance to missions and LDCs as to the appropriate role of these energy sources, and assist in developing projects for financing from other sources.

The Bureau will focus most of its energy resources on the 15 or so countries with the most pressing energy needs. These in turn will serve as models for the remaining AID assisted countries.

Income growth will be enhanced by energy production using the agricultural sector. Two examples being pursued are: developing the energy needed for agriculture within the industry itself; and generating by-product energy that can be sold to increase income.

An example is using sugar cane to power a sugar mill and feed electricity into a utility grid while also producing ethanol from cane to blend with gasoline.

3.1.4 Projected Results

Over the FY 1987-1991 period, S&T, in collaboration with missions, projects these selected results impacting income growth:

-- Three sets of guidelines and training tools for use by LDC analysts to: diagnose production constraints of limited resource farmers; conduct on-farm tests of the "fit" of new technolgies in small farm production systems; and assess the impact of economic policies on the capacity of LDC farmers to adopt and benefit from new technologies.

-- Policy guidance based on field tested institutional approaches for improving national financial systems, increasing local savings and improving decentralized revenue generation.

-- Higher yielding wheat, rice sorghum, corn and cowpea varieties that have improved tolerance to salt, drought, aluminum toxicity and other major stresses, ready for LDC testing.

-- At least two new animal vaccines (rinderpest and heartwater disease) in or ready for field trials.

-- Improved rhizobia inoculants for "fixing" nitrogen biologically being produced by private firms and distributed to farmers.

-- Several multipurpose and fuelwood tree species and their seed available in each of three ecological zones in Asia.

-- Models to help AID and LDCs better understand and manage the complex relationship between man and natural resource systems. Strategies developed for stabilizing the more fragile or high risk producing lands with research and technical networks functioning in each region.

-- More indigenous coal and oil shale used in national power programs.

-- Successful use of sugar cane and rice hull power to rejuvenate the cane industry and improve the economics of rice milling.

All of the above, along with other results foreseen in S&T Bureau programs to counteract inadequate income growth, will mesh with related activities sponsored by regional bureaus and missions to contribute to the Strategic Plan's target of attaining at least a 2 percent annual real rate of per capita income growth for the countries AID assists. Such an increase will improve standards of living and raise the consumption of food, including U.S. exports.

3.2 Hunger Strategy

As the AID Strategic Plan points out the elimination of hunger involves food production, household income, food availability, food consumption patterns, and the cost of energy to poor households. The S&T Bureau approaches this problem, in conjunction with country missions, with a multi-faceted program that complements our efforts to address inadequate income growth. Several of our programs address both problem areas.

Our high priority programs to reduce hunger include programs which: improve stress tolerance of plants and animals; maintain the natural resource base for sustained food and income production; and expand the supply of energy for irrigation.

3.2.1 Agriculture Production

Agriculture is the most important economic activity in the developing world; economic development cannot be generated or sustained without major investments in agriculture. Agriculture not only generates employment and food for the majority of the population, but also its reach extends throughout the economy. It creates domestic investment capital and stimulates development of other sectors through demand for goods and services. For per capita growth to occur, agricultural production must exceed the level required to keep pace with population increases. S&T's support to agriculture production strategies emphasize development of improved agricultural technology, agricultural policy and the transfer of agricultural technology as elaborated below.

3.2.1.1 Development of Improved Agricultural Technology

Technology development and transfer play primary roles in increasing productivity. The S&T Bureau will emphasize programs that enhance stress tolerance of plants and animals to increase agricultural productivity. S&T's first priority is the selection and development of high-yielding varieties tolerant or resistant to stress from pests, disease and adverse environment and climate. In addition, the Bureau will work on technologies for:

-- improved management/control of weeds and pests;

-- development of pre- and postharvest loss-prevention systems;

-- biological approaches to reduce the need for purchased inputs; and

-- improved management of soil and water resources for plant production.

S&T will strengthen cooperating country institutions through participation in research programs. We will seek advice and technical assistance from U.S. universities, often collaboratively funded by S&T and missions, in supporting the establishment and strengthening of the chain of LDC public and private institutions required to translate laboratory breakthroughs into increased food supplies. This includes information and extension services, distribution systems for agricultural inputs, and postharvest storage and processing facilities.

S&T will continue to collaborate with AID missions to analyze and generate information on the distribution and marketing of food and on policy requirements to build and maintain effective technology development transfer systems, including those which effectively utilize the private sector. As consumer purchasing power increases, economic growth within the developing countries will increase the need for improved processing, storage and marketing technologies, with private enterprise playing a greater role.

Attention will be given to livestock and fisheries production/capture because of the importance of these as protein sources; because livestock or fish are the sole source of livelihood for some groups in developing nations; and because of the strong interactions between livestock or aquaculture on the one hand, and

agricultural crops and land use on the other. S&T research objectives in these two areas are higher production levels, more efficient disease and pest control, integration with cropping activities, and the development of higher quality livestock/fishery products to stimulate consumer demand.

3.2.1.2 Agricultural Policy

Sustained performance of the agricultural sector requires policies that allow owner-operated farms and privately owned and managed marketing systems to flourish. Economic policies that stimulate agricultural productivity and raise the effective demand of consumers for food are essential conditions to this performance.

S&T will support AID missions in carrying out effective policy dialogue with host countries by providing relevant analyses for policy assessment, and will help missions build the capacity of local institutions to formulate and implement policies supportive of agricultural growth. S&T research will provide information to guide the Agency on agricultural development policies and the cost-effective use of its resources for this purpose. S&T university projects will continue to offer quick collaborative response support to missions and LDCs on pressing policy issues. From AID's experience base they will develop guidelines to help LDCs develop and adopt policies that support sustained economic growth.

3.2.1.3 Transfer of Agricultural Technology

As discussed above, increasing agricultural productivity requires introduction of new and improved technologies for use on the farm and in the processing and marketing of products. Identifying, transferring, and adapting these technologies for

farmers and small entrepreneurs is more than a scientific or technical process. Assuring the use of productive technologies requires knowledge of the motivations and incentives faced by private individuals, men and women, and of the institutions and policies that create and sustain those incentives.

Widespread adaptation of new, locally relevant technologies and techniques is basic. It is equally important that information flow from the farm to the research station. S&T will work with bureaus and missions in a major program to apply to agriculture the many lessons learned from earlier work on technology adaptation done in health, education, and population. The system will vary in detail from country to country but in all cases will make heavy use of rural radio broadcasting and target population analysis closely integrated with extension and research systems. S&T will develop new, more cost-effective and responsive models for agricultural extension and, indeed, the entire process of technology transfer in agriculture.

3.2.2 Energy

The Agency's targets for agricultural growth cannot be met unless LDCs are able to increase the amount of energy available in rural areas. Many AID countries rely heavily on irrigation to increase agricultural output. Areas of gravity-fed irrigation have been largely developed over the last several decades. The focus is now on rehabilitation, improved management and effective organization. In some areas pumping is now necessary to supply additional water to crops. Energy for expanding that pumping is not now available.

S&T is giving high priority to energy for irrigation. Energy for food processing, storage and transport, while important aspects of increasing food availability, will receive less immediate attention due to funding limitations.

3.2.3 Increased Food Consumption

Increased production and food availability must be translated into improved consumption. In accordance with the needs of regional bureaus and missions, the S&T Bureau will help train food and agriculture planners to select policies and programs on the basis of how they will affect food consumption by the poor. The impact of food policies and programs will be significant if they are based on both accurate data and an accurate understanding of the operational relationships between public policies and individual food consumption behavior.

3.2.4 Effective Demand

S&T's field support, collaborative research and basic research to increase effective demand will be in the areas of natural resources, employment and enterprise development, and food policy. These activities will focus on increasing spendable income in the hands of the poor primarily through: (a) improving their access to land and water; (b) increasing off-farm employment opportunities; (c) undertaking policy reforms and institutional strengthening to support micro- and small-scale entrepreneurs; (d) improving the efficiency of marketing channels; (e) improving the incomes of people at greatest risk of malnutrition; and, (f) stabilizing prices for what they produce and purchase. Our activities in this area obviously complement our programs that deal with inadequate

income growth, but, the hunger problem cannot be overcome without improvement in the share of that income going to those groups with the greatest need -- but currently the most limited capacity -- to buy food.

3.2.5 Natural Resources Management Policies and Institutions

Long-term economic growth and dependable food production in developing countries depends on maintaining life-support and eco-systems such as soil regeneration and protection, recycling of nutrients, and cleansing of waters. Forests, grazing lands, and aquatic resources need to be managed on a sustainable basis over the long term. Such long-term efforts, which will make a significant impact on arresting land degradation and help maintain or increase the economic value of the natural resource base, are more important and of higher priority for S&T Bureau attention than shorter-term measures such as, for example, development of intensive cultural systems on marginal lands, which may have some near-term economic impact for limited population groups.

3.2.5.1 Natural Resources Management

S&T will continue to help missions finance the initial step in integrated planning essential for natural resource management, the collection of data on the current status of each country's natural resources and the major environmental issues and options for their resolution. This will be achieved through the preparation of Country Environmental Profiles, Natural Resource or Forestry Assessments, and National Conservation Strategies and land and water inventories for agricultural production. The information and data collected will be the basis for policy dialogue, education,

and training programs. S&T will identify research needs and analyze institutional strengths and weaknesses, providing opportunities for programs by missions and other donors.

S&T will work through U.S. institutions and international organizations to advance the understanding of the dynamics of the natural resource base as a primary requirement in the development of technology and its subsequent application in AID supported activities. S&T activities which support the compilation and dissemination of this information among national agencies will strengthen the role and capacity of these local institutions.

S&T will collaborate with AID missions to carry out field support and research activities in natural resource management which focus on stabilizing and making more efficient use of the natural resource base. Effective management of water, land, and tree resources; provision of secure land tenure; assessments, policies, and strategic approaches to fragile lands use; agricultural production; and communications use in technology identification and transfer will figure prominently in our natural resources activities to reduce hunger.

3.2.5.2 Forestry, Fuelwood and Biological Diversity

Forests occupy approximately 40 percent of the total land area of the tropical zone and make a major contribution to food security by maintaining environmental stability. Forests conserve soil and water and help to neutralize the damaging effects of climate fluctuations to provide a stable micro-climate for animal and plant production. Active forestry development diversifies the rural economy, offering employment complementary to agriculture

activities. Nine-tenths of all wood harvested annually is used for energy; it accounts for over two-thirds of total energy consumption in 24 tropical countries.

S&T will work with missions to develop farming systems that include multi-purpose trees or shrubs that are most likely to relieve the current fuelwood deficit, fix nitrogen and promote soil and water conservation. S&T funded research on tree species and social forestry will mesh with improved farming systems and lead to the establishment of private nurseries to provide seedlings to farmers. S&T will work closely with the regional bureaus and missions to identify coal and biomass residue substitutes for fuelwood. Development of fuelwood substitutes will free large numbers of women from the chore of gathering fuelwood, enabling them to engage in more economically beneficial pursuits. The S&T Bureau forestry/fuelwood programs will create opportunities for policy dialogue by bringing together researchers, government agencies, and policy makers in workshops and training sessions on natural resources issues.

S&T will encourage host country conservation and management of natural resources (soil and water) and environments which are essential to food production and the maintenance of forest cover to prevent site degradation and desertification.

3.2.6 Projected Results

Over the FY 1987-1991 period, S&T, in collaboration with missions, projects these selected results in our efforts to alleviate hunger.

-- through tissue culture, cereals and legumes resistant to the stresses of salt, drought, and aluminum toxicity will have been developed and will be ready for testing in LDCs;

-- vaccines for rinderpest, heartwater, and for some strains of anaplasmosis will have been developed, and researchers will be beginning to direct their attention to babesiosis;

-- conceptual and analytical capability to help individual countries analyze their agricultural marketing systems and policies and introduce improved institutional approaches;

-- development communications will be combined with social marketing approaches in eight countries, in cooperation with the missions, to disseminate a variety of localized agricultural technologies;

-- assessments of energy needed for irrigation in collaboration with AID's agriculture projects; in four African countries and at least two Asian countries;

-- effective approaches to market analysis and improvement, focusing on increasing farm income and reducing consumer costs;

-- land resource inventories and natural resource management plans to preserve soil quality for food production will be adopted in at least six LDCs;

-- policy guidelines published for natural resource planning and management in areas of high priority such as river basins, watersheds and under-utilized biotic resources and their conservation;

-- an expanded variety of multipurpose/fuelwood tree species available for use in social or rural development programs with two networks fully operational in eight Asian countries;

-- improved understanding of the economic and social benefits from better management of the natural resource base and from preservation of biological diversity; and

-- methodologies refined and widely disseminated as a result of completing 15 studies of the impact of agriculture policies on improved food consumption levels.

3.3 Health Deficiencies Strategy

The Agency's Strategic Plan sets the following targets for AID's health efforts:

-- reducing infant mortality to less than 75/1000 live births (compared with an average of 114/1000 in low income countries in 1982);

-- reducing mortality to less than 10/1000 for children 1-4 (compared with an average of 19/1000 in low income countries in 1982); and

-- achieving a level of life expectancy at birth of 60 years for the population as a whole (compared with an average of 52 years in low income countries in 1982).

The S&T Bureau's Health program directly supports the Agency's strategic focus on Child Survival. Our first priority is Child Survival. Primary Child Survival programs are immunization and oral rehydration therapy. Deaths in children under five years of age comprise one-half of all deaths in developing countries, and of those, up to one-half can be prevented by these two activities. This Child Survival Strategy is the vehicle upon which to build sustainable health systems.

The Child Survival Program of the Agency is still in the design and early implementation phase. At this stage in its development, especially in view of overall staffing and budget constraints throughout the Agency, there is a major requirement for central technical support to the Missions in the design, establishment of baseline data, implementation and evaluation of the Child Survival program. The heavy requirement for central technical support is the S&T Bureau's highest priority in the health area. Specifically, the Bureau will emphasize:

a. Developing and monitoring ORT and immunization programs in all 22 Child Survival emphasis countries;

b. Developing, assessing, and monitoring health actions required to complement or sustain Child Survival programs in AID's emphasis countries, including improvements in program management and financing; water and vector-borne disease control, where these are major sources of mortality and morbidity; health education and social mobilization programs for Child Survival; and greater involvement of private sector agencies in the delivery of Child Survival services; and

c. Providing essential health backstopping services to non-emphasis countries, which in the next few years will have fewer professional staff and financial resources available to them where there are strong reasons for U.S. involvement and support for improvements in health conditions (For example: in countries where malaria vaccine trials will take place, or in a number of middle income countries of importance to the U.S. with significant health problems which can be ameliorated by the application of proven health technologies (Mexico, Brazil, Turkey, Jordan, Zimbabwe, Tunisia), or in African countries with high infant mortality rates).

Once Child Survival programs are established and running smoothly in all emphasis countries, with adequate financial and technical staff resources deployed in-country, we would expect the requirement for central technical support to diminish considerably. As that occurs, the major focus of the Bureau's field support activities will shift toward (1) central backstopping of non-emphasis programs, (2) continued improvements in and dissemination of essential health technologies, and (3) coordination of the technical program through support for epidemiological data collection and analysis, and technical program evaluations and information dissemination.

There are a large number of health areas S&T will not fund such as hospital services, specialized manpower development, high technology research and application, and the delivery of a broad range of personal curative services. While AIDS is a critical health problem in the developing world, it is S&T's judgment at this stage that the research and financial requirements are being largely met by other agencies. S&T intends to keep this under continuous review, and should that assumption prove not to be accurate, or if centrally-funded training activities for LDC staff is desirable, we want to reconsider the need for significant S&T involvement in the AIDS issue.

3.3.1 Health Research Strategy

Research is an important feature of the Bureau's strategy to improve health conditions worldwide. The strategy we intend to follow is to select health research which is fairly well advanced, mainly in the area of vaccines, and accelerate its pace through additional funding. Our priorities reflect the Agency's emphasis on Child Survival.

In research, the Bureau's emphasis will be on:

a. Improvements in diarrheal disease control and immunization needed now to enhance the effectiveness of our Child Survival program, such as improved measles, pertussis and other vaccines, more cost-effective delivery systems, better evaluation techniques and improved techniques for diagnosing diseases with the greatest impact on Child Survival.

b. The next generation of Child Survival needs, such as the problems of low birth weight and acute respiratory infections.

c. Nutritional aspects of health, particularly Vitamin A, the role of micronutrients, and maternal nutrition, with special reference to child survival.

d. Developing and testing a vaccine or vaccines to control malaria, a dreaded tropical disease striking children as well as adults.

e. Improved approaches to financing health care, including operations research and pilot activities to involve the private sector in the delivery of critical health services.

3.3.2 Communications for Health

For attacking basic health deficiencies, particularly infant mortality and child health, the S&T Bureau will continue, in collaboration with regional bureaus and missions, to support the use of communications and social marketing, providing a major tool for making oral rehydration therapy a worldwide success. We will

continue to apply the state-of-the-art communications and social marketing methods which we used in The Gambia, Honduras, and Swaziland to help assure the introduction of ORT to approximately 60 percent of rural populations. In Health Region I of Honduras, a 40 percent drop in infant mortality due to diarrhea-related causes was documented. The methods used there will be applied to a broader set of objectives in additional countries. These techniques will be adapted to other basic health problems where family practices and participation are fundamental, e.g. participation in vaccination programs, breastfeeding, the dietary management of diarrheal disease and other infant nutrition issues.

A broader objective of the next several years is to confirm the transformation of "health education" from a near-moribund appendage of the health system to a primary methodology, one that is particularly appropriate to the LDCs, where much of the responsibility for health will continue to reside with the individual family and community over the coming years.

3.3.3 Health Technical Assistance

The Bureau, through the experience and expertise of its technical staff, its function as the Agency's institutional memory in health, and its broad-based contractor resources to backstop operational issues in the field, is the Agency's major resource for the design, redesign, and evaluation of AID's health activities, in full cooperation with the geographic bureaus and missions. S&T will provide guidance and assistance in: ORT, immunizations, malaria and other vector-borne disease control, diarrheal disease control, promotion of infant breastfeeding and growth monitoring, water and sanitation, essential drugs, health financing, health communications, health information systems, training and management, and international conferences and workshops.

For each of the major areas of health programming, the Bureau has created and will manage and maintain technical assistance contracts to promote, design, and, in an increasing number of cases, help implement bilateral, regional, and PVO programs as needed in the field. Regional bureaus and individual missions and PVOs are increasingly purchasing the services of these projects for the specific help they require.

The Bureau is acutely aware of its responsibility to enhance the delivery of selected technologies. Central management of such projects tends not only to be more efficient, an important consideration at the time of staff reductions and decentralization, but it also allows us to benefit from our experience with technology applications in various settings.

The objective of these efforts is to assist the Agency achieve its health goals - not only those enunciated in the Strategic Plan but also in collaboration with other donors, the specific goals of the AID's Child Survival efforts:

1. Universal access to ORT, with 45 percent use of packets or home-available solutions and 2 million deaths from dehydration due to diarrhea averted;

2. ORT and immunization activities supported in all emphasis countries and selected non-emphasis countries;

3. A sustained capacity, including private sector participation, to provide immunizations worldwide.

3.3.4 Child Feeding and Nutritional Surveillance

Selected nutrition programs are central to the Bureau's health activities in support of the Agency's Child Survival Strategy. These activities will have a direct impact on reducing morbidity and mortality of infants and young children. S&T will promote the following proper infant and child feeding practices:

-- breastfeeding during first several months of life.

-- weaning over several months beginning about the fourth month of life so as to manage the transition from breastfeeding to adult foods.

-- feeding during and after episodes of diarrhea.

These actions will be promoted because death rates are highest during the first 18 months of life primarily due to a combination of malnutrition and diarrhea. In these cases both ORT and feeding are essential to save children's lives.

Growth monitoring and nutritional surveillance will provide early identification of nutrition problems at national and sub-regional levels (surveillance), and at the family level (growth monitoring). These activities are vital because the earlier impending problems are discovered and remediated, the more promising is the prognosis for successful avoidance of serious malnutrition.

3.3.5 Projected Results

By 1991, we are confident that the $3-5 per capita equivalent that LDCs now spend on health care will go a great deal further as

a result of the Agency's efforts to apply science and technology to the health problems of the developing world. Specifically, within the next five years we expect to see:

-- well-advanced malaria vaccine field trials in five or six sites, leading to the widespread use of the vaccines.

-- at least three other new or improved vaccines already in use in LDC health programs;

-- an 80 percent reduction in the incidence of blindness in children due to Vitamin A deficiency in Bangladesh, the Philippines, the Sudan and Indonesia;

-- more than a 50 percent reduction the number of Vitamin A deficient children in at least eight countries;

-- application of at least five rapid diagnostic tests developed by AID in a variety of primary health care settings;

-- vastly improved cost-efficiency in 5-6 LDC health programs through development of:
   a. methods to lower recurrent costs;
   b. means to increase cost recovery;
   c. improved health management supervision and logistics systems; and
   d. use of more cost-effective health technologies.

-- applications of development communications combined with social marketing approaches will be made in cooperation with approximately 15 AID countries and missions for targeted objectives such as adoption of oral rehydration therapy (ORT), immunizations, and improved infant feeding.

-- two hundred managers at various levels trained in lactation management.

-- twenty countries with strengthened immunization and ORT programs.

-- twenty countries with carefully designed breastfeeding policies and national nutritional surveillance systems.

-- four hundred health professionals trained in growth monitoring.

These changes are directly related to the AID Strategic Plan's calls for the reduction of disease and early death, as well as for the reduction of hunger and overall levels of child and adult malnutrition.

3.4 Illiteracy and Lack of Education Strategy

The Strategic Plan states that "basic literacy and related skills training are among the fundamental requirements for sustained economic and social development in all sectors." This assessment is reflected in the high demand for basic education evidenced in all developing countries and supported by the allocation of as much as 25 percent of the national budget to the formal education system.

The Bureau for Science and Technology has a broad response to this development problem. The Bureau provides specialized training for both the recipients and implementors of development programs. There are academic courses, workshops and technical training sessions, in-country and in the United States funded by projects in

all the technical fields supported by the Bureau. S&T supports approximately 1,300 to 1,500 participants annually for training in the United States and third countries.

The Bureau directs the centrally-funded education program to assist host countries and missions that are struggling to educate increasing numbers of children with static or diminishing shares of national budgets. It also assists countries to apply the principles of development communications and social marketing to achieve technology transfer in all sectors.

The Bureau's human resource development program will concentrate on: the most efficient use of scarce financial and human resources through methodologies to improve analysis and decision making, to introduce and adapt technology that will improve the quality of education, and to extend education to large, dispersed populations; and the application of communications and social marketing to promote improved practices in health, nutrition, family planning and agriculture.

The strategy is selective to increase the likelihood of achieving impact. Each element is tied to improving educational efficiency, a worldwide need, and a perceived role relying on AID's strengths. Other areas of possible endeavor are not pursued, such as pre-school programs, vocational education programs, and education financing. While these and other areas are important, they are simply not as amenable to S&T pursuit within present budgetary and personnel constraints.

3.4.1 Systems Efficiency

Country investment in formal education systems is high, but there is a ceiling, already reached in most cases, for what can be spent. Thus, the S&T Bureau's main priority during the next five

years will be to seek maximum efficiency in the use of resources in education systems. We will assist developing countries to make better use of scarce resources -- funds, trained personnel and facilities. Projects in this area are designed to improve the performance of education systems and to strengthen each participating country's capabilities for educational assessment, planning, management and research.

3.4.2 Educational Technology

The problems of illiteracy, under-education and lack of technical skills present a fundamental challenge to every nation's development. National shortages of skilled person-power feed on themselves, producing insufficient numbers of teachers with skills sufficient to effectively train others. Rural poverty and isolation exacerbate the problem, and deprive millions of access to quality education. The creative use of educational technology has the potential to help solve this dilemma, by extending the reach of scarce human resources through various media far more widely than is possible through conventional person-to-person means. It also makes possible effective "front-end" investments by AID and other donors, for designing education programs which have low costs in national budgets.

Based on these premises AID, through S&T research and development, has led a resurgence of interest in using communications technologies as needed in the field to overcome basic educational problems. S&T has developed instructional materials in basic math, language, and, currently, science that are teachable through the low-cost medium of radio. These systems have been exceptionally effective in rural schools, even in communities without conventional schools and teachers. S&T will continue to refine the development of such technologies and to work with

missions to incorporate them, where appropriate, into the mainstream of education throughout the developing world. This will also contribute to the efficiency objective enunciated above.

3.4.3 Communications and Social Marketing

While providing the tools for national self-sustenance through basic literacy and formal education systems, the Bureau will continue to support the direct transfer of key health, nutrition, population, and agricultural technologies to populations at large through development communications and social marketing programs. These programs will directly assist major technology transfer objectives of these sectors and have a direct and immediate impact on the quality of life in AID-recipient countries. (See sections 3.2.1.3 and 3.3.2 for specific examples.)

3.4.4 Policy Dialogue Support

Policy dialogue with those government officials responsible for allocating resources for human resource development will receive particular attention. Countries that allocate 25 percent of their budgets for education and training must take into account the returns of that investment at all levels. Currently, too many governments are subsidizing higher education with its high private rate of return to the detriment of primary education with its much higher social rate of return. The development and transfer of technology that will increase access and improve quality at affordable costs will continue to be a major emphasis. So that education will become more responsive to the needs of local communities, ways will be sought to assist the decentralization of

education systems. The resources of the private sector will be specifically involved in this effort. The program will continue with long-term (10 years) multi-donor assistance agreements.

3.4.5 Projected Results

In the next five years the Bureau, working closely with missions and regional bureaus, expects the following results:

-- the 12-15 focal countries for the Bureau's education program will achieve the target of 90 percent enrollment in primary school. More importantly, through more efficient use of resources the target of 70 percent of students completing the 4th grade will also be achieved;

-- sixteen countries participating in the Bureau's major education projects will profit from the information and experience gained in designing and using more efficient and effective methodologies for operation of education systems;

-- training activities will continue as integral components of projects in all development sectors;

-- over 5000 participants will be trained in critical skill areas across all sectors.

The Bureau for Science and Technology will continue to work closely with the regional bureaus and missions and continue to give them high quality technical support on human resource development topics. We expect that missions will continue to add significant amounts of funding to Bureau projects, reflecting the relevance of our projects to their programs and providing the opportunity for expanding the impact of the Bureau's program.

3.5 Unmanageable Population Pressures Strategy

The basic strategy of the Bureau's population program is to ensure the widespread availability of high quality voluntary family planning services through which couples who so wish can regulate their fertility. This strategic mandate supports the Agency's population program assistance objective of making family planning services available to 80 percent of developing world couples.

To accomplish its strategy, the Bureau will retain critical features of the 20 year old population program whose hallmark has been the provision of assistance to family planning programs based on voluntarism and informed choice. Over the next five years, we will continue to support activities in family planning services, biomedical, demographic and social science research, information, education and training programs, and policy analysis. Program efforts in these areas have proven to be successful in contributing to significant demographic changes.

However, the Bureau's population program is entering a new evolutionary stage that will give new importance to three key areas: contraceptive development; improved service delivery and emphasis on Africa. We intend to concentrate our program assistance on these.

-- Contraceptive Development: The broad range of available contraceptive methods does not provide what is needed for safe, long-term and reversible forms of family planning.

-- Improved Service Delivery: The expansion of family planning services cannot proceed unless programs become more cost-effective and/or the amount of resources for programs increases. A large increase in family planning funds is not likely to occur in the near-term. Therefore,

we will continue to find more cost-effective ways to deliver services emphasizing improved program management, participation by for-profit organizations, and more efficient management of commodity logistics.

-- Africa: Today, almost 80 percent of the developing world population live in countries with policies which address population growth. These policy changes have been especially dramatic and noteworthy in Africa in recent years. Continued assistance in policy development is needed in Africa, but the major emphasis will be to expand the availability of family planning services in a cost-effective manner, especially in those countries with no bilateral population program.

The S&T Bureau's basic population strategy, like its policy objectives, has withstood the test of time. Our strategic mandate is the support of "programs to ensure the widespread availability of high quality voluntary family planning services through which couples who so wish can regulate their fertility." No changes in our basic strategy are anticipated or needed, but we are fine-tuning the approach employed in implementing the strategy.

Annually, the Bureau's program undergoes a review that involves all of the interested offices in AID, our contractors, and major private donors. Through this review, some parts of the program are designated for fine tuning while others are flagged for major overhaul. The revisions of our program, then, represent the distilled wisdom of population specialists drawn from the entire community of population expertise.

The Agency's development strategy emphasizes four components - policy dialogue, institutional development training, technology creation and transfer, and the private sector. The discussion of these components below concentrates on the new emphases in our program.

3.5.1 Policy Dialogue

In the past, AID has emphasized policy dialogue with governments. The Bureau is now embarking on a major change in its approach to policy dialogue which reflects revised programmatic interests. Our approach is three-pronged - public, private not-for-profit, and private for-profit, and varies from country to country. For instance, in some African countries, especially those with weak private sectors, government and private voluntary organizations (PVOs) may be the focus for policy dialogue. In other African countries, such as Kenya and Nigeria, the for-profit sector is a major provider of health services and business leaders are important forces in determining the future direction of service expansion. AID has learned that:

-- combined for-profit and PVOs often provide more health services than governments;

-- policy continuity in the private sector is frequently more evident than in the public sector;

-- programmatic changes are quicker and easier to make in the private sector;

-- for-profit organizations have shown initial keen interest in incorporating family planning into existing health care systems.

The population program will continue to work with governments and PVOs, but much more emphasis will be given to the for-profit sector.

3.5.2 Institutional Development

The program's institutional development activities have been characterized by their concentration on benefits for individuals served by the institutions we support. For example, the Bureau, through its cooperating agencies, has trained tens of thousands of LDC physicians and hundreds of thousands of LDC health workers. Generally speaking, this training has been outside of and additional to the regular training a physician, nurse, or midwife received. We will continue to provide such training, while working to have training accepted as part of the standard education professionals and paraprofessionals receive.

3.5.3 Technology Research, Development and Transfer

The Bureau is involved in all aspects of population technology: its development, distribution, and use. Our technological interest ranges from contraceptives to computers. There are, however, several areas that will receive our special attention during the coming years.

-- Contraceptive Development: There is no single method that satisfies the desires and needs of all couples. New and improved methods of fertility regulation must be developed. Private industry has drastically reduced its support for contraceptive development because of relatively unattractive product margins and because of growing liability for product damages in the American market. We

will collaborate with private foundations and other governments to ensure the development of the next generation of safer and more effective fertility control methods.

-- Information Dissemination: The diffusion of technology depends on the effective communication of information. For the first time, the Bureau has developed a special program for packaging new products or research findings that strives to make this information genuinely "user friendly." We will make effective use of this program which draws heavily on the experience and expertise of the private sector.

-- Logistics: The central contraceptive procurement and distribution program has outgrown the capacities of the Bureau. With the growing number of countries and organizations that ask for contraceptives, the increase in the types of contraceptives offered, and the volume processed, much of this function will need to be contracted out.

-- Management: While it has been known that population programs have not always employed their resources in optimally effective and efficient ways, little systematic effort was directed to solve this problem. During the next five years, this is one of the Bureau's major goals and includes the following objectives:

  -- improve logistic systems
  -- train managers
  -- transfer for-profit managerial techniques to PVOs and public programs
  -- test managerial alternatives through operations research.

3.5.4 Private Sector

Although the population program is largely implemented through private U.S. organizations, programs in developing countries have usually engaged the public and PVO sectors. Social marketing programs which began in the 1970s were a new effort to engage the marketplace to expand access to family planning. In 1985, the Bureau took an important next step by initiating programs designed to stimulate the provision of family planning services by the for-profit private sector without public subsidies. Future programs will expand efforts to tap private sector resources by:

-- promoting family planning as an employee benefit;
-- adding family planning to for-profit health care systems;
-- adopting for-profit expertise for PVOs; and
-- seeking corporate support for population efforts.

This is one of the Bureau's more exciting areas and it should have a profoundly positive impact on our program. The for-profit sector is by nature self-financing and these initiatives have the potential of channeling considerable financial and human resources to meet family planning needs at little or no expense to governments.

3.5.5 S&T Responsibilities

The division of labor between the central office and regional units is fairly well established. Allowing for differences between regions and countries, the Bureau's responsibilities are:

-- technical assistance
-- commodities
-- research

-- policy planning and analysis
-- generic functional activities
    -- training
    -- information, education and communication
    -- evaluation
-- services for non-bilateral countries
-- private sector delivery systems

Although the Bureau takes the lead in these areas, it directs activities in partnership with other bureaus of the Agency. Proprietorship over projects is subordinate to a common responsibility for the Agency's overall population program.

3.5.6 Projected Results

Working with missions we expect the following results by 1991:

-- The for-profit sector will be a major provider of family planning services in 30 key developing countries;

-- Two new and three improved contraceptives will be available for use in programs in 40 or more countries;

-- Modern logistics systems will be operational in 42 AID recipient countries, and the first generation of trained LDC managers will be in positions of influence.

These results will contribute to meeting the targets of the Strategic Plan by complementing inadequate cooperating government resources with self-supporting private sector initiatives, broadening contraceptive choices, and helping governments and other providers of family planning services to use resources more effectively.

4. Relationship of the Bureau for Science and Technology to the Rest of AID

The Bureau for Science and Technology is the Agency's core and main vehicle to stimulate the use of science and technology for development. It directly supports projects to create and transfer technology while collaborating with regional bureaus and country missions in their efforts to do the same.

The S&T approach is to collaborate with other bureaus and the missions to find solutions to the key development problems and other concerns set forth in AID's Strategic Plan. Science and technology have an essential role to play in dealing with each of these problems and concerns and have, in fact, already helped develop a number of tools that are proving effective, as discussed in Part II (Analysis). Much more, however, remains to be done. Far greater technological achievements must be realized if the developing countries are to achieve even modest development goals.

Through its collaborative arrangements with other AID bureaus, the country missions, international organizations and the scientific community, the S&T Bureau is helping to make a significant contribution to accelerating technological progress in the developing world. Important strides have been made toward building the scientific and technological capacity of AID and the LDCs. If sustained over time, these advances will make possible significant progress on the key problems and other concerns presented in the Agency's Strategic Plan.

AID uses several mechanisms and organizational units to plan and implement its technology generation and transfer efforts. Those which are basically country-specific are supported through bilateral country programs, while regional bureaus support some

intercountry efforts within their respective regions. The Agency is encouraging both missions and regional bureaus to increase their support for longer term technology generation and transfer efforts.

Some of the Agency's critical science and technology efforts can be planned and implemented most effectively and efficiently through the central Bureau for Science and Technology's. Included are five major activities:

1. General technical advice and leadership for the Agency as a whole.

2. Global Basic and applied research.

3. Collaborative Research and development activities.

4. Technical field services.

5. Technical field support to specific country mission projects.

In pursuing these activities, the S&T Bureau makes a unique contribution to the Agency's development programs. It identifies the major constraints to development which science can help remove. It also identifies and brings together the technical and human resources to fill knowledge gaps that inhibit solutions.

4.1 General Technical Leadership

An overriding area of responsibility which is becoming increasingly important is the role of the Bureau in centrally leading the Agency's efforts to create and effectively use improved technologies.

This leadership is evidenced in several ways, first through the Bureau's overall influence on the Agency's science and technology programs and their use in development. S&T provides guidance to the Administrator and other senior Agency leaders on all matters relating to science and technology. The Bureau serves as an advocate for all technical activities in the Agency. It is especially concerned with means of improving the quality of the Agency's technical personnel and the management procedures which permit these people to be most effectively utilized. It also works closely with missions and bureaus to identify countries where capacity and need suggest the desirability of a major focus on research and technology development in the country program. The S&T Bureau then works closely with the mission and respective bureau in strategy and project design, implementation and evaluation. Current examples include Egypt, India, Indonesia and Thailand.

The Bureau, moreover, is the Agency's primary means of interacting with the external scientific and development community, both in and outside the United States, including S&T components of other donor programs. For example, the Bureau is strengthening its ties with other donors and with private sector parties so that AID's modest energy research and development budget will leverage considerably larger investments by these other groups. This is done through official contacts and peer interaction. S&T staff thereby provide access to a broader network of experts and thus, to new approaches to problems. Through these contacts, S&T staff are also alerted to early warning signals that indicate when programs are proceeding on the basis of questionable assumptions. The Bureau is the primary liaison with the Agency's Research Advisory Committee and with many of the U.S. universities. It provides the Agency's primary point of interaction with the National Academy of Sciences and with U.S. Government agencies concerned primarily with

science (e.g. NSF and NIH). The Bureau also plays a leadership role in working with science and technology-related international agencies such as WHO, UNICEF, UNDP and FAO.

Through these overall external interactions, the Bureau identifies and uses in its own projects promising science and technology concepts and tools with potential for the stimulation of development. It calls these tools to the attention of decision makers in the other bureaus and the missions and stimulates their use in Agency programs.

The S&T Bureau also provides guidance and program leadership in new areas of development need and priority, such as forestry, environment and biological diversity, where the Agency has not developed a core program or staffing capability in field missions. By establishing an initial "critical mass" of central expertise, the Bureau has significantly influenced Agency policy and strategy in such sectors. The S&T Bureau also plays a formal role in helping to increase the use of research and technology in mission and regional bureau projects. Through project and program reviews, the bureau helps assure that technology generation and transfer opportunities are appropriately incorporated into the projects of missions and other bureaus.

In helping to represent U. S. scientific and technological capacities, the Bureau plays an additional role in exposing host country policy makers to the opportunities available through these resources. Such exposure also can affect other donors' development assistance strategies (an example is what has occurred in the environmental sciences in the Mahaweli project area in Sri Lanka).

4.2 Generic Research and Development of Worldwide Significance

No other function of the S&T Bureau is of greater significance to long term development than designing and implementing research. Problem-focussed research is the life blood of technology generation for the developing world. It provides the knowledge and tools necessary to solve development problems. Increasingly, we find that the key development constraint is not lack of resources. Instead, the constraint is often our lack of understanding of the nature of the problems, along with the inadequacy of the technology required to solve them.

Research to develop vaccines and drug therapy for tropical diseases such as malaria, leprosy, and cholera is an example of the work supported by the Bureau. So is agricultural research to create improved pest resistant crop varieties tolerant of adverse water, soil, and climatic conditions. At no time in history has the potential for accomplishment in biomedical and agricultural research offered greater promise. The tools of modern biotechnology open up avenues of research that could revolutionize these sectors.

Another example is social science research to help us better understand how to create viable development institutions and to determine how people can be motivated to adopt improved technologies, to manage natural resources, change detrimental health practices, and to solve their own development problems. Research to enhance forestry and fuelwood production, to explore the use of mass media to inform or to improve basic health practices and to accelerate the adoption of innovative fossil fuel and renewable energy technologies to reduce oil imports is another example.

4.3 Collaborative Research and Development

In addition to worldwide research, the S&T Bureau collaborates increasingly with mission and regional bureau programs through jointly sponsored research and development. In some cases, the projects are developed jointly with the field missions and regional bureaus, and project support from all partners is programmed from the beginning. The water synthesis project in Asia is a good example, as are the newly established forestry research and development project in Asia and Africa, the fragile lands project in LAC, and the collaborative educational efficiency project in Africa. In other cases, projects originated by the S&T Bureau attract the interest of missions which then share in the funding to assure project implementation in their countries. Both types of interaction is being encouraged in all sectors.

Collaborative networks, especially for research, are also receiving increasing attention. Such networks focus on problems which can be most effectively solved through the cooperative efforts of country, regional and international research entities. Existing and proposed crop improvement networks concerned with developing more productive wheat, maize, rice, cassava, sorghum, and millet varieties are examples. Newly established networks will soon be focusing on the problems of dryland agriculture and forestry and fuelwood. Discussions are also underway with the World Bank and other donors to initiate a series of priority commodity research networks in Africa.

These collaborative activities between S&T and the missions and geographic bureaus help to ensure that AID's country programs are equiped to take maximum advantage of the latest scientific and technological advances as they implement their respective strategies.

4.4 Worldwide Services

An important intercountry activity of the S&T Bureau is the provision of certain worldwide technical services for which a number of management considerations, including cost and efficiency, mandate a central bureau role. An excellent example is S&T's support of family planning services. These are provided through Bureau-funded private and voluntary organizations and delivered in two groups of countries. First are countries such as Mexico and Brazil which are not eligible for bilateral support but continue to have significant population pressures. Second are many countries eligible for bilateral aid that lack human and institutional capability to provide family planning services themselves. Without the centrally funded efforts, these countries would be denied effective assistance in their health and family planning programs. When their capabilities (public and private) are expanded, the countries should be able to take over much of this responsibility, but for the near future collaboration through centrally-funded projects is essential.

Participant training is a second example of global services provided by the Bureau. In 1982, the Agency began giving greater emphasis to participant training in order to meet more effectively the changing needs of managers, scientists, technicians, teaching faculty, and institutional leaders in all sectors of development. As a result, the number of A.I.D. participants in U.S. training has grown dramatically. In FY 1979, fewer than 6,000 participants were trained, of which 17 percent were women. In FY 1982, the number had risen to almost 8,000, of which 18 percent were women; in FY 1984 to more than 11,000, of which 18 percent were women; and in FY 1985 to about 12,500 with the participation of women increasing to 20 percent. The Agency expects a significant annual increase to

between 15,000 and 17,000 participants trained in the United States in FY 1986 and FY 1987, with the number of women trained increasing as well.

Training is a significant component of a large number of Agency projects managed by missions, regional bureaus and central bureaus, including S&T which has training projects in every sector office. In addition to these project activities, however, the S&T Bureau has specific Agency-wide responsibility for encouraging, monitoring, and evaluating the participant training program. The Bureau provides to all AID missions and AID/W bureaus and offices with participant training activities a centralized, cost-effective service for managing participants. Currently it manages about 30 percent of the Agency's participants. In addition, the Bureau provides extensive field support and technical assistance in training to missions and regional bureaus.

4.5 Technical Field Support

One of the primary responsibilities of the Bureau for Science and Technology is to help missions and regional bureaus enhance the quantity and quality of their technology generation and transfer programs. In a general way, this is done through the overall S&T leadership role and the intercountry research and delivery roles. Missions are also kept informed of recent technological developments through the Bureau's organized system for disseminating research and technology findings, not only those supported by AID but by others in the development community.

In addition, however, the S&T Bureau interacts with and directly supports the technology generation and transfer programs of the missions and regional bureaus. This is done through the provision of technical field support or backstopping for mission

projects and programs. The Bureau is called upon to provide technical field support for selected mission projects, especially in the design and project development stages. S&T Bureau direct-hire staff, supplemented by staff from contractors or grantees, work with mission staff and their country counterparts in project development, implementation and evaluation.

Some S&T Bureau projects have technical field support as a primary goal. Projects to provide backstopping for the expanded oral rehydration, immunization and water sanitation programs of missions are excellent examples. Other selected examples are projects concerned with coastal and aquatic resources management, energy technical services support, local revenue generation, seed industry development, improving the efficiency of educational systems, and population technical assistance.

The advantage of centrally-funded technical field support projects over individual mission arrangements is that knowledge and experience is centrally accumulated and updated and is available to all missions. Technical assistance also furthers the S&T Bureau's research function by providing site-specific feedback as to the nature of problems and the efficacy of solutions.

5. Resources

For the S&T Bureau to attain the objectives stated in this CPSS adequate levels of both Development Assistance funds and staffing are required.

5.1 Development Assistance Funds

The following tables provide the details of the resources required to implement the strategy contained in this CPSS.

S&T
CPSS RESOURCE REQUIREMENTS
($000)

Problem	FY '87 CP	FY '88 AAPL	FY '89	FY '90	FY '91
Inadequate income growth	28,350	36,143	37,692	38,145	38,526
Hunger	38,325	56,277	57,800	58,500	59,085
Health deficiencies	46,700	56,730 *	55,100 *	55,760 *	56,320 *
Illiteracy and lack of education	7,675	8,050	8,700	8,800	8,900
Unmanageable population pressures	114,300	116,000	118,000	119,514	120,842
Total	235,350	273,200	277,292	280,719	283,673

* Includes funding to cover the costs of the malaria vaccine field trials.

S&T FY 1988 PROGRAM BY KEY PROBLEM AREA

	INADEQUATE INCOME GROWTH	HUNGER	HEALTH DEFICIENCY	ILLITERACY INADEQUATE EDUCATION	UNMANAGEABLE POPULATION PRESSURE	TOTAL
S&T/PO	2,500	1,000				3,500
S&T/AGR	17,595	32,975				50,570
S&T/N		2,850	5,650			8,500
S&T/FNR	5,292	3,238				8,530
S&T/EY	4,300	2,700				7,000
S&T/ED		970	380	5,650		7,000
S&T/H			47,000			47,000
S&T/POP					116,000	116,000
S&T/IT				2,400		2,400
S&T/RUR		8,000	3,700			11,700
S&T/RD	6,456	4,544				11,000
TOTAL	36,143	56,277	58,730	8,050	116,000	273,200

The resource rquirements of the S&T Bureau, as summarized above, represent a 16 percent increase in FY 1988 over the FY 1987 CP level. The increase is concentrated on the inadequate income growth and hunger areas. Thereafter our request averages less than a 1.5 percent per year increase. In 1991 the Bureau just reaches its FY 1985 obligation level.

The S&T Bureau is acutely aware of the Agency's budget problems. For example, we have had to reach agreement with many of our existing university contractors and grantees to reduce expenditure rates to accommodate current levels. We fully expect that pipelines will be used up and shortened to a critical minimum by the end of FY 1987.

The increases proposed in this CPSS are necessary to sustain minimum efforts required by the Agency to meet the objectives specified in the Strategic Plan: for example, improved agricultural production technologies, biological diversity, Vitamin A, vaccine research, improved contraceptive technologies. The proposed increases in the hunger and inadequate income growth budgets over the planning period are somewhat higher than the Bureau average due to the intensity of their agendas and the unsustainable cuts made in these areas during FY 1986.

This budget does not include any central funds for mission or WHO support for AIDS research or information/service programs. The S&T Bureau believes that the Agency will need to commit some resources to AIDS over the next five years but we are unable to specify level of effort or focus of responsibility at this time.

5.2 Staffing

We recognize that staff is a shrinking resource, so do not expect to receive any significant increases in ceiling. We are assuming no further reductions in direct-hire staff positions. We will continue to pursue creative ways to augment our staff by tapping non-direct hire scientific and technical expertise.

CPSS CENTRAL PROGRAM STRATEGY STATEMENT, FY 1987 - 1991 : BUREAU FOR

COUNTRY DEVELOPMENT STRATEGY STATEMENT

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