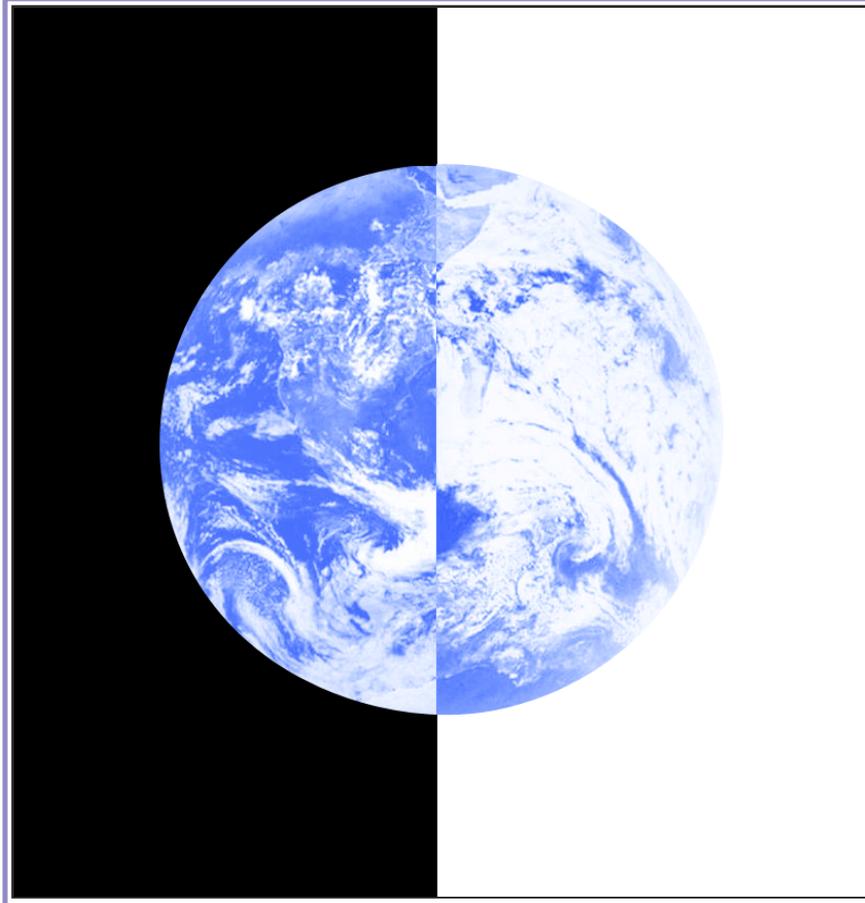

**CLIMATE CHANGE
INITIATIVE**



ANNUAL REPORT
1 9 9 9

United States Agency for **USAID** *International Development*



**CLIMATE CHANGE
INITIATIVE
ANNUAL REPORT
1999**



To receive additional copies or for more information,
please contact:

U.S. Agency for International Development
Global Environment Center
Telephone: (202) 712-1750
E-mail: climate@usaid.gov
<http://www.usaid.gov/environment>



United States Agency for International Development

*The Climate Change Initiative Annual Report is
available electronically to both USAID-authorized
users of the Agency's intranet at
<http://www.genv.org/gcc>
and to the general public at
<http://www.usaid.gov/environment>.*

This report is produced by the Environment Information Clearinghouse (EIC). The EIC is an information management activity performed on behalf of USAID's Global Environment Center by Planning and Development Collaborative International (PADCO), Inc. This contract requires EIC to serve as an environmental information resource to USAID staff, their partners, and the general public.

PADCO, Inc.

Table of Contents

Acronyms	v
Executive Summary	1
USAID’s Response to Climate Change.....	1
The Climate Change Initiative.....	2
Achievements for 1999	2
The Challenge of Climate Change	4
Emissions Projections	4
Climate Impacts for Developing Countries and Countries with Economies in Transition	5
International Response.....	6
Agency Climate Change Program and Strategy	8
USAID’s Approach	8
USAID Climate Change Initiative	8
Objectives, Strategic Approach	
Climate Change Initiative Management and Performance	11
Program Performance and Reporting	11
Mitigation Project Results	11
Policy Advances	12
Capacity Strengthened	12
Climate Change Initiative 1999 Achievements	14
Reducing Emissions in the Energy Sector, Industries, and Cities	14
Power Sector and Tariff Reforms, Energy Efficiency, Renewable Energy, Clean Energy, Industrial Emissions, Helping Cities Respond to Climate Change, Urban Transportation, Urban Buildings, Infrastructure, and Energy Use.	
Protecting Carbon Sinks through Forest Conservation and Land Use Management	20
Forest Conservation and Reforestation, Fire Prevention and Control, Promoting Community-Based Forest Management, Sustainable Agriculture and Agroforestry	
Promoting Developing and Transition Country Participation in FCCC	26
Capacity Building, Technology Cooperation, Policy Advances	
Addressing Vulnerability and Adaptation to Climate Change Impacts	29

Partnerships and Resources Leveraged 30
 Development Credit Authority, Direct and Indirect Leveraged Funding for
 USAID-Initiated Activities

