

USAID Environment Highlights

Conserving the world's biodiversity. Since 1987, USAID has worked in 60 countries to protect millions of acres of globally significant habitat.

- With USAID assistance, Guatemala's protected-areas system, which grew from 148,000 acres to two million acres over the past decade, now includes critical habitat in Central America's largest tropical forest.
- Madagascar's parks agency now has the capacity to manage 34 protected areas, up from 14 areas in 1991.
- Ecotourism revenues entering Uganda's park system rose more than 11-fold in four years, from \$66,300 in 1991 to \$700,000 this year.

Improving the urban environment. USAID assistance to 26 countries has helped improve the quality of life for millions of people and has achieved dramatic environmental improvements.

- USAID's Housing Guarantee Loan Program in Morocco has made 10,000 low-cost homes available annually and provided potable water to 90,000 low-income urban dwellers over the past decade.
- In Poland, USAID-assisted industries and municipalities discharge 22 percent less waste into rivers today than they did in 1990.
- A USAID-led initiative to privatize garbage collection in low-income barrios in Machala, Ecuador, has expanded coverage from nearly zero to more than 50 percent of the population.

Promoting sustainable energy services and mitigating global climate change. The Agency is helping 22 countries shift toward environmentally sound energy systems that yield local economic and environmental benefits and reduce the threat of global climate change.

- In Egypt, Agency-supported improvements in energy efficiency helped prevent the emission of nearly five million tons of air pollutants in Cairo and Alexandria.
- In Ukraine, USAID helped conduct a historic privatization program of the once centrally controlled power sector, leading to the creation of a competitive market for electricity and incentives for more efficient energy use.
- In Mexico, USAID is installing 600,000 compact fluorescent lamps and plans to install 1.4 million more; these lamps will reduce carbon dioxide emissions by 27,500 tons yearly.

Sustainably managing natural resources. USAID is directly helping people in 47 countries better manage their natural resources for sustainable development.

- In Honduras, nearly 9,000 poor hillside farm families, including 500 farms headed by women, adopted environmentally sound agricultural practices during 1989-94. As a result, 2.5 million tons of topsoil are saved annually.
- As part of Nepal's efforts to decentralize responsibility for resource management and encourage sustainable forestry, USAID helped establish 200 community forest-user groups.



5. Protecting the Environment

USAID'S GOAL of promoting environmental management for long-term sustainability rests on the tenet that sustainable development requires careful stewardship of the earth's finite natural resources. Productive lands, forests, and coasts provide the underpinnings for equitable economic growth. Clean air and water are essential for a healthy and productive life. Sustainable resource management also is essential for preventing humanitarian disasters and maintaining food security. Moreover, degradation of the global environment—global climate change and loss of the earth's biological diversity—ultimately threatens the economic and national security of the United States and endangers the well-being of people around the world.

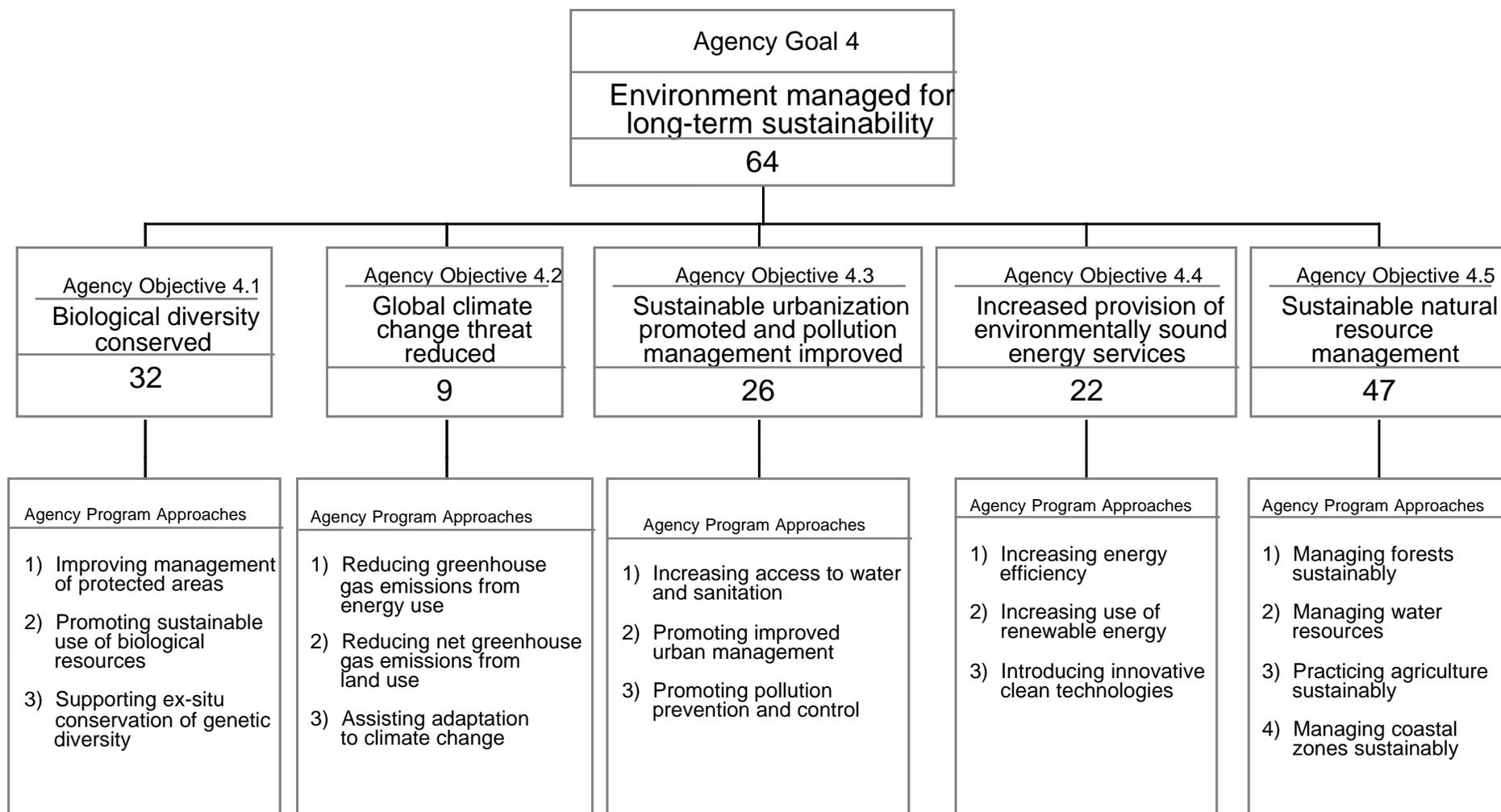
The Agency recognizes that sustainable development depends on, and contributes to the protection of, well-functioning ecosystems. USAID strives to achieve two high-order environmental goals: 1) to mitigate long-term threats posed by the loss of biological diversity and global climate change and 2) to address local, national, and regional environmental problems that impede sustainable development. To realize these goals, the Agency pursues five environmental objectives (see figure 5.1).

Overview of USAID's 1995 Environmental Objectives

This year, 64 programs, or nearly 70 percent of USAID's country-based programs, support at least one environmental objective (see map 5.1 and table 5.1). The scope of these objectives differs widely. In Egypt—where USAID's largest environmental program is based—the Agency is helping the citizens of Cairo, Alexandria, and other cities improve their air and water quality by expanding wastewater treatment and pollution control. USAID/Cambodia is adopting a more modest objective: to help the government develop basic institutional capacity for environmental planning. Environmental objectives also are being managed by the regional and global Bureaus and programs.

“Green” objectives (biodiversity conservation and natural resource management) dominate the environment portfolio, although a significant number of programs also are pursuing “brown” objectives (sustainable urbanization and pollution management, environmentally sound energy, and a reduced threat of global climate change). Within regions, USAID's programs often concentrate on two or three objectives to reflect the

Figure 5.1
Environmental Strategic Framework 1995
Number of Country Programs Contributing to each Objective



unique challenges of meeting sustainable development.

For example, in Central and Eastern Europe and the former Soviet Union—where air and water pollution and inefficient energy generation hinder economic growth—

USAID supports mostly brown objectives. In Africa and Latin America—where poverty combined with poorly planned national policies threaten biological diversity and natural resources—the Agency directs its attention primarily at green issues. This year USAID

Table 5.1 USAID Programs With Environmental Objectives in 1995^a

	Africa	Asia and the Near East	Europe and the New Independent States	Latin America and the Caribbean	Total
Total number of programs	29	18	26	20	93
Number with environmental objectives	16 (55%)	11 (61%)	20 (77%)	17 (85%)	64 ^a (69%)
Objective 4.1: Biological diversity conserved	<i>Botswana, Ghana, Kenya, Madagascar, Malawi, Namibia, Tanzania, Uganda, Zimbabwe</i> (9)	<i>Egypt, India, Indonesia, Jordan, Nepal, Philippines, Sri Lanka</i> (7)	Bulgaria, Russia, Ukraine (3)	<i>Belize, Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru</i> (13)	32 (34%)
Objective 4.2: Global climate change threat reduced	None ^b	<i>India, Indonesia, Philippines</i> (3)	Kazakhstan, Poland, Russia, Ukraine (4)	Brazil, Mexico (2)	9 (10%)
Objective 4.3: Sustainable urbanization and pollution management improved	None	<i>Egypt, India, Indonesia, Morocco, Philippines, Sri Lanka</i> (6)	Albania, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Macedonia, Poland, Romania, Slovakia, Turkmenistan, Ukraine, Uzbekistan (15)	<i>Chile, Ecuador, Honduras, Jamaica, Paraguay</i> (5)	26 (28%)
Objective 4.4: Increased provision of environmentally sound energy services	None	<i>Egypt, India, Indonesia, Philippines</i> (4)	Armenia, Bulgaria, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Ukraine (17)	Dominican Republic (1)	22 (24%)
Objective 4.5: Sustainable natural resource management	<i>Cape Verde, Gambia, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mali, Niger, Senegal, Uganda</i> (11)	<i>Bangladesh, Cambodia, Indonesia, Jordan, Morocco, Nepal, Oman, Philippines, Sri Lanka</i> (9)	Albania, Bulgaria, Czech Republic, Kazakhstan, Kyrgyzstan, Latvia, Macedonia, Poland, Romania, Russia, Slovakia, Turkmenistan, Ukraine, Uzbekistan (14)	<i>Belize, Bolivia, Chile, Costa Rica, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Panama, Peru</i> (13)	47 (51%)

^aSustainable development countries are in italics. Does not include regional and global Bureaus with major environmental objectives.

^bThe Africa Bureau supports a major global climate change objective.

also began to address the growing problem of brown issues in Latin America and the Caribbean through the Environmental Initiative for the Americas. The initiative was launched to mitigate urban and industrial pollution, foster the use of renewable energy, harmonize trade and environmental regulations between countries, and protect coastal and marine ecosystems threatened by pollution and urbanization.

USAID's objectives in Asia and the Near East are the most varied because of the diverse range of countries in that region—including Indonesia, one of the world's most biologically diverse countries, and Morocco, where urban environmental problems and water scarcity and quality are major development issues.

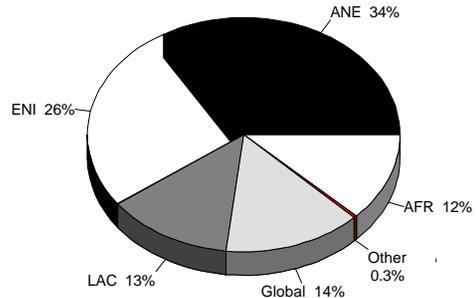
The Agency's 1995 environmental obligations amount to \$798.6 million, or 13 percent of USAID's total development assistance budget. The Asia and Near East (ANE) and Europe and the new independent states (ENI) regions receive the greatest share of environmental funds, with Egypt, Russia, Ukraine, Indonesia, and Mexico receiving the most assistance this year (see figure 5.2). The ANE and ENI regions manage programs mostly under urban, energy, and pollution abatement objectives, propelling the overall environment budget toward brown issues (see figure 5.3).

Analysis of USAID's 39 sustainable development programs uncovers several trends since last year. For example, the proportion with environmental objectives increased substantially this year. Nearly 80 percent of all such programs now have environmental objectives, up from 60 percent just a year ago. Most of this growth is led by country programs in the Africa region followed by country programs in ANE and Latin America and the Caribbean (LAC). Although natural resource management objectives continue to dominate the portfolio, the energy sector and biodiversity conservation show the greatest relative growth.

Measuring Program Performance

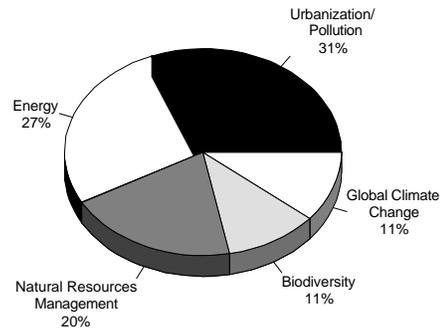
Environment staff throughout the Agency made headway this year on institutionalizing the Agency's environmental performance measurement system. They developed an Environmental Strategic Framework as a simple, comprehensive tool to guide budgeting, programming, performance reviews, and reporting to Congress and the public. Staff also agreed on 21 "core environmental indicators" that provide a frame of reference for analyzing USAID programs by assessing national environmental progress in host countries. In addition, the Environment Center of the Global Bureau developed

Figure 5.2 USAID Environmental Obligations by Region (FY95 Budget = \$798.6 million)



Note: Egypt's obligations account for 20 percent of the total budget.

Figure 5.3 USAID Environmental Obligations by Objective, FY95



Box 5.1 The Global Bureau's New Environmental Strategic Plan

In 1995 the Global Bureau's Environment Center engaged staff and interested institutions outside the Agency to prepare the first strategic plan for USAID's environmental technical leadership and support program. Three strategic objectives supporting the Agency's environmental goal were identified:

- *Sustainable living resources.* Increased and improved protection and sustainable use of living natural resources, principally forests, biodiversity, and freshwater and coastal ecosystems.
- *Sustainable cities.* More sustainable cities, including reduced pollution and environmentally sound urbanization.
- *Sustainable energy systems.* Increased environmentally sound energy production and use, encompassing energy efficiency and renewable and nonrenewable energy resources.

The center's three objectives are viewed as responsibilities shared with the regional Bureaus and Missions. The center also has lead responsibility for implementing USAID's global environmental objectives of reducing biodiversity loss and threats associated with global climate change. It will develop its results frameworks and its monitoring systems in 1996.

its first comprehensive strategic plan (see box 5.1).

Several more steps must still be taken to make performance measurement fully operational. For example, only 22 programs reported enough data to systematically assess their environmental performance this year. This highlights the difficulty field offices encounter in collecting and reporting complete performance data. Moreover, only 12 offices consider gender in their performance monitoring, and of these only 4—Caribbean, El Salvador, Honduras, and Jamaica—report performance data to assess their progress on gender issues. Over the next year, the Agency plans to help selected field offices with on-site technical assistance to strengthen their capacity to gather, report, and use such data.

Availability of performance data is improving but remains uneven. Information from action plans, progress reports, program evaluations, and staff consultations provides insight into the difference USAID is making in fostering environmentally sustainable development. The following sections give an overview of the Agency's accomplishments reported in 1995 for each environmental objective.

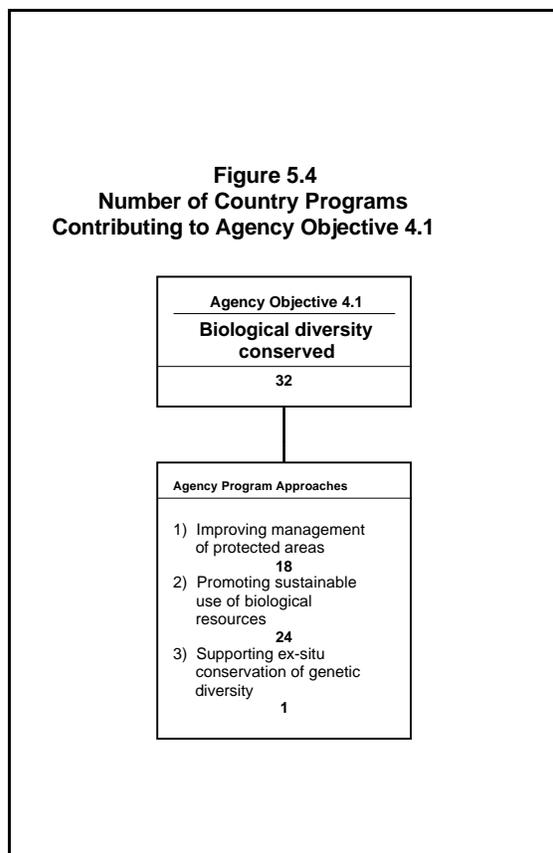
Conserving Biological Diversity

Since the Agency established its biodiversity conservation program in 1987, a growing number of programs have supported activities to stem the loss of biological diversity. Program staff recognize that well-functioning ecosystems are critical to sustainable development in each country and to life-support systems worldwide. Biological resources provide the building blocks for common products used by people around the world, including foods and industrial products. Indeed, 80 percent of the top 150 prescription medicines in the United States are modeled after natural products. Biodiversity, particularly genetic diversity, is critical for maintaining the viability of food crops in the United States and abroad. It supports such essential environmental functions as maintaining climate and water supply. Biodiversity also has recreational and other intangible values, attracting billions of dollars in revenues from tourism each year.

USAID funds the largest and most comprehensive biodiversity program of any bilateral donor. It has launched biodiversity

conservation activities in more than 60 countries over the past eight years. This year, 32 programs have biodiversity conservation objectives. Most programs are located in Latin America and Africa, followed by Asia and Europe. Biodiversity objectives fall under three mutually supporting approaches (see figure 5.4). To complement these approaches and support the UN Convention on Biological Diversity, the Agency has formulated a biodiversity strategy to systematically target assistance to the world's most biologically diverse and endangered habitats.

A recent USAID field assessment of selected protected-areas management projects carried out between 1980 and 1992¹³ found that the Agency has made important contributions toward safeguarding biological diversity, particularly in improving the management of protected areas and strengthening national conservation policies. USAID



has made significant gains in establishing new conservation institutions, improving capacity in protected areas, fostering innovative public-private partnerships, and establishing mechanisms for long-term conservation financing.

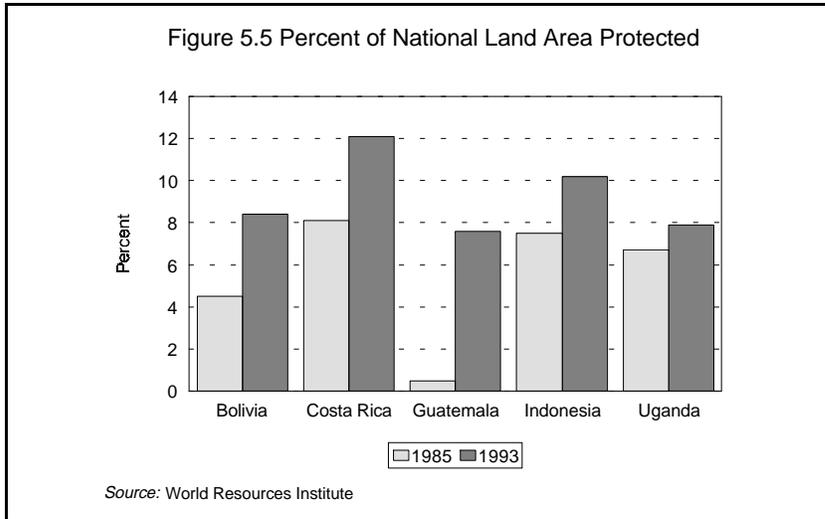
At the same time, the Agency had only limited success throughout the 1980s in its integrated conservation and development projects (ICDPs). These projects aimed to introduce income-generating activities in the buffer zones surrounding protected areas as a way to decrease community dependence on fragile, often declining biological resources. The assessment's findings concur with evaluations of other ICDPs conducted by the World Bank and the Biodiversity Support Program. According to these studies, several factors led to the mixed success of ICDPs, including unfavorable land tenure and scarce credit for communities living outside a cash economy, remote project sites that limited market access for sustainably harvested products and ecotourism development, and inadequate linkage between development and conservation objectives.

Accomplishments highlighted in the following pages suggest that USAID continues to realize most of its goals on management of protected areas, policy reform, and partnerships between governments and nongovernmental organizations (NGOs). In addition, having learned from experience, the Agency has sought to strengthen its ICDPs and other community-based efforts. Indeed, it has begun to achieve demonstrable payoffs and successes in linking sustainable development with conservation.

Improving Management of Protected Areas

A major thrust of USAID's biodiversity program is to work with counterparts to set aside habitat for official protection and to restrict human activity to low-impact uses. USAID, in partnership with governments and local and international environmental organi-

¹³ Phillip E. Church and Katrina Brandon. 1995. *Stemming the Loss of Biological Diversity: An Assessment of USAID Support for Protected-Area Management*. Washington: Agency for International Development.



zations, has made considerable headway in bringing legal protection to some of the world's most valuable ecosystems (see figure 5.5). In Guatemala, for example, the Agency has worked closely with the government to expand the country's national park system from 148,000 acres to 2 million acres. As a result, core sites in the Petén forest—the largest tropical forest in Latin America north of the Amazon—are now officially designated as protected.

However, official protection does not guarantee that biodiversity will be safe from the innumerable threats to parks around the world. High on USAID's agenda is support for government, local environmental NGO, and community efforts to build in-country capacity to manage protected areas. USAID has three priorities at the local level: to integrate communities into park management, to establish basic management capacity for protected areas, and to develop and implement management plans to guide decision-making. Nationally, programs are emphasizing development of long-term financial mechanisms to ensure the viability of protected areas, mechanisms often critical for graduation from USAID assistance.

Increased grassroots commitment to conservation is a high priority for virtually all programs supporting biodiversity programs. Activities have ranged from sponsoring environmental awareness classes for 400 people (including 140 women) in the Caribbean to encouraging the Ugandan government to hire 630 local citizens as park employees, up from 400 in 1991. Initiatives such as these foster local commitment to conservation and help ensure its sustainability. In Madagascar's Isalo National Park, for instance, program staff report that the number of fires and area burned was cut by two thirds during 1991–94 following community outreach programs. In Guatemala, 90 percent of logging and agricultural encroachment into the Sierra de las Minas Biosphere Reserve was prevented by an intensive environmental education and outreach program targeting indigenous people. This, coupled with a USAID institutional strengthening grant to Guatemalan NGOs, set the stage for a \$4 million biodiversity grant from the Global Environment Facility (GEF)¹⁴ for the country's Sarstun–Montagua region, which includes the reserve.

Another high priority for programs is to put in place the essential elements for managing specific protected areas. A dire need exists for basic tools, infrastructure, and trained staff in many parks. USAID's Parks in Peril initiative, the Agency's largest biodiversity program to deal exclusively with protected areas, has made significant strides in laying the groundwork to safeguard 28 of Latin America's biologically richest sites. Since

¹⁴ The GEF is a financial mechanism that provides funds to developing countries for projects and activities that aim to protect the global environment. It is jointly implemented by the United Nations Development Program, the United Nations Environment Program, and the World Bank.

1990, 85 ranger stations and outposts have been built, and more than 450 park rangers and managers have been trained, up from 300 park personnel trained as of last year. Increased patrols, boundary demarcations, and sign postings deter deforestation, hunting, and other incursions in the 19.3 million acres the program encompasses, an area nearly the size of South Carolina.

Four parks have graduated from Parks in Peril—meaning they are well on their way toward self-sufficiency—and four more are scheduled to graduate shortly. These parks cover three million acres of tropical forest and coastal habitat in Bolivia, Colombia, Costa Rica, the Dominican Republic, Panama, and Paraguay.

In addition to ensuring that essential “hardware” is in place, nine programs are working closely with partners to develop management plans and to conduct ecological and sociological studies to monitor progress. In Indonesia, a country with little experience in community-based park management, USAID supported development of the country’s first truly participatory management plan in Bunaken National Park, to protect exceptionally rich coral reefs and mangrove habitat. The Agency supported a series of studies to determine community attitudes and resource-use patterns in and around the park. Then it facilitated dialog between government authorities and local citizens, many of whom live within park boundaries. A management plan was developed with ongoing feedback and regional meetings, with the result that all major stakeholders now support Bunaken’s plan and play a major role in its implementation. The Bunaken experience is viewed as a potential model for other parks in Indonesia.

A similar participatory approach was adopted in Masoala National Park, Madagascar’s largest protected area, where 127 villages have signed consent agreements to establish boundaries around the park.

At the national level, a priority for nearly half the programs is to help budget-strapped national park agencies and conservation NGOs build financial solvency. Field staff have worked with partners to increase revenues from park entrance and commission

fees, establish conservation funds, and spur innovative financing mechanisms. In Uganda, USAID supported government and community efforts to set aside part of the revenues from the country’s burgeoning ecotourism industry for park management and community development. In 1994, ecotourism generated \$700,000 in park entrance and commission fees, up from \$66,000 in 1991. Twelve percent of 1994 revenues is being allocated for revenue-sharing with local communities, and 80 percent is being retained in the national park that generated them.

USAID-supported conservation funds in Costa Rica, Jamaica, Madagascar, and other countries are showing promise as long-term and stable sources of financing for national parks agencies and other conservation endeavors. For example, USAID assistance to Costa Rica’s fund helped reduce dependency on external donors for the overall park service budget from 61 percent in 1992 to 52 percent in 1994. Dependency for operating costs decreased from 27 percent to 11 percent.

Highlights from USAID’s program this year included establishment of a \$25 million trust fund to protect the Panama Canal watershed. In Madagascar, the government showed its commitment to conservation by capitalizing its USAID-supported endowment fund with the equivalent of \$6 million in local currency, despite the country’s economic crisis. In Indonesia, program staff began setting up a \$20 million endowment fund to build NGO capacity for biodiversity conservation.

In Belize, USAID helped lay the foundation for an innovative financing scheme that links biodiversity conservation with mitigation of global climate change through the U.S. Initiative on Joint Implementation, which fosters cooperation between the private sector and developing countries to reduce net greenhouse gas emissions. With USAID assistance, The Nature Conservancy and the Programme for Belize secured a \$2.6 million pledge from a consortium of U.S. companies, led by Wisconsin Electric. The idea behind the partnership is to offset carbon dioxide emissions generated in the United States by protecting 120,000 acres of endangered tropical forest in northwest Belize. The

project is expected to offset 5.2 million tons of greenhouse gas emissions over 40 years and to be economically self-sufficient in 10 years.

Promoting Sustainable Use of Biological Resources

Protecting habitat as parks and reserves is an effective step toward safeguarding biodiversity. But most of the world's biological wealth is located outside the 6 percent of the earth's land area officially designated as protected. Subject to a range of threats, the world's unprotected biological resources need to be sustainably harnessed to benefit people and, at the same time, to ensure the continued integrity of the environment. USAID encourages local people to capture benefits from the sustainable use of their biological resources (both in unprotected areas and in the buffer zones of parks and reserves) and helps them get secure land tenure when necessary. This helps give communities an incentive to become effective caretakers of their natural resources and advocates for conservation.

The Biodiversity Conservation Network is supporting 15 community-based sustainable-use enterprises throughout Asia and the Pacific with the aim of conserving eight million acres and improving the quality of life for more than 260,000 people. Enterprises include small-scale sustainable timber harvesting in critical orangutan habitat around a national park in Indonesia, biodiversity "prospecting" to identify potential pharmaceutical compounds in Fiji, and a community-based ecotourism business that serves as an alternative to logging and mining in Papua New Guinea. In Nepal's Humla district, the network is helping 900 villagers (the majority of them women) establish community-based distillation factories that process herbal and medicinal plants harvested from surrounding forests and pastures. By selling a value-added product, participants are increasing their earnings by 45 percent over what they would make selling the plants in their raw form. Combined with community forest management programs, this effort is empowering citizens, especially women, to exercise better care of their local resources.

USAID's biodiversity initiatives also seek to redress weaknesses in national policies and institutions that often are the root causes of biodiversity loss in both protected and unprotected areas. In some instances, market distortions encourage unsustainable farming practices on agriculturally marginal land. In other cases, lack of land tenure encourages businesses and communities to exploit resources for short-term profit rather than for sustainable long-term returns. In Madagascar and Uganda, USAID is helping governments identify and adopt new policies that encourage conservation by supporting improvements in their administrative and operational procedures and by fostering public-private sector partnerships.

National conservation strategies are emerging in USAID's portfolio as first steps toward promoting sustainable use of biological resources in countries with little previous experience in this area. USAID helps these countries map out conservation and sustainable-use policies and initiatives and leverage funds for their implementation from the multilateral development banks. In Bulgaria, for example, the Agency worked with 75 officials and environmentalists to develop the country's National Biological Diversity Conservation Strategy. With financing from USAID, the Global Environment Facility, and other international donors, the strategy is now being implemented. It is the model for a similar initiative in Ukraine.

Supporting Ex Situ Conservation of Genetic Diversity

To complement programs that maintain biodiversity in natural settings that are being rapidly degraded, USAID promotes ex situ, or off-site, conservation to preserve the genetic diversity of crops, timber, and livestock. This approach represents only a small portion of the biodiversity portfolio, but it is critical to the food security of many developing countries. Genetic variation is key to cultivating plants that can withstand environmental stresses—such as pest infestations and drought—that lead to natural disasters, an important issue also in global climate change. Moreover, scientific information gained through ex situ conservation can be vital for

protecting endangered species in their native habitats.

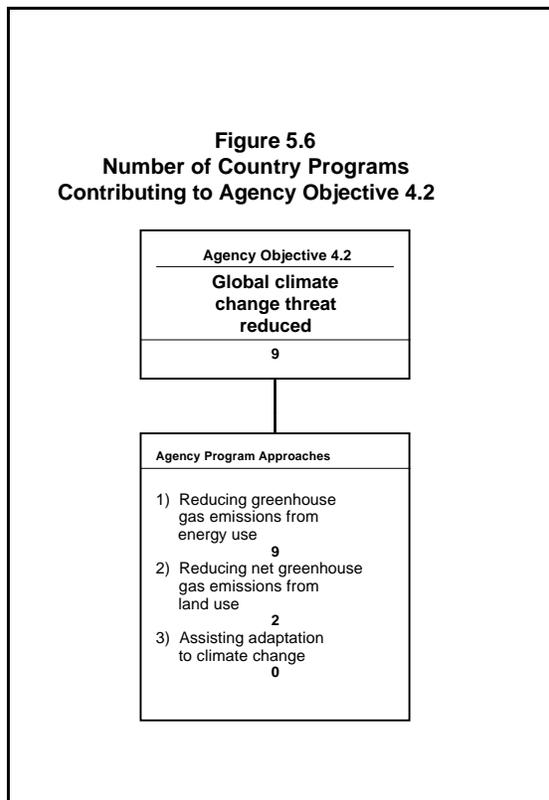
USAID/India and the Global Bureau supported programs in ex situ conservation this year. The Agency provides the U.S. contribution to the multilateral system of ex situ conservation coordinated through the Consultative Group on International Agricultural Research and its International Agricultural Research Centers. These centers manage the developing world's major gene banks. In India, USAID is helping the Bureau of Plant and Genetic Resources preserve 600,000 specimens for long-term storage by 1996, up from the 180,000 specimens the gene bank stored in 1988.

Reducing the Threat of Global Climate Change

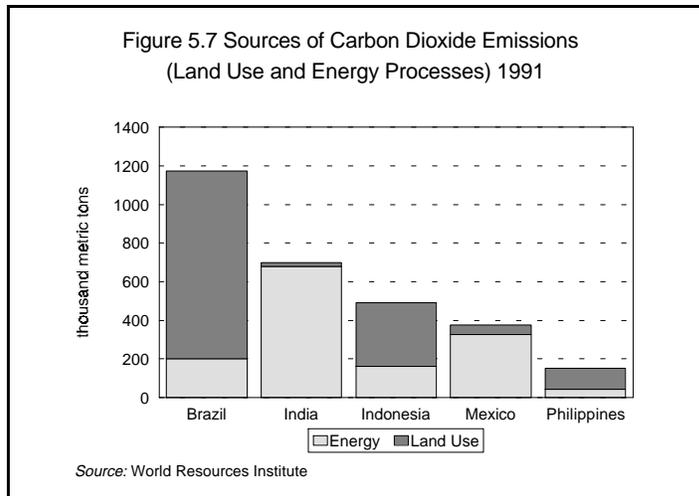
Consensus among the world's leading experts on climate change continued to build this year on the link between the emission of heat-trapping greenhouse gases due to human activity and a 0.5°F to 1.1°F rise in average global temperatures since the turn of the century. If emissions continue to grow following historic trends, the earth's temperature will increase between 1.8°F and 6.3°F by the year 2100, according to recent climate models. Experts predict these increases will lead to shifts in agricultural zones, rising sea levels, and more weather-related disasters, resulting in economic, social, and environmental dislocation worldwide. Developing countries and parts of the United States that rely on agriculture, forestry, and other resource-based activities for their economic well-being could be especially hard hit.

USAID is responding to these threats by targeting programs to mitigate climate change in central Africa and nine key climate change countries: Brazil, India, Indonesia, Kazakhstan, Mexico, Poland, the Philippines, Russia, and Ukraine (see figure 5.6). These countries were identified in the Agency's 1994 Global Climate Change Strategy as being among the largest current or potential contributors of greenhouse gas emissions worldwide.¹⁵ They now account for 25 percent of global emissions, a share likely to rise steeply if appropriate steps are not taken. Indeed, developing countries as a whole are expected to make up about 70 percent of greenhouse gas emissions by 2025.

USAID's objective of mitigating climate change involves reducing net greenhouse gas emissions from energy systems and land use. Energy and land use account for most of the world's greenhouse gas emissions, although within countries their relative importance can differ greatly (see figure 5.7 for carbon dioxide emissions). These differences have criti-



¹⁵ *Global Climate Change: The USAID Response, A Report to Congress. Agency for International Development. June 1994.*



cal implications for program design. In Brazil, for example, where net emissions arise principally from deforestation in the Amazon basin, USAID works to stabilize land use. In India, where inefficient and heavily polluting energy production is the problem, the Agency targets the energy sector.

All climate change activities are designed to be fully justifiable in their sustainable development benefits. Similarly, programs pursued under other environmental objectives (support to forested protected areas or assistance to increase energy efficiency) also contribute to mitigating climate change.

Many of the Agency's climate change programs are still in early stages of implementation and have produced few documented results. The earliest of these programs were launched in 1990, and many of them did not specifically quantify reductions of greenhouse gas emissions because they were add-on activities to existing forestry and energy programs. As a result, performance data related to global climate change remains scant. Programs launched since 1994 under this objective have improved the monitoring of results and effects on greenhouse gas emissions.

Reducing Greenhouse Gas Emissions From Energy Use

Reducing net greenhouse gas emissions from energy use through energy efficiency and renewable energy technologies is at the

core of climate change activities in eight of nine key programs. The energy sector accounts for half of greenhouse gas Emissions worldwide and is the greatest source of emissions in six key countries. Faced with outdated energy technologies, a host of policy and institutional constraints, and a shortage of investment capital and trained personnel, many countries are hard pressed to convert to environmentally sound energy systems to reduce greenhouse gas emissions, even though clean and efficient technologies are

often the least-cost alternative for meeting long-term energy needs. USAID supports efficiency in energy demand by helping end-users consume energy less wastefully. It supports efficiency in energy supply by helping utilities increase the efficiency of power production and distribution.

Four key programs have tailored their energy efficiency programs to mitigate climate change, and many of these programs receive support through USAID's parallel contribution to the Global Environment Facility. For example, USAID/Philippines has been working with local utilities since 1994 on a demand-side management program that offers economic incentives to utility customers to use electricity during off-peak hours and to purchase energy-efficient lighting and appliances. The program is expected to offset the expansion of fossil fuel-based generating capacity, thereby achieving economic savings, and to eventually avert between 160,000 and 200,000 tons of carbon dioxide emissions each year.

In another demand-side management program, USAID/Mexico sponsored a feasibility study to install two million compact fluorescent lamps in Monterrey and Guadalajara. The program is being funded by the Global Environment Facility and governments of Mexico and Norway and is expected to save \$5 million annually in fossil fuels and to reduce carbon emissions by 27,500 tons each year. In addition, 600,000 fluorescent lamps will be bought from two U.S. firms. Also in Mexico, USAID has been working

with 20 industries on a pilot program to increase the efficiency of electric motors, which are responsible for about 40 percent of the country's total demand for electricity. An initial USAID investment of \$1.0 million has leveraged about \$2.5 million from the government and private industries. Both are looking to the program as the basis for a national motor efficiency program and as a way to demonstrate to Mexican industry the utility of demand-side management.

Four programs promote the use of renewable energy technologies such as geothermal, wind, and solar power as another strategy to reduce greenhouse gas emissions. In India, a USAID feasibility study and policy dialog have led to contracts between utilities and sugar mills to produce 275 megawatts of energy using bagasse cogeneration, which uses organic waste from the country's large sugar industry for fuel. Once fully operational, the program will replace the need to burn 944,000 tons of coal annually and will use agricultural wastes that otherwise would be burned with no net power produced. Similar USAID projects in other renewable energy technologies are proceeding in Indonesia, Mexico, and the Philippines.

In Central and Eastern Europe and the new independent states, which are responsible for 13 percent of global greenhouse gas emissions, USAID is introducing energy-efficient technologies, helping to lift energy subsidies on heavily polluting fossil fuels, and encouraging privatization of energy generation and distribution networks. Although global climate change mitigation is not a primary objective of ENI programs, their programs help shift countries toward cleaner, less costly energy systems that also help mitigate climate change (see energy section later in this chapter).

In Krakow, Poland, USAID's efforts to improve energy efficiency and reduce air pollution from 100,000 coal-based domestic stoves and 3,000 small coal-burning boilers is a good example of how the Agency's energy, pollution abatement, and global climate change objectives are closely intertwined. The Agency, in cooperation with the U.S. Department of Energy, has been working

with Polish officials and citizens to introduce low-cost alternatives to highly polluting low-grade coal in domestic and municipal heating. USAID has helped Polish counterparts form joint ventures with eight U.S. energy technology and engineering firms. Together they plan to install industrial and domestic boiler house controls to increase efficiency and to use specially designed heating briquettes that can reduce the emission of particulate contaminants by 90 percent. USAID's energy conservation demonstration projects—located in four buildings and several smaller sites—have been replicated tenfold by Polish counterparts without U.S. assistance. In addition to reducing greenhouse gas emissions, these initiatives are attracting considerable public interest and spurring new markets in energy-efficiency services and technologies for U.S. firms.

Reducing Net Greenhouse Gas Emissions From Land Use

Land-use patterns also are closely linked to the rise of greenhouse gas emissions. Most notably, clearing tropical rain forests releases the equivalent of 20 to 50 percent of all carbon discharged by the combustion of fossil fuels each year. In addition, wet rice agriculture and livestock production release methane, a potent greenhouse gas. USAID programs in Brazil, Mexico, and central Africa support initiatives to reduce the rate of tropical deforestation and other land-use changes and to increase the amount of carbon stored in existing and new forests. USAID's large portfolio of forest conservation and reforestation activities in other countries also plays an important role in reducing net greenhouse gas emissions.

In Brazil, USAID supports a variety of activities to improve the management of 9.2 million acres of forested land in the Amazon basin to achieve the dual purpose of reducing greenhouse gas emissions and stemming biodiversity loss. The field office is working to improve the management of protected areas, to promote sustainable use of forested lands, and to increase productivity on already degraded lands near forests. In 1995 the Bureau for Africa approved the Central African Regional Program for the Environment, a major

initiative designed to reduce the rate of deforestation in the Congo basin, both to mitigate climate change and to reduce biodiversity loss.

Assisting Adaptation to Climate Change

Under USAID's strategy to mitigate climate change, programs to reduce vulnerability and promote adaptation to climate change will be addressed through individual activities. To date, no programs have specifically targeted objectives to assist countries in adaptation programs. However, the U.S. Country Studies Program (see below) has included vulnerability and adaptation assessments in its country studies.

Promoting Interagency Cooperation in Mitigating Climate Change

In addition to USAID's own climate change programs, the Agency participates in several governmentwide programs that support the U.S. commitment to the Framework Convention on Climate Change. Under the U.S. Country Studies Program, launched in 1993, USAID has joined with nine other agencies to help countries analyze their greenhouse gas emissions and identify options to mitigate emissions and reduce vulnerability to global climate change. The Country Studies Program is a response to the dearth of data on climate change in developing countries, data needed to formulate well-conceived policies on mitigation and adaptation.

Climate change studies are now being conducted in 55 countries, with preliminary results released in April 1995 for 21 nations. Building on these initial studies, USAID, the Department of Energy, and the Environmental Protection Agency are helping nine countries prepare national action plans that address both mitigation of and adaptation to climate change. USAID will fund action plans in three key countries—Indonesia, Mexico, and the Philippines.

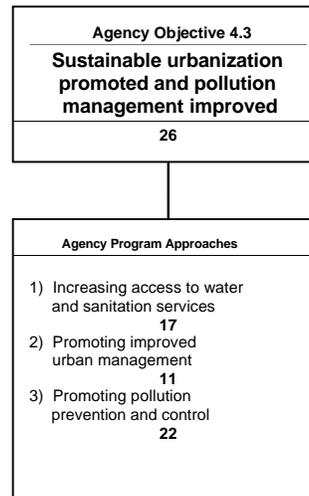
The second major interagency program is the U.S. Initiative on Joint Implementation. This was launched under the Clinton administration's Climate Change Action Plan to fa-

cilitate cooperation between the private sector and countries in supporting "joint implementation" projects. Joint implementation describes cooperative programs between two or more countries to reduce or sequester net emissions of greenhouse gases. USAID is helping administer the program, which has approved 15 projects so far. Projects support reforestation and energy production from biomass, geothermal, and wind resources. USAID also contributes to the International Climate Technology Initiative unveiled by countries of the Organization for Economic Cooperation and Development in April 1995 at the first Conference of the Parties of the Framework Convention on Climate Change.

Promoting Sustainable Urbanization and Improving Pollution Management

The world in which USAID works today is increasingly urban. Nearly half the people

Figure 5.8
Number of Country Programs
Contributing to Agency Objective 4.3

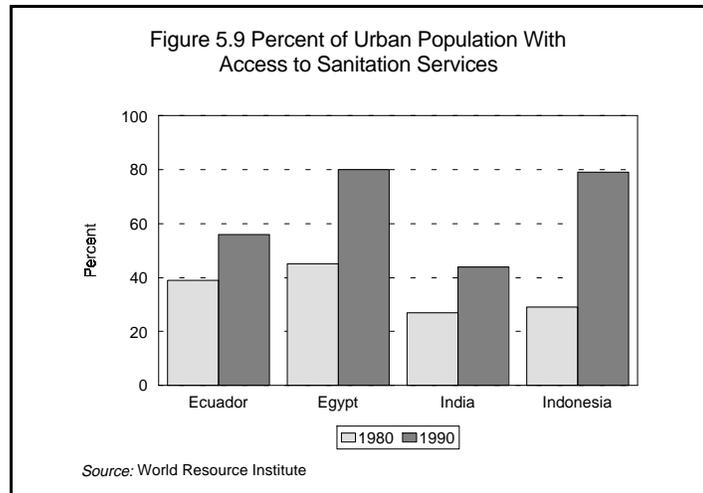


in developing countries live in urban areas. Rapid urban growth is expected to continue because of high birth rates and rural-to-urban migration. Indeed, the number of “megacities” such as Jakarta and Mexico City is expected to quadruple, from six in 1989 to 24 by the year 2000. In the ENI region, the legacy of command-and-control economies, which relied on heavy industry and laxly enforced environmental regulations, has led to dangerously high levels of air and water pollution. In other regions, poorly managed urban growth has led to severe pollution, which affects human health, environmental quality, and economic productivity. Benefits associated with urbanization and industrial growth (more jobs, higher incomes, and increased productivity) are often threatened by degradation of the urban environment.

In 1995, 26 programs had sustainable urbanization and pollution management strategies in place. USAID’s activities target municipal and national governments, local communities, and industries. They aim to promote sustainable urbanization and improve pollution management by 1) increasing access to safe water and sanitation services, 2) promoting improved urban management, and 3) supporting pollution prevention and control (see figure 5.8). These approaches are intricately linked. It is common, for example, for a program to work with a host country to improve urban management through financial policy reform, which then leads to new or expanded water and sanitation services.

Increasing Access to Water and Sanitation Services

In the developing world and countries in transition, 95 percent of sewage is discharged untreated directly into rivers and other waterways. As a result, diseases such as diarrhea, cholera, typhoid, and hepatitis spread through contaminated water, killing 10 to 25 million people annually. USAID strives to alleviate problems arising from poor sanitation and contaminated drinking water by im-



proving and expanding the water supply, wastewater treatment, and solid waste management. In short, programs are working to improve urban environmental services and related infrastructure. Their approach spans a broad range of activities, from infrastructure development and refurbishment in Egypt to provision of water pipe in Ukraine to direct technical assistance in Jamaica to housing guarantee programs in Morocco. Efforts such as these have helped improve access to sanitation services for urban populations in several developing countries (see figure 5.9).

In Cairo, for example, illnesses such as hepatitis and intestinal worms caused by poor sanitation lead to between 2,000 and 5,000 deaths annually and the loss of millions of workdays. To improve water delivery and increase access to sanitation, USAID/Egypt is supporting improvements in infrastructure systems that treat wastewater entering the Nile River and Lake Maryut, Egypt’s principal source of drinking water. USAID’s accomplishments to date include construction of 131 miles of sewers, 11 new or rehabilitated pump stations, 2 wastewater treatment plants, and a sludge treatment facility. In 1994 the Mission reported its targets for removing organic contaminants from water at USAID-funded facilities in Alexandria and Cairo had been exceeded by 45 to 80 percent.

USAID/Jamaica’s efforts to improve access to water and sanitation provide another example of the type of impact the Agency can have in this sector. Studies funded by the

Mission of the water supply system in the city of Negril revealed that leakage, waste, and low system pressure caused significant water shortages. To ameliorate the problem, USAID provided technical assistance and training in infrastructure improvements that enhanced leak detection and repair, metering, system rehabilitation, and maintenance. As a result, the city boosted its municipal water supply from 2.3 million to 3.5 million gallons a day—a 53 percent increase—and reduced system losses from 38 percent to 22 percent.

One of the greatest environmental risks to urban populations in the ENI region is lack of access to safe water. In Ukraine, the situation is acute because the return of ethnic Tartars to their homeland in Crimea has significantly increased the population. To help provide safe water to this growing population, USAID purchased and delivered water pipe to local authorities to complete new pipeline construction. Through this effort, water delivery capacity was doubled, and an additional 82,000 previously unserved residents got access to safe water.

To improve access to sanitation, USAID has also been fostering private–public partnerships in waste management. In Ecuador, USAID has supported private–public cooperation in solid waste management in several cities. In the city of Machala, for example, which struggled with severe sanitation problems because 50 tons of garbage went uncollected each day, USAID helped create an independent solid waste enterprise. The project has established a solid waste collection system that uses bicycle carts to collect garbage for more than half the population, located mostly in poor urban barrios that previously were outside municipal collection routes. By conducting a study of men’s and women’s roles in and attitudes toward household waste disposal and collection, the municipality has been able to better tailor its collection services, improve local participation, and set up a realistic fee structure for households with different needs and resources.

In Morocco just a decade ago, 13 percent of the urban population lived in slums and squatter settlements. This population lacked access to basic services such as clean water

and sanitation. With assistance from a USAID housing guarantee loan program, Morocco’s National Shelter Upgrading Agency achieved remarkable results in improving shelter for the country’s urban poor. The national agency made low-cost housing lots (hooked up to water and sewers) available for sale to residents at a rate of more than 10,000 lots a year. At the same time, the program brought potable water to 90,000 people. As a result, the proportion of urban dwellers living in slums dropped to 6.7 percent, despite Morocco’s rapid urban growth. Staff from the national agency, now an acknowledged regional leader in dealing with problems of slums and shanties, have traveled to Gaza and the West Bank to provide technical advice to the Palestinian Housing Council, which faces similar problems. Moreover, the housing agency won the 1995 UN World Habitat Award for eliminating shantytowns in the city of Taza.

Promoting Improved Urban Management

Poorly managed urbanization and industrialization create enormous environmental problems. Rapid industrialization combined with inadequate environmental management results in the discharge of a wide range of toxic pollutants that threaten human health and environmental quality. Unfortunately, the cost of improving urban infrastructure is often beyond the capacity of municipal governments, especially in developing countries, where the growth of cities far outpaces the filling of public coffers. USAID works with municipal and national authorities to establish urban management policies and regulations, strengthen government capacity for environmental management, and develop sustainable financing for environmental infrastructure.

Several programs promote improved urban management by strengthening policies and regulations and enhancing the monitoring and enforcement capabilities of municipal authorities. In the Philippines, USAID-financed studies identified the major polluting sectors of Filipino industry, analyzed market-based methods of promoting pollution reduction, and identified gaps in the

regulatory structure. The Agency then helped prepare hazardous waste legislation and a compliance system for industrial environmental impact assessments, which are now in implementation. The Agency is following similar paths in India, Indonesia, and Sri Lanka.

In Egypt, USAID helped the government formulate its environmental law, which created a centralized environmental agency, mandated environmental impact assessments, and legislated sweeping changes in how pollution and hazardous wastes are treated. To familiarize the general public, government, and private sector with their responsibilities under the new law, USAID helped the environmental agency develop a national environmental awareness program.

In the ENI region, USAID has been promoting improved urban management by building institutional and human capacity in environmental management. The Agency has provided training and sponsored workshops for local urban planners, environmental NGOs, and the private sector designed to strengthen their skills in the technical, policy, and administrative aspects of pollution prevention. In Russia, for example, the Mission provided training in environmental management, health risk assessment, and environmental epidemiology, thus contributing to the development of personnel who can design and implement future urban environmental management programs. Also in Russia, USAID funded an environmental policy adviser to help the Federal Ministry of the Environment review existing legislation. The adviser works with several localities to reform their environmental tax regimes and to design environmental policy and financial instruments. Through this effort, USAID is helping improve the capacity of national and local authorities to address urban environmental problems.

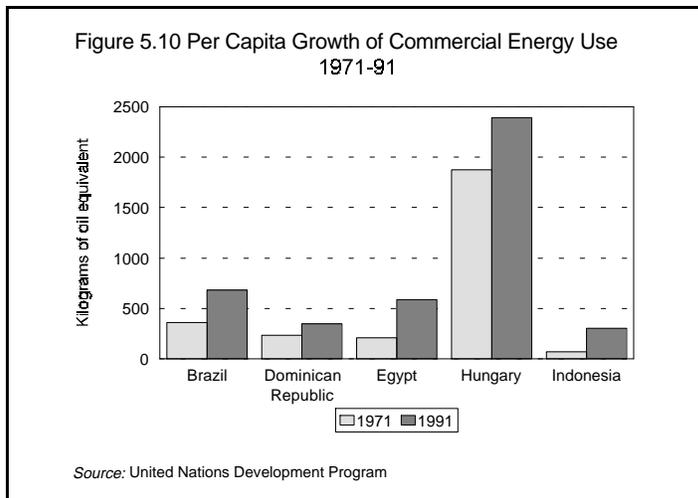
Promoting Pollution Prevention and Control

The discharge of poorly treated industrial waste, including heavy metals and toxic chemicals, is responsible for both water and air pollution in many developing countries. In

the ENI region, state ownership and subsidization of heavy industry have resulted in market distortions that undervalue environmental goods and services and lead to widespread degradation. In response, USAID promotes pollution prevention and reduction, as well as end-of-the-pipe cleanup, by providing policy advice and introducing new technologies in pollution abatement and waste management.

These efforts have begun to show results. The Agency has funded more than a hundred waste-minimization demonstration and impact projects that illustrate how low-cost technology can reduce operating costs and pollution emissions while providing economic returns to factories. These demonstration projects show companies how they can lower their annual output of waste and save each plant anywhere from \$30,000 to \$2 million a year. In Poland, for example, USAID helped decrease the discharge of industrial and municipal waste into rivers by 22 percent during 1990–93.

USAID's promotion of technology transfer for pollution reduction complements its waste minimization programs. Throughout the ENI region, the Agency has been working with municipalities and industries to identify low-cost methods of reducing emissions at local factories, and to purchase and install pollution prevention equipment. In Estonia, for example, USAID supplied equipment to a chemical plant that reduced waste and improved process control, saving the company an estimated \$100,000 annually. Similarly, equipment supplied to a fertilizer plant in Lithuania is expected to lead to savings of \$160,000 as a result of reductions in material use and energy consumption. In the Near East, USAID has been conducting industrial assessments of key polluting industries. These assessments not only have identified and targeted priority industrial facilities for improved pollution prevention systems, they have also trained plant engineers and consultants in environmental auditing and pollution prevention techniques. In the Philippines, for example, 59 of the 106 companies that took part in USAID pollution management appraisals have now implemented pollution prevention systems.



Increasing the Provision of Environmentally Sound Energy Services

Energy production is a major economic, environmental, and social issue for developing countries. In the developing world, demand for energy is increasing seven times faster than in the industrial world, more than doubling in Egypt and Indonesia, for example, between 1971 and 1991 (see figure 5.10). For many reasons, the cost of energy in these countries is very high. Capital costs and the purchase of fuel, often imported, consume as much as 40 percent of total public investments in developing countries. Poor administrative and operational practices inhibit efficient energy production, and unreliable supplies of electricity inhibit economic growth. Just as serious, inefficient energy use and escalating demand for energy in the developing world add to the global greenhouse gas burden, increase local air pollution, and deplete nonrenewable fuel resources.

USAID recognizes the strong link between sustainable development, including economic growth, and energy consumption in the developing world. The Agency promotes market-based activities in support of three program approaches: 1) increased energy efficiency, 2) expanded use of renewable energy sources, and 3) introduction of clean energy technologies (see figure 5.11). These

energy activities may also achieve secondary results, such as reducing carbon emissions.

USAID's largest energy investments are in ENI, India, Indonesia, Mexico, and the Philippines, but the Agency supports energy objectives in many countries. Agency approaches vary according to national or regional needs. In ENI, for example, air pollution from inefficient energy use is a primary concern, while in LAC efforts target providing energy in remote areas without electricity and providing clean energy for urbanization. In

Asia's rapidly industrializing countries, the emphasis is on energy efficiency and conservation. In Africa, with its largely rural population, poor infrastructure, and extreme poverty, no country programs have explicit energy objectives, but a limited number of project activities are being pursued.

Increasing Energy Efficiency

Centralized control of energy production and distribution in many USAID host countries often leads to institutional and operational weaknesses. Ill-managed, poorly maintained distribution networks contribute to energy losses at every stage. As a result, power plants in the developing world consume an average of 15 to 30 percent more fuel per unit of energy produced than those in industrial countries, increasing harmful emissions while reducing productivity. Similarly, weak policies and institutions lead to wasteful energy use by consumers. In most developing countries, 20 to 30 percent savings in energy consumption could be achieved through cost-effective conservation measures, with no loss in energy services. To promote energy efficiency, the Agency supports energy policy reform, price restructuring, energy efficiency and conservation programs for users, provision of U.S.-manufactured pollution prevention equipment, and increased provision of decentralized and private-sector services.

Energy policy reform is essential for increasing developing nations' energy efficiency because many of the sector's problems stem from national policies that neither encourage sound energy use and investment nor link the cost of providing energy to its true market value or environmental impacts. In Czechoslovakia, for example, USAID worked on privatization of utilities but found that the absence of a good regulatory framework hindered the final stages of the process. In ENI and elsewhere, the Agency is applying this lesson by supporting policy studies and training to help countries identify policies, laws, pricing practices, and regulations that contribute to inefficient energy supply and delivery. USAID has helped the Ukraine government develop and implement a historic restructuring of its previously centrally controlled electric power industry. The institutions established under this effort—including a national regulatory commission, 6 generating companies, and 27 local power and heat supply companies—will create a competitive wholesale market for electricity and establish incentives for more

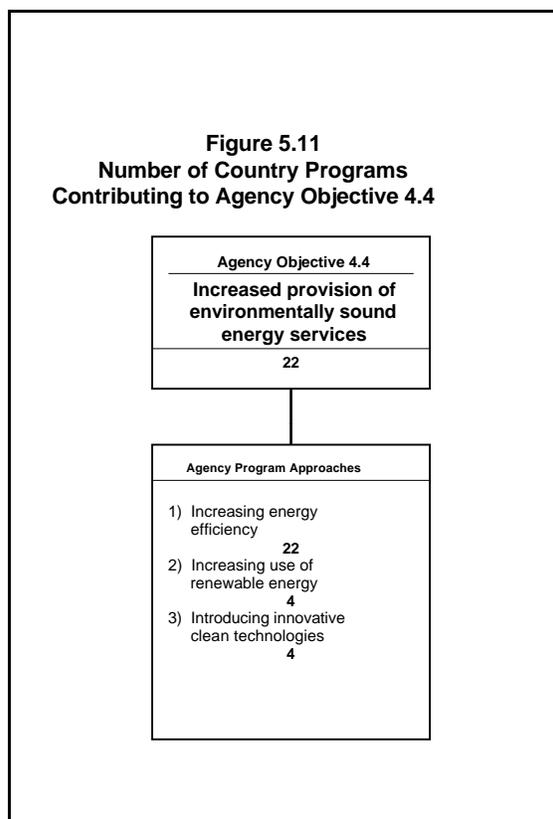
efficient energy use. Similar policy reform is under way in Poland, Romania, and Russia.

The Agency also promotes both national and local initiatives to reform energy pricing policies. Price reform, including higher energy prices, helps recover the cost of services, encourages energy conservation on the part of users, and facilitates investment by utilities and governments. In Egypt, USAID helped prepare strategies and an implementation schedule for reform of the power sector. Efforts to increase the cost-effectiveness of Egypt's use of electricity have resulted in a 20 percent increase in the price of the service. The increased energy efficiency resulting from Agency support in Egypt (including policy and price reform and facility construction and repair) has averted annual emissions of 70,854 tons of sulfur oxides, 1.76 million tons of carbon dioxide, and 2,708 tons of nitrous oxides in Cairo and Alexandria.

Seven programs include in their country strategies demand-side management, a technique for reducing energy demand or upgrading equipment to boost energy efficiency. In Morocco, USAID provided demand-side management training and energy audits for more than 200 companies in 22 cities. The Agency then gave the companies specific recommendations to increase efficiency and save costs. The 60 percent of firms that followed the recommendations have realized an average of 26 percent in energy savings through energy audits. A program of boiler tune-ups helped 46 clients save the equivalent of 1,764 tons of petroleum annually. For one Marrakech hotel, this procedure saved 28 percent on energy bills. In Indonesia, USAID supported feasibility studies and an action plan to implement demand-side management in the power sector. This preliminary work resulted in \$12 million in international bank loans to implement the action plan.

Increasing the Use of Renewable Energy

Renewable energy offers a way of supplying energy without the environmental and health damage that result from exclusive use of fossil fuel- or wood-fired energy. For certain applications, especially rural electrification, renewable energy is economically



viable, although locating financing is challenging. The Agency is supporting studies, policy and technical assistance, and training aimed at demonstrating and institutionalizing the use of alternative sources of energy, including photovoltaic, solar thermal, hydro, wind, geothermal, and biomass energy.

Renewable energy is of particular interest in Latin America, where remote rural communities and small businesses need reliable alternatives to provide or supplement power from electrical grids or diesel generators. In Bolivia, local partners are partially or fully funding USAID's installation of 900 of a total of 2,350 photovoltaic power systems for household and community use in remote rural communities. This effort is expected to help stimulate other renewable energy activities, which will displace the use of 90,000 tons of carbon in Bolivia within the next 20 years.

USAID has found that short-term interventions and support for preinvestment studies often produce substantial support from other donors. In Costa Rica, for example, a preinvestment study on a wind energy site, partially funded by USAID, led to a \$31.3 million project, which includes \$3.3 million in Global Environment Facility funds and a \$24.1 million loan from the Inter-American Development Bank. The completed 20-megawatt project will constitute about 2 percent of the country's total generating capacity.

USAID's renewable energy efforts also help position U.S. manufacturers to compete in the growing market for environmental goods and services. USAID and the government of Botswana, for example, are cofunding a loan guarantee program that will allow rural households and communities to purchase small photovoltaic systems. Phase I of the project will electrify 200 homes, resulting in the generation of 10 kilowatts of electricity. U.S. manufacturers supply virtually all the systems purchased for this program.

Introducing Innovative Clean Technologies

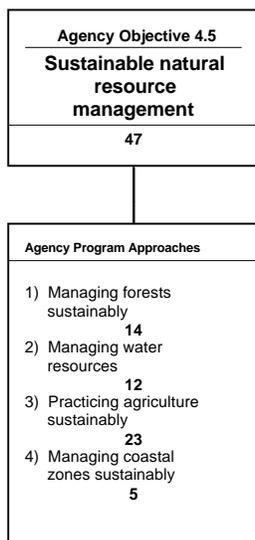
USAID seeks to help governments and communities in developing nations reap envi-

ronmental and economic benefits from introducing cleaner fossil-fuel techniques such as coal washing, retrofitting, and desulfurization. Clean coal technology reduces the environmental impact of energy production and transportation. This program approach is part of the country strategies of Indonesia, the Philippines, Russia, and the Global Bureau, which is introducing clean technology in many other countries.

USAID is working with the Mexican government to reduce pollution at the Manzanillo power plant. This plant—a six-unit, 1,900 megawatt oil-fired power plant—generates power for the industries of Guadalajara. The plumes of air pollution from the plant's stacks are clearly visible at nearby tourist locations, including world-renowned beaches and Las Hadas resort. USAID is installing Reduced Emissions and Advanced Combustion Hardware technology in two of the Manzanillo units. This technology will increase the boilers' efficiency by 1 percent (reducing oil consumption by 35,000 barrels per unit annually, with a corresponding drop in operating costs) and reduce particulate emissions by 50 percent (including an 8,800-ton reduction in carbon dioxide emissions and a 20 to 40 percent reduction in annual nitrous oxide production).

In Asia, USAID is fostering efforts to convert two- and three-wheeled taxis, presently running on gasoline, to emission-free electrical power. Twenty million of these gas-motorized vehicles snarl their way along streets and alleyways in Asia. Each emits twice the carbon dioxide emitted by automobiles and eight times the hydrocarbons. In India and Nepal, USAID is testing a new technology—nickel metal hydride batteries—for electric two-wheeled scooters and three-wheeled rickshaws. A similar effort, using lead-based batteries, is under way with the three-wheeled *tuk-tuks* in Bangkok, where three prototype vehicles are being tested. Full production is still a few years away. These efforts have resulted in a dozen partnerships between U.S. and Asian firms to develop and manufacture electric vehicles and batteries.

Figure 5.12
Number of Country Programs
Contributing to Agency Objective 4.5



Sustainable Natural Resource Management

Management of renewable natural resources for long-term productivity is a major goal of USAID's environmental activities. Most people in Africa, Asia, and Latin America depend directly on the earth's renewable natural resources for their livelihood. Yet natural resources are being degraded rapidly by conflicts over their use, market distortions, extreme poverty, population pressures, and inappropriate technologies and practices. Over the last two decades, USAID's activities have responded to these threats by strengthening national policies and institu-

tions in environmental and natural resource management, building public environmental awareness, fostering community empowerment and stewardship, and encouraging adoption of appropriate technologies and practices.

USAID's portfolio of natural resource management programs addresses the four most important renewable resources for sustainable development: forests, water resources, agricultural lands, and coastal resources (see figure 5.12). In each geographic region, excluding ENI, country programs have been engaged in resource management activities over a number of years. Their experience provides a long-range perspective on the Agency's progress.

Managing Forests Sustainably

Over the last 50 years, global forest cover has been reduced by 20 percent. Remaining forested areas are being degraded and fragmented. Degraded areas, though still categorized as forests, are losing their ability to provide their original range of ecological services. Fourteen country programs are responding to this decline by promoting two strategies in forest management and conservation: community forestry to harvest timber and nontimber forest products, and sustainable timber extraction for commercial enterprises. Most programs are located in Latin America and Asia, where forest loss has been the most acute. USAID's forestry activities aim to directly support the livelihoods of rural men and women, and often help conserve biodiversity and mitigate global climate change by maintaining or increasing forest cover and preserving habitat.

USAID is actively promoting community forestry in Indonesia, Nepal, and the Philippines, and recently has launched activities in Albania. According to an Agency study on selected forestry projects,¹⁶ forests under communal management show measurable improvements in growth, regeneration,

¹⁶ Phillip E. Church and J. Laarman. 1995. *Forestry and the Environment: An Assessment of USAID Support for Forest Stewardship*. Washington: Agency for International Development.

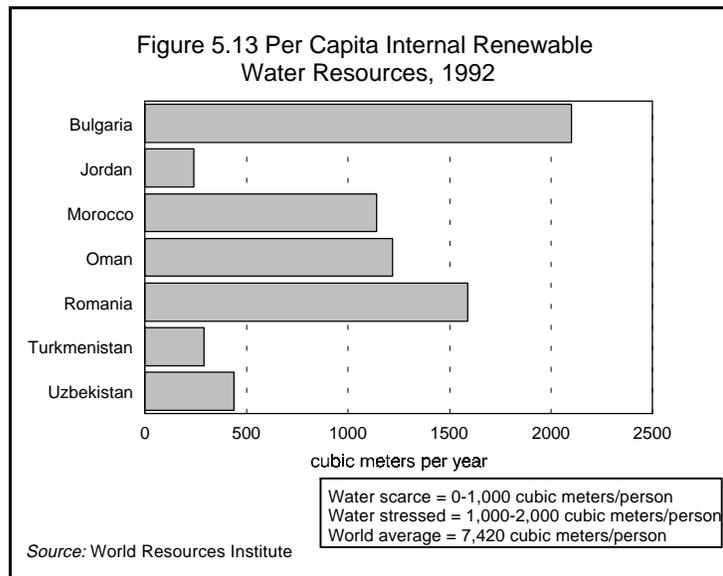
ground cover, retention of soil moisture, and reduced erosion. Community management also has a positive impact on women, who are responsible for collecting fuelwood and fodder in many countries. Forest management agreements between governments and local communities are often key first steps to communal management. These agreements provide communities with greater access to, and authority over, the use of forested lands. They foster the adoption of improved management practices and often replace inefficient state forestry agencies. However, the study finds that shifting forest stewardship from public agencies to local communities requires extensive retraining of government forestry staff and support to communities in forestry and organizational development.

USAID's experience in the Philippines is instructive. The dramatic loss of forests has lead the government to proclaim community-based forest management as the national strategy to achieve sustainable forestry. With USAID assistance, the government is transferring direct management responsibility for more than 494,000 acres to 22 communities. The Agency supports this process by conducting community-based rapid rural appraisals to identify local farmer and community needs and desires. Early evidence suggests that improved management practices have increased tree cover and reduced soil erosion into local streams.

In Nepal, the Agency supports government efforts to decentralize responsibility for resource management. USAID pilot programs in community forestry and training for students at the Institute of Forestry are playing an important role in this decentralization process. For example, USAID-trained foresters, 10 percent of whom are women, provide technical leadership at the local level to ensure that decentralization moves forward. In addition, USAID helped establish 200 forest user groups, with many more groups requesting technical assistance to develop management plans for their forest resources.

USAID also works to reform policies in commercial logging and to promote sustainable practices in timber harvesting and processing. In Honduras, where forests were exploited in the past with little consideration for sustainability, the Agency promotes policy reform and technologies to encourage sound forestry practices. The country has lost nearly five million acres of broadleaf forest and 40 percent of its natural coniferous forest to agricultural encroachment and unregulated timber cutting. USAID/Honduras aims to bring 25 percent of the country's remaining pine forests under effective management by 1997. As of 1994 the Mission helped bring 313,700 acres under improved management, well beyond its target of 271,700 acres. Concurrently, USAID helped restructure the Honduran forestry parastatal from an agency that oversaw the "mining" of forest resources to one that now balances its responsibilities for forest management and the protection of biodiversity.

USAID also has assisted Bolivia (which between 1981 and 1990 lost 1.1 million acres of tropical moist deciduous forest annually) in developing a comprehensive approach to forest management that includes policy analysis, improved harvesting and production, and marketing interventions. At the policy level, USAID supported the creation of an ambitious forestry law. On the marketing side, USAID has been instrumental in bringing together loggers and NGOs to design a



certification process for harvesting timber. “Ecocertified” timber is less damaging to forest biodiversity and creates new markets and income opportunities for timber harvesters. As a result of these efforts, USAID/Bolivia exceeded its first-year target—to achieve improved forest management in 2,600 acres—by 100 percent, putting 5,200 acres under sustainable management.

Managing Water Resources

A safe and reliable water supply is critical for both economic development and human well-being. But many countries are consuming their water reserves beyond sustainable limits and are now classified as water-scarce or water-stressed (see figure 5.13). Availability of water for irrigation, industrial use, and direct human consumption is expected to decrease rapidly for these countries unless concrete steps are taken quickly. USAID water resource management programs support water conservation, provision of safe water to unserved and underserved populations (primarily in rural areas), and effective management of small-scale irrigation systems.

In Jordan and Morocco, USAID supports water conservation programs to address inefficiencies in the agricultural, industrial, and household sectors. It also invests in water treatment facilities. In Jordan, water scarcity is so critical that a national catastrophe could occur within the next decade. Since virtually all natural sources of water have been tapped and desalination is not yet economical, USAID targets the largest public and private water users for conservation and cost-recovery interventions. The Mission is supporting industrial water management audits and the upgrading of a water-use tracking system at the Ministry of Water and Irrigation. In Morocco, water consumption will exceed supply by the year 2020. USAID/Morocco funds water quality and distribution programs in the urban and industrial sectors and promotes water users’ associations as a way to save water through improved maintenance, adoption of efficient irrigation technologies, and strengthened policies and regulatory frameworks.

Although environmental programs in the ENI region are still in their early stages, the three countries in the Aral Sea watershed—Kazakhstan, Turkmenistan, and Uzbekistan—Uzbekistan—are keenly aware of the need to develop a regional plan to improve water quality and distribution. Since 1960, the volume of water reaching the Aral has decreased dramatically, with serious environmental, economic, and health consequences. Salinity has increased to 3 percent from 1 percent, resulting in the virtual elimination of the fishery industry. At the same time, the surface area of the sea has shrunk by half, exposing salt beds and mineral contaminants that are damaging crops as far as 200 miles away. To assess and begin mitigating the disastrous environmental conditions surrounding the Aral, USAID supported a health survey in Kazakhstan and equipped a water quality testing laboratory in Turkmenistan. In Kazakhstan and Turkmenistan, the Agency funded construction of a water treatment plant and installation of chlorination equipment to provide 150,000 people with safe drinking water.

Communal management of water resources, another Agency strategy to encourage water conservation, is part of a package of technologies that USAID has introduced into low-rainfall areas of Senegal. The ultimate objective is to increase crop yields. In 1994, 9 percent of agricultural communities adopted improved irrigation technologies, and yields for four of six targeted crops increased. Adoption of irrigation technologies is helping stabilize agricultural yields in the country, though annual variations in weather remain a critical factor in determining crop yields.

Practicing Agriculture Sustainably

A strong link exists between agriculture and the Agency’s other sustainable development objectives. Much of the world’s population relies exclusively on agriculture for its livelihood. An adequate food supply is essential for maintaining health and reducing the risk of malnutrition. A country’s ability to consistently produce food is essential for preventing expensive and tragic crises in food

Box 5.2 In Honduras, Women Are Key Players in Sustainable Agriculture

Among USAID host countries, Honduras stands out for demonstrating consistent attention to gender issues in natural resource management.

USAID and the Honduran Ministry of Natural Resources have helped more than 8,800 farm families, including 500 households headed by women, increase their yields by more than 30 percent by promoting hillside farming techniques that rely on the active participation of women. The project has hired 672 community leaders—289 of them women—to introduce sustainable technologies to communities. The women teach vegetable gardening and food preparation, how to build efficient wood-burning stoves, and how to process and market new crops. Women not only have promoted new crops and stoves, but also have been enthusiastic participants in providing such improvements in watershed management as grass barriers to erosion.

Women recognize that deforestation is depleting their local water supply and causing flooding. Through erosion prevention and more efficient stoves, women are able to spend more time tending new income-generating crops.

Women also are becoming active in the political process. USAID/Honduras was instrumental in bringing a group of women farmers into discussions about agrarian reform in a rare example of women participating in policy reform. The women's group was particularly skillful at proposing compromises during difficult negotiations, the Mission reported.

Impact on the environment. The performance data show that the number of poor hillside farm families adopting environmentally sound practices increased from 9,000 in 1989 to 19,800 in 1994. Approximately 2.5 million tons of topsoil are saved annually.

security. But inappropriate agricultural policies and practices are undermining the productive capacity of land around the world. Soil fertility is being lost rapidly through erosion, salinization, pesticide contamination, and other destructive forces.

Twenty-three country programs, spread evenly across the regions, support three general strategies in sustainable agriculture. Most commonly, programs promote the introduction of appropriate technologies and techniques in sustainable agriculture—intercropping, the use of nitrogen fixation and other natural nutrient cycles, small-scale irrigation, no-till planting, and integrated pest management. Second, programs emphasize strengthening national policies and regulations. Third, they make resources available to local farmers, both women and men, to encourage sustainable agriculture. Such resources include information about markets, low-input agricultural techniques, and environmental education.

Throughout the Africa region, USAID supports the introduction and dissemination of improved agricultural technologies to boost yields of key crops. USAID programs in Senegal have helped increase by 50 to 100 percent the number of households using such technologies and practices as agroforestry, "live fences," alley cropping, and crop rotation. In Mali, the Gambia, and Zimbabwe, the introduction of high-yielding maize and drought-resistant sorghum, combined with improved cultivation techniques, has led to higher yields and economic returns. In Mali, the Mission reports that 8,000 of 10,000 Haute Vallée farmers have improved their productivity by adopting sustainable practices for maize and sorghum.

A handful of countries, including Honduras, Indonesia, and Mali, have been working in integrated pest management as a way to reduce pesticide applications, save money, increase the marketability of nontraditional agricultural exports, and reduce the toxic effects of pesticide overuse and misapplication. Indonesia adopted an integrated pest management program nearly a decade ago following a USAID pilot program that leveraged a major World Bank loan. The country has continued to realize increases in rice yields (up to six tons per hectare) while saving more than \$100 million in pesticide subsidies to farmers. Indonesian rice yields have increased by 15 percent, while pesticide use has declined by 60 percent.

Managing Coastal Zones Sustainably

Coastal and marine resources are essential for the well-being of hundreds of millions of people around the globe. Nearly a billion people, most of whom live in developing countries, depend on fish as their sole source of protein. However, finfish, shellfish, marine mammals, and sea turtles are being overharvested, and their breeding grounds—mangroves, estuaries, and coral reefs—are being destroyed at an alarming rate. Currently, 70 percent of marine fish stocks are fully exploited or overharvested. Despite the importance of these resources, USAID's biological conservation and resource management initiatives traditionally have paid more attention to land ecosystems. Five Missions (Bangladesh, Indonesia, Jamaica, the Philippines, and Sri Lanka) are supporting coastal zone management and fisheries programs to change that focus.

The recently completed Coastal Resource Management project, a nine-year pilot program that paved the way for integrated coastal resource management in the Agency, highlights the importance of policy and institutional strengthening and stakeholder participation in sustainable resource management. The project worked in three countries (Ecuador, Sri Lanka, and Thailand) to field-test new strategies that address the often complex and unique challenges confronting coastal zones, including the management of common property resources and fragmented policies that govern land, coastal, and marine resources.

In Ecuador, USAID helped create a coastal management program from the ground up. It helped draft the first coastal zone management policy, set up a small technical unit and interministerial office to coordinate coastal policy. Most important, it enlisted support from major resource users and stakeholders. Women conch gatherers, artisanal fishermen, regional port captains, and government personnel are now taking a proactive role in safeguarding their coastal resources. These positive results led to a \$13.4 million loan from the Inter-American Development Bank.

The Coastal Resource Management project's integrated and participatory approach is being replicated in Missions worldwide. USAID's Environmental Initiative for the Americas supports activities in coastal zone management in El Salvador, Haiti, Mexico, Nicaragua, Panama, and Central America on a regional basis. The project is viewed as a model by various international organizations, including the UN and the World Bank.

USAID/Indonesia is currently adopting this community-based and integrated approach to dealing with the country's declining coastal resources. Seventy-three percent of the country's coral reefs are classified as severely or moderately damaged, and 11 percent of its mangroves have been lost in the last decade. The Mission is linking its coastal and forestry programs to bring 1,860 miles of coastline under community management.

In Jamaica, an island nation where tourism plays a significant economic role, USAID is taking a similar multipronged approach that couples coastal zone management with sustainable urbanization and pollution prevention. The Agency is expanding wastewater treatment in urban areas along the coast, supporting environmental education campaigns throughout the island, and increasing the capacity of the Natural Resource Conservation Authority to enforce environmental regulations. In 1994 the authority exceeded its targeted number of enforcement actions for illegal activities such as dumping waste into rivers and mining sand from beaches, an activity highly destructive to coastal habitats. USAID supports similar approaches in other developing nations whose coastal resources attract tourists and play a major role in their economic development.

In addition to these programs, USAID supports the State Department in its efforts to launch the International Coral Reef Initiative. USAID/Philippines, which already has a coastal management program, cohosted the initiative's first global meeting in May 1995. The product of that meeting, the Framework for Action, is the cornerstone of the initiative that will eventually protect 20 percent of the world's coral reefs and provide scientific understanding of coral reef ecology to guide management and conservation actions.

Integrating Environmental Objectives

The Agency Environmental Strategic Framework (see figure 5.1) is a planning and analytic tool that helps categorize program objectives in “boxes.” This serves to define USAID’s environmental portfolio and allows for a more systematic performance assessment. At the same time, this categorization does not present the complex, integrated nature of environmental strategies well. On the impact side of the equation, the strategic framework tends to obscure results that cut across several environmental objectives and have an impact on other Agency objectives (such as economic growth, democracy, and health). Thus there is a natural tension between the *analytic clarity* of the strategic framework and its inability to easily represent environmental *interactions*. We must not lose sight of how environmental programs in one sector (biological diversity, energy, urbanization) contribute to other environmental objectives (mitigating global climate change, improving natural resource management) or of their impact on other Agency objectives. As conservationist John Muir (1838–1914) noted, “When we try to pick out anything by itself, we find it hitched to everything else in the universe.”

For example, sustainable natural resource management often contributes directly to economic growth. In many developing countries, economic growth has slowed in the last decade, partly because of mismanagement and overexploitation of natural resources. In many African countries, Agency support for agricultural market reform and infrastructure rehabilitation will have limited impact if soils are not protected, water is not conserved, and pests are not sustainably controlled. Similarly, for many Latin American and Asian countries, continued agricultural development is predicated on the growth and expansion of markets. In Ecuador and Guatemala, USAID agricultural programs are expanding markets for nontraditional exports and increasing employment.

In the forestry sector, USAID technical assistance, policy guidance, and market analysis is helping Costa Rica and Bolivia

capitalize on a market for sustainably harvested woods, thereby generating income while reducing deforestation. Countries with abundant biodiversity, such as Ecuador and Uganda, have created jobs in park management and maintenance and have sparked development of a range of tourism services, from wildlife guides to lodging and eating establishments. Natural resource management and economic growth are closely integrated, and success in one area is likely to spill over into others.

In urban areas throughout the world, human and environmental health is deteriorating as rural-to-urban migration increases and industrial development accelerates. USAID is responding by bringing its extensive health and environmental expertise to bear on the problems of urban deterioration. Urban programs in Egypt, Indonesia, and Mexico, and throughout most of Central and Eastern Europe and the new independent states, are helping identify environmental health risks, reeducating people about ways to reduce their exposure to hazards, introducing technologies to reduce pollution, and increasing access to safe water and sanitation services.

These interventions are directly lowering the incidence of respiratory illness and the transmission of waterborne diseases while decreasing personal medical expenses and worker downtime. USAID clean technologies in India, Indonesia, and Mexico, and in the ENI region, will result in fewer acute respiratory problems because of cleaner fuel combustion, in addition to immediate efficiency improvements and the mitigation of climate change. Again, promoting sustainable urbanization and pollution prevention is closely linked with desired outcomes in the health sector.

Implicit in USAID environmental programs is the notion of sustainable management and taking into account how people interact with their environment and how these interactions can vary by gender, class, ethnicity, age, and the like. USAID experience with forest management in Nepal and the Philippines, coastal resource programs in Ecuador, and integrated conservation and development projects in Thailand have taught us that security of land tenure, control over

local resources, and trust in public resource management institutions often motivate communities to adopt and implement sustainable environmental practices. Recognition of the rights of people to land and its resources is an important step in the transition to a demo-

cratic society in which communities and individuals are active participants. Local land stewardship and the formation of grass-roots environmental NGOs foster the development of democracy and reinforce the underlying nature of a civil society.