Conclusion 33

USAID Climate Change Contacts 34

Endnotes..... 35

Acronyms

AIJ	Activities Implemented Jointly
CAIP	Cairo Air Improvement Program
CBFM	Community-based forest management
CBM	Coal bed methane
CCI	USAID Climate Change Initiative
CDM	Clean Development Mechanism
CFUG	Community Forest User Groups
CGIAR	Consultative Group on International Agricultural Research
CNG	Compressed natural gas
COP	Conference of Parties
CRM	Coastal Resources Management
DCA	Development Credit Authority
DENR	Department of Environment and Natural Resources (Philippines)
DOE	U.S. Department of Energy
EMS	Environmental Management Systems
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ESCO	Energy services company
FAN	Fundacion Amigos de la Naturaleza (Bolivia)
FCCC	United Nations Framework Convention on Climate Change
FEWS	USAID Famine Early Warning System
FIDE	Trust for Energy Efficiency (Mexico)
FY	Fiscal Year
GCCS	USAID Global Climate Change Strategy
GEF	Global Environment Facility
G/ENV	USAID Global Environment Center
GHG	Greenhouse gas
GIS	Geographic Information Systems
GOM	Government of Mexico
GWI	USAID Global Warming Initiative
ICCC	Interagency Commission on Climate Change (Ukraine)
ICLEI	International Council on Local Environmental Initiatives
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standards Organization
JI	Joint Implementation
kW	Kilowatt
MBR	Maya Biosphere Reserve (Guatemala)
MW	Megawatt

MW-h	Megawatt-hours
NEDO	New Energy Development Organization (Japan)
NGO	Non-governmental organization
NJIT	New Jersey Institute of Technology
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PDOE	Philippine Department of Energy
PiP	Parks-in-Peril Program
PNNL	Pacific Northwest National Laboratory
RESCO	Renewable Energy Services Company
RMS	Resource Management Systems
TCAPP	Technology Cooperation Agreement Pilot Project
TVA	Tennessee Valley Authority
UN	United Nations
UNCED	United Nations Commission on Environment and Development
UNDP	United Nations Development Programme
UNEEC	Ukrainian Network of Energy Efficient Cities
US	United States
US-AEP	U.S.-Asia Environmental Partnership
USAID	U.S. Agency for International Development
USCSP	U.S. Country Studies Program
USIJI	U.S. Initiative on Joint Implementation
VET	Vehicle emissions testing

Executive Summary

Global climate change poses profound threats to international economic development and ecological balance. Despite the uncertain ties that exist in understanding and predicting changes to global climate systems, the international scientific community has grown confident that climate changes observed over the past fifty years are the result of increasing atmospheric concentrations of greenhouse gases.¹ As greenhouse gas emissions continue to grow unabated, all sectors of the global economy, all realms of the natural environment, and all countries of the world will be affected.

Based on the growing body of scientific evidence, climate change is now considered an even greater threat to the global environment, human populations, and economic development than previously believed. Recent studies and reports affirm that humans bear a significant share of responsibility for generating these greenhouse gases, particularly carbon dioxide, which is released with the burning of fossil fuels. As human populations and national economies continue to grow over the next century, average global temperatures are expected to increase, causing potentially dramatic changes to global climate systems. Changes to precipitation patterns, for example, may exacerbate and increase the frequency of severe weather, flooding, and droughts. Likewise, an increase in temperature will mean a rise in average sea level, threatening coastal populations and economies worldwide.

Developing countries and countries with economies in transition, particularly those least able to cope with crisis and adapt to change, will bear the greatest impacts. Many of these countries, however, offer significant opportunities to reduce greenhouse gas emissions that contribute to climate change, while at the same time improving economic performance, protecting the environment, and addressing social needs.

USAID's Response to Climate Change

For over a decade, efforts to address the causes and impacts of climate change have been a key focus of the U.S. Agency for International Development's (USAID) development assistance program. As the foreign assistance arm of the U.S. Government, USAID works in collaboration with developing nations to promote sustainable development and provide humanitarian relief. Helping developing and transition countries balance economic growth with environmentally sustainable development protects the global environment and serves the U.S. national interest.

For many years, USAID has implemented environmental programs that, though targeted on other goals (e.g., energy efficiency, forestry, and biodiversity conservation), have led to reduced greenhouse gas emissions. USAID also has supported efforts that implicitly help decrease the threat climate change poses by addressing population growth, promoting economic development, and improving human health, nutrition, and access to basic services.

Launched in 1990, USAID's Global Warming Initiative (GWI) was directed through legislation to focus its activities in key climate change countries. That year the Agency published a Report to Congress, *Greenhouse Gas Emissions and Developing Countries: Strategic Options and the USAID Response*, which described relevant USAID programs that could help minimize greenhouse gas emissions from developing and transition countries while promoting economic development. Since then, USAID has actively managed a portfolio of climate-related programs focused on decreasing emissions from the energy sector, industries, and cities, and increasing carbon sequestration in forest areas. With the entry into force of the United Nations Framework Convention on Climate Change (FCCC) in 1994, USAID outlined a new Glo-

bal Climate Change Strategy (GCCS) that built on the Agency's sustainable development activities, and documented its progress in a follow-up Report to Congress, *Global Climate Change: The USAID Response*.

The Climate Change Initiative

Speaking at the United Nations (U.N.) in June 1997, the President announced that the U.S. would establish a \$1 billion, five-year program to collaborate with developing nations and countries in transition to reduce the threat of climate change. That announcement signaled a renewed U.S. Government commitment to facilitate technology transfer and collaborate with developing and transition countries to achieve the goals of the U.N. Framework Convention on Climate Change (FCCC).

USAID was given the U.S. Government lead in implementing the President's commitment, and in 1998 initiated the Climate Change Initiative (CCI), an Agency-wide effort to address climate change through fifty country and regional programs worldwide. The over-arching objective of USAID's Initiative is to promote sustainable development that minimizes the associated growth in greenhouse gas (GHG) emissions and reduces vulnerability to climate change. Under the Initiative, USAID seeks to address climate change in developing and transition countries through \$750 million in grant assistance for climate-related programs over five years, as well as through use of credit instruments that will leverage an additional \$250 million to foster "climate-friendly" investment in developing and transition countries. Through the CCI, USAID encourages these countries to:

- mitigate greenhouse gas emissions from the energy sector, industries, and urban areas;
- protect forests and farmland that can sequester carbon dioxide from the atmosphere;
- participate more effectively in the FCCC; and
- reduce their vulnerability to the impacts of climate change.

The Agency focuses on activities that are "win-win"—simultaneously promoting sustainable development and combating climate change. The Initiative has fostered a broader vision of development assistance that recognizes the central importance of reducing the threat of climate change as part of successful sustainable development efforts, and enhanced U.S. leadership in collaborating with the donor community and developing nations to combat climate change. The Initiative has also strengthened the U.S. Government's ability to measure the impact of its global assistance work to address climate change, and has helped fulfill significant U.S. obligations to assist and collaborate with developing countries under the FCCC.

Achievements for 1999

This report describes the results of USAID's Climate Change Initiative for Fiscal Year 1999. It is divided into several sections, beginning with an overview of the current knowledge about climate change and its impacts, and USAID's strategic approach in measuring progress to address climate change. The report then addresses each of the four primary areas of focus for the Agency and describes the successes in leveraging funding through replication of programs, partnerships, and related collaboration with other donors and foreign governments. Highlights of 1999 achievements under the Initiative are as follows:

- USAID programs helped avoid the equivalent of approximately 3.9 million metric tons of carbon dioxide through a variety of energy, industrial, and urban programs under the CCI. These efforts included support for over 225 policy advances in partner countries to promote energy efficiency, renewable energy, and clean energy production, as well as support for over 250 capacity building activities involving 544 institutions. An important aspect of the Initiative has been recognizing the relationship between urban development and climate change, and to work in direct partnerships with local authorities and organizations to identify cross-cutting solutions that address urban development challenges, mitigate emissions, and help

cities reduce their vulnerability to climate impacts.

- The Agency worked under the CCI to protect or conserve more than 57 million hectares of many of the world's most critical forests and protected areas located in Central and South America, Central Africa, Southeast Asia, and the Russian Far East. These programs also supported over 390 policy actions to improve forest and biodiversity conservation, as well as 625 capacity building activities involving over 450 organizations. The Agency's approach includes supporting local and national authorities, communities, and NGOs with the technical capability, expertise, and information necessary to manage forest and agricultural areas more sustainably.
- USAID supported over 120 policy advances in developing and transition countries relating to FCCC participation, more than twice as many as in the previous year. A major component of the Initiative is to encourage developing and transition country participation in Convention events and discussions, and in fulfilling FCCC commitments. In cooperation with other U.S. Government agencies, USAID also plays a key role in FCCC negotiations and other technical meetings to develop strategies related to capacity building, technology cooperation, and targeted policy reform.
- To address vulnerability and strengthen the capacity of developing and transition countries to

adapt to the potential impacts of climate change, USAID has implemented a range of programs worldwide in water resources management, agriculture and food security, biodiversity and species conservation, and disaster management and assistance.

- While it is difficult to determine the extent of USAID's ability to leverage funding from other donors and institutions, data collected across all programs participating in the Initiative in 1999 indicate that USAID leveraged over \$600 million in direct funding to support its ongoing activities, and over \$950 million in indirect funding for activities that replicated or built on past USAID projects or initiatives. The Agency also used its Development Credit Authority (DCA) to leverage \$10 million in climate-related investments.

Many of the consequences of climate change are still not fully understood and will require continued research and analysis. Still, as recent scientific evidence increasingly shows, global climate change has already started and is likely to continue if measures are not taken to decrease greenhouse gas emissions. USAID seeks to find ways to address the causes and potential impacts of climate change, and do so in a manner that furthers many of the Agency's continuing efforts to promote sustainable economic development, protect the environment, and improve the lives of developing and transition country populations.

The Challenge of Climate Change

Scientific evidence indicates that the 20th Century was the warmest century on record, with surface temperatures increasing by between 0.4 and 0.8 degree Celsius. Three of the warmest years in recorded history occurred in the 1990s. In addition, glaciers and icecaps are melting, sea level is rising and the incidence of extreme weather events is increasing.²

The last century has also seen an increase in the atmospheric concentrations of greenhouse gases, including carbon dioxide, methane, and nitrous oxide. Since 1860, atmospheric concentrations of carbon dioxide have increased by over 31 percent above pre-industrial levels.³ The latest analysis of ice core data from Vostok, Antarctica—the deepest and oldest ice core sample ever drilled—indicates that current carbon dioxide levels are at the highest they have been in the past 420,000 years.⁴

Growth in the emissions of greenhouse gases worldwide is due in part to human influence through deforestation, agricultural practices, population growth, and the ever-increasing consumption of fossil fuels that power the world's economies. Using more advanced climate modeling technologies, the bulk of current scientific evidence now provides even stronger links between human-induced increases in greenhouse gas emissions and changes to the global climate. According to the Intergovernmental Panel on Climate Change (IPCC), about three-quarters of the anthropogenic emissions of carbon dioxide during the past 20 years has been due to fossil fuel burning. The remainder is predominantly a result of land use changes, especially deforestation.⁵

Given current population and economic growth trends, greenhouse gas emissions worldwide are projected to increase significantly over the next century. According to the U.S. Department of Energy (DOE), if consumption trends continue as projected, global carbon emissions from the burning of fossil fuels will rise

from 6.3 billion metric tons⁶ in 1999 to over 10 billion metric tons by 2020.⁷ The IPCC reports that by 2100, when atmospheric carbon dioxide concentrations could double, average global temperatures may rise by up to 5.8 degrees Celsius (11 degrees Fahrenheit) above 1990 levels.⁸

Of particular concern is the possible relationship between climate change, precipitation patterns, and the frequency and intensity of droughts, floods, and extreme weather events such as hurricanes and typhoons. Weather-related damage in the 1990s increased fivefold from the previous decade and storm-related damage in 1999 totaled more than \$67 billion worldwide.⁹ Though weather-related impacts are unpredictable and difficult to link directly to climate change—unlike gradual changes like temperature increase and sea level rise—it will be important to take steps to prepare for potential impacts to developing countries. Many developing countries and countries in transition are already highly vulnerable to the effects of extreme weather events, and any increases in frequency or severity of these events will further threaten urban and rural populations, housing and infrastructure, and economic development.

Emissions Projections

Industrialized countries bear the greatest responsibility for the historical buildup of greenhouse gases, with per capita emissions that exceed those of developing countries. However, rapid economic expansion and population growth in developing countries have also resulted in significant increases in greenhouse gas emissions.¹⁰ If current trends continue, developing (“non-Annex I”) countries alone will account for 79 percent of the total projected increase in global carbon emissions between 1990 and 2020.¹¹ By the year 2009, developing countries could surpass industrialized countries in total emissions. (See Figure 1.) Even if the industrialized (“Annex I”) countries were to adopt the terms of the Kyoto Protocol, an agreement under

the United Nations Framework Convention on Climate Change (FCCC) that specifies emissions reductions obligations, continued heavy reliance on coal and other fossil fuels in developing countries will ensure that worldwide emissions would still grow substantially over the next century.¹²

While emissions have continued to grow for developing and industrialized countries, countries with economies in transition have experienced a downward emissions trend, largely due to reductions in industrial output associated with the economic recession they experienced in the transition from a centrally planned economy to a market-driven economy. As these economies begin to stabilize, however, per capita emissions are expected to rise in these nations.¹⁴ While these reduced figures are favorable for climate change, transition economies remain among the world's most carbon-intensive. For example, Russia's carbon intensity—emissions generated per unit of output—is over six times that of the European Union.¹⁵

Climate Impacts for Developing Countries and Countries with Economies in Transition

Global climate change could substantially alter the hydrologic cycle. Changing precipitation patterns will put freshwater resources at risk and threaten species biodiversity in sensitive ecosystems. Water supply, which is already at risk in India, southern Africa, South America, and the Middle East, is expected to drop as a result of climate impacts, while water availability in Asia and central and eastern Africa may increase. Argentina, China, and other mid-latitude countries may see an increase in cereal yields while Africa, the Middle East, and India will experience decreases in yield. As a result, these areas may be subject to threats to food security and increasing poverty, land degradation, displacement, and the possibility of civil conflict.

Sea level rise could also put two-thirds of the world's largest cities at risk. (See Figure 2.) Storm surges could subject an additional 40 to 80 million people to flood-

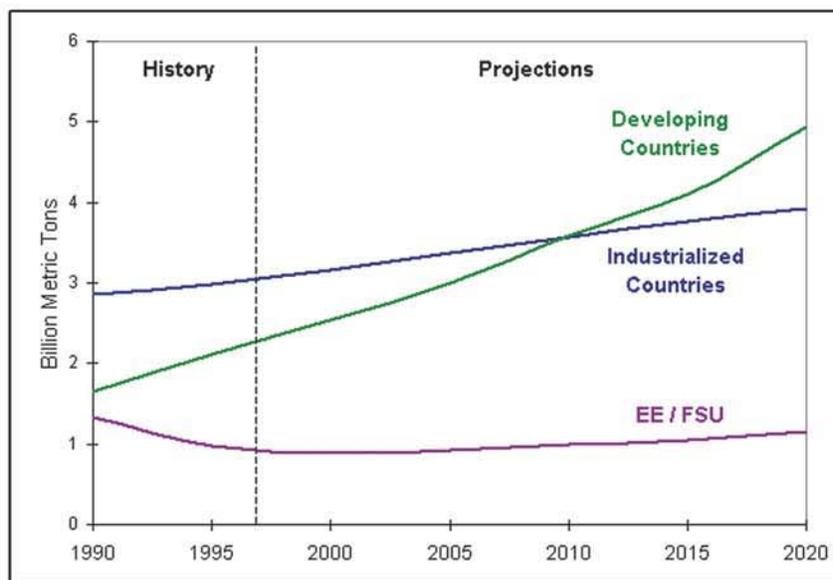


Figure 1. Projected carbon dioxide emissions trends for developing countries, industrialized countries, and Eastern Europe/Former Soviet Union¹³

ing and property damage, particularly in Asia. The health impacts of climate change could increase heat-related illness and death, deaths from extreme weather events, and hospital admissions for respiratory and cardiovascular disease, and the incidence of diseases such as malaria and cholera.

Impacts will be particularly severe in poor nations with dense populations, low-lying coastal areas, limited water resources, or economies that are highly depen-

International Response

International response to climate change has been coordinated under the United Nations Framework Convention on Climate Change (FCCC). The FCCC was opened for signature at the U.N. Conference on Environment and Development (UNCED), the so-called “Earth Summit” in Rio de Janeiro, Brazil on June 4, 1992, and came into force on March 21, 1994. Signed and ratified by more than 185 nations, the objective of

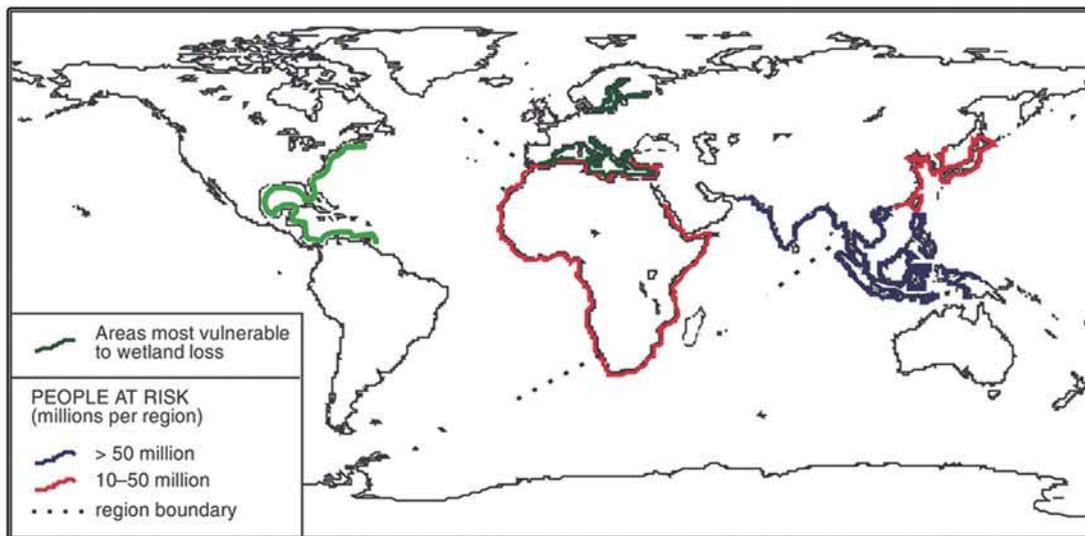


Figure 2. Coastal Areas Most Vulnerable to Sea Level Rise¹⁶

dent on natural resources. Since these countries generally have the fewest economic resources, they often lack adequate means to prepare for crisis or adapt to change, making them more vulnerable to the risks and costs associated with climate change. Given the unpredictable nature of climatic change and climate variability, it will be particularly important for the most vulnerable developing countries to be prepared for natural disasters and severe environmental stress. Facilitating the transfer of technology, expertise, and information on adaptation options, especially for agriculture, water supply and coastal zone management, will be a critical strategy for reducing the vulnerability of poorer nations.

the Convention is to stabilize “greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system.”¹⁷ To become a Party to the Convention, a country must ratify, accept, approve, or accede to, the Convention. Parties meet regularly at an annual Conference of the Parties (COP) to review the implementation of the Convention and continue talks about how to address the global climate change problem.

A key principle established under the FCCC holds that Parties have “common but differentiated responsibilities” to address the problem of climate change.¹⁸ Since

industrialized countries have the largest share of historical and current emissions of greenhouse gases, these countries are expected to take a leadership role in reducing emissions and assisting in responses to adverse impacts. In particular, under the Convention, developed countries are obligated to provide financial support and transfer technologies to promote activities in developing countries to reduce emissions and improve the ability of countries to adapt to climate change impacts.

In 1997 at the Third Conference of the Parties in Kyoto, Japan (COP-3), Parties adopted a protocol to the FCCC, known as the Kyoto Protocol. Though it has not yet entered into force, the Kyoto Protocol obligates industrialized countries to achieve quantified targets for decreasing their greenhouse gas emissions. Designated as “Annex I” Parties under the FCCC, industrialized countries are required under the Kyoto Protocol to reduce overall emissions of major greenhouse gases, including carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, and others, by at least 5 percent below 1990 levels between the years 2008 and 2012. To enable Parties to reach their targets, the Protocol provides for three flexible market mechanisms:

- *Emissions Trading*, whereby Parties with emissions-reductions commitments may trade emission allowances with other Parties;
- *Joint Implementation (JI)*, whereby countries with emissions-reductions commitments meet their obligations for reducing their greenhouse gas emissions by investing in emissions-reduction activities in other countries with emissions targets; and
- *Clean Development Mechanism (CDM)*, which enables industrialized countries with emissions-reductions commitments to finance emissions-avoiding projects in developing countries without emissions targets and receive “certified emissions reductions” units for doing so.

Although many Parties have signed the Kyoto Protocol, no industrialized country has ratified it since there has not yet been agreement on how to implement and administer Protocol requirements. Fifty-five Parties must ratify the Protocol for it to enter into force, including Annex I Parties responsible for at least 55 percent of total carbon dioxide emissions in 1990. To date, only 31 Parties have ratified the Protocol.¹⁹

Agency Climate Change Program and Strategy

USAID's Approach

The U.S. Agency for International Development recognizes that global warming poses a significant threat to ecological balance and economic development worldwide, particularly for developing countries and countries with economies in transition. As the foreign assistance arm of the U.S. Government, USAID works collaboratively within these countries to promote sustainable development.

For ten years, efforts to address the causes and impacts of climate change have been a key focus of USAID's development assistance program. Launched in 1990, USAID's Global Warming Initiative (GWI) was directed through legislation to focus its activities in "specific key countries which stand to contribute significantly to global greenhouse gas emissions, and in which actions to promote energy efficiency, reliance on renewable energy resources, and conservation of forest resources, could significantly reduce emissions of greenhouse gases".²⁰

With the entry into force of the FCCC in 1994, USAID

outlined a new Global Climate Change Strategy (GCCS) that built on the Agency's sustainable development activities.²¹ The goal of the GCCS was "to contribute to global efforts to stabilize greenhouse gas concentrations and to assist countries to adapt to the adverse effects of climate change, while maintaining economic growth in developing and post-communist countries."²² In establishing this new strategic approach, the Agency continued to focus its resources on key countries and regions, addressing both emissions mitigation and adaptation through capacity building, policy reform, technology cooperation, and financial leveraging.

USAID Climate Change Initiative

In 1997, the President reaffirmed the U.S. commitment to reduce the threat of climate change in developing countries and countries with economies in transition. Under this commitment, USAID launched the Climate Change Initiative (CCI), an Agency-wide effort that complements existing sustainable development programs with efforts to identify and encourage reductions

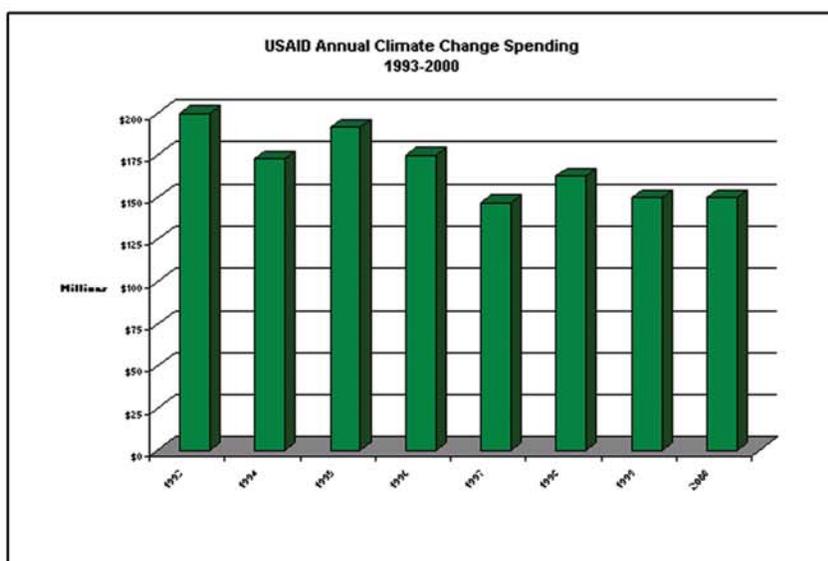


Figure 3. Annual USAID Climate Change-Related Funding Attributions, 1993-2000

in greenhouse gas emissions, as well as improved long-term adaptation to climate change impacts. The Initiative attributes approximately \$150 million per year of program funds, or \$750 million over five years (see figure 3 on previous page). The Initiative also works to leverage a total of \$250 million through use of USAID’s Development Credit Authority (DCA), a loan guarantee mechanism used to help developing and transition countries access financing for sustainable development projects.

Objectives. Building on lessons learned since 1990, the current USAID Climate Change Initiative focuses on four primary objectives:

- Reducing net greenhouse gas emissions from the energy sector, industries, and urban areas;
- Increasing carbon storage through forestry and land use activities;
- Strengthening participation in meeting the goals of the FCCC; and
- Reducing vulnerability to the threats posed by climate change.

Through its programs, USAID implements “win-win” solutions that provide climate-related benefits while meeting sustainable development objectives in energy, urban, and industrial development, pollution control, forest conservation and sustainable agriculture, climate adaptation, and disaster preparedness and assistance. The Agency also plays an important role promoting participation of developing and transition country partners in the FCCC. (See Figure 4.)

Strategic Approach. The objectives of the Initiative are achieved through a range of approaches, including technical assistance, human and institutional capacity building, policy reform, technology cooperation, public-private partnerships, information sharing, and research. Across all regions and countries, USAID places strong emphasis on leveraging the capabilities and resources of other donors, the private sector, non-governmental organizations (NGO), and communities. In addition, USAID collaborates directly with other U.S. Government agencies on a range of sector-specific activities to bring necessary and valuable expertise to the field.

The Initiative builds on earlier USAID climate change work by concentrating activities in 12 key countries

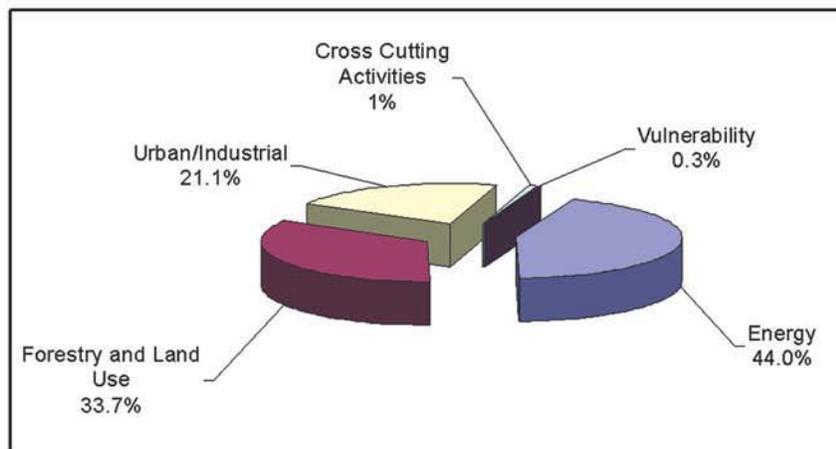


Figure 4. FY99 USAID Climate Change Funding Attributions by Sector

and regions. Key countries and regions include Brazil, Central Africa, Central America, Central Asia, India, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, and Ukraine. USAID selected these countries based on their contribution to global net greenhouse gas emissions, their vulnerability to climate change im-

pacts, their strategic importance to development efforts, and their desire to take action under the Convention. Including these key countries and regions, the Initiative operates overall in 50 country and regional programs. (See Figure 5.)

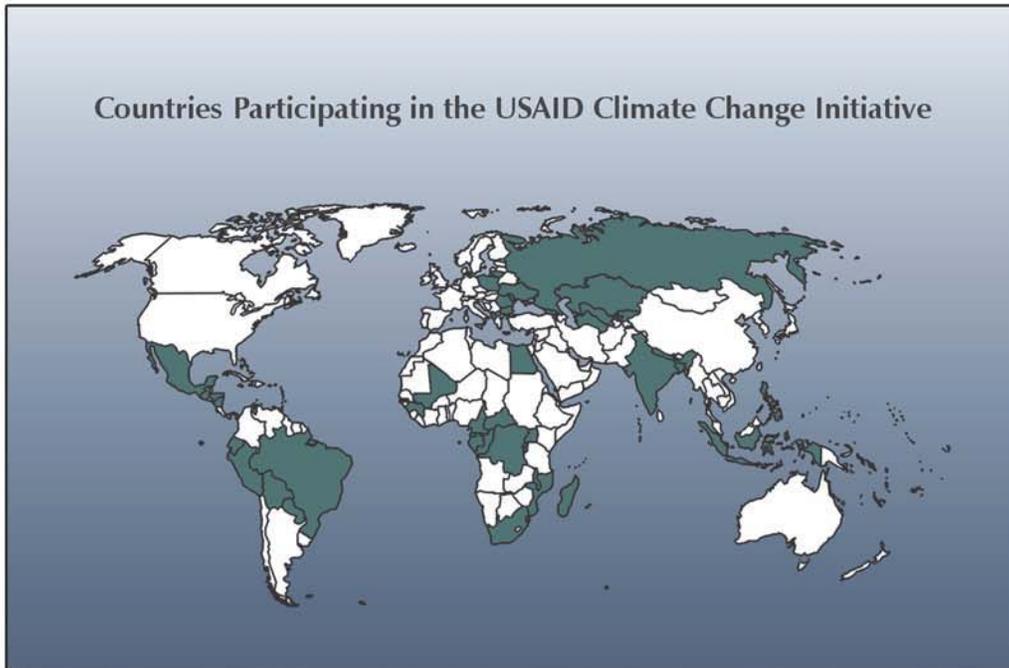


Figure 5. Countries and regional programs participating in the USAID Climate Change Initiative (shaded).

Climate Change Initiative Management and Performance

The USAID Global Environment Center (G/ENV) manages the Climate Change Initiative under the USAID Climate Change Program. The Center coordinates Agency involvement in the Initiative through the Agency-wide Climate Change Team, which consists of representatives from USAID regional bureaus and offices that implement climate-related programs and activities under the Initiative.

Program Performance and Reporting

To track the performance of Initiative activities worldwide, in accordance with USAID requirements, the Climate Change Team developed a performance monitoring plan and four key indicators to measure overall program performance. (See Table 1.) Developed in a participatory manner with the input of Agency regional and field staff, these indicators are designed to capture the progress of the Initiative in meeting its objectives. These indicators provide the collective re-

sults from all Agency units reporting on the Climate Change Initiative, addressing emissions avoided, forestry and land use, and FCCC participation.

Mitigation Project Results

The first two key indicators, emissions avoided and carbon stocks protected, provide a concrete, quantitative measure of the effectiveness of the Agency's on-the-ground projects and activities under the Initiative that lead to reductions in greenhouse emissions. These indicators are direct measures of the effectiveness of the Initiative in meeting its objectives related to greenhouse gas mitigation. Information contributing to these indicators is aggregated across a range of USAID energy and forestry projects worldwide, providing an overall measure of program results.

Table 2 presents a summary of progress to date. In the forestry sector, the Agency continued to protect car-

Table 1. Performance Indicators

Indicator	Description	Unit of Measure
Emissions avoided	Emissions of Carbon Dioxide (CO ₂) equivalents avoided due to USAID assistance	Metric Tons of (CO ₂)
Carbon stocks protected	Area where USAID has initiated interventions to maintain or increase carbon stocks or reduce rate of loss	Million hectares
Policy advances supported	Policy steps achieved (prepared, adopted, implemented) in support of the FCCC, in the energy sector, industry, or urban areas, or in the land use/forestry sector	Number of policy steps achieved
Institutional capacity strengthened	Institutions strengthened in support of FCCC, in the energy sector, industry, or urban areas, or in the land use/forestry sector	a) number of capacity building activities b) number of institutions strengthened

Table 2. Greenhouse Gas Mitigation Results

Indicator	FY98	FY99	Change
Emissions avoided (mil. metric tons CO ₂)	2.853	3.883	36 %
Carbon Stocks protected (mil. hectares)	55.1	57.4	4 %

bon stocks, expanding program work to over 57 million hectares worldwide. In the energy sector, through renewable energy, clean energy and energy efficiency projects, the Agency continued to maintain strong programs, resulting in an overall reduction of nearly 3.9 million metric tons of carbon dioxide equivalents. This figure increased in FY99 largely as a result of a series of newly launched activities under USAID's global energy programs.

Policy Advances

USAID supports the development of improved policy frameworks that will reduce greenhouse gases in the long run. Policy improvements that the CCI tracks are related to energy use, land use and forestry, and participation in the FCCC. As defined under this indicator, a policy includes any legislation, regulation, or other official guidance requiring a specified legal course of action by government, public, or private-sector body. For example, USAID has provided assistance towards the preparation and adoption of laws that establish protected areas, regulatory reforms to restructure national

energy sectors, and policy actions that fulfill national reporting requirements under the FCCC. Table 3 provides a summary of policy advances across all areas of the Initiative. The significant increase (and partial decrease under Energy) shown in FY99 in policy steps achieved resulted in part from improvements in Agency reporting, as well as general increases in USAID assistance in FCCC participation.

Capacity Strengthened

Building human and institutional capacity is central to USAID's core mission and an essential means of ensuring sustainability and replication of new practices and technologies in developing and transition countries over the long term. Tracking capacity building results across all program areas, this key indicator measures the number of capacity building activities, including training and technical assistance, as well as the number of institutions receiving training or technical assistance. As indicated by the expansion of program results in this area, strengthening capacity has been critical to the early stages of the Initiative. Capacity

Table 3. Policy Development Results

Indicator (policy steps achieved)	FY98	FY99	Change
Energy, Industry, and Urban Areas	256	228	-11 %
Forestry/ Land Use	274	391	43 %
FCCC participation	52	124	138 %
Total	582	743	28 %

building activities include training and technical assistance efforts that address climate change as part of emissions mitigation, forestry and land use, or FCCC participation activities. Institutions strengthened include local, state, and national governments, NGOs, academic institutions, and other USAID partners. The significant increases shown in FY99 in capacity building activities resulted in part from improvements in Agency-wide reporting. (See Table 4.)

These indicators suggest meaningful progress in USAID's efforts to implement the Climate Change Initiative. The sections following in this report provide important illustrations of the methods, tools, and approaches USAID has used in practice to avoid greenhouse gas emissions from the power sector, industries, and urban areas; protect carbon sinks through forestry, land use, and biodiversity conservation; strengthen participation in the FCCC; and to reduce developing and transition country vulnerability to climate impacts.

Table 4. Institutional Capacity Results

Indicator (number)	FY98	FY99	Change
Capacity building activities	466	952	104 %
Institutions strengthened	926	998	8 %

Climate Change Initiative 1999 Achievements

Reducing Emissions in the Energy Sector, Industries, and Cities

In most economies, the energy sector serves as the engine for development. Current global carbon emissions from the energy sector, industries, and cities account for over 6 billion metric tons per year. The Climate Change Initiative is committed to working in these areas to reduce greenhouse gas emissions and pollution, and conserve energy and other resources.

In 1999, USAID programs helped avoid the equivalent of approximately 3.9 million metric tons of carbon dioxide under the Initiative. USAID's efforts included support for over 225 policy advances to promote energy efficiency, renewable energy, and clean energy production. In addition, USAID supported over 250 capacity building activities involving 544 institutions.

Power Sector and Tariff Reforms. Strengthening the power sector through utility restructuring and regulatory reforms—including adjustments to energy tariffs and fuel pricing—can result in improved market efficiency, cost-effective management, and reduced greenhouse gas emissions by providing incentives to increase the efficiency of energy production, distribution, and consumption. Support to regulatory authorities has been an important step in making energy production and delivery more sustainable.

USAID efforts to reform electricity rates in Egypt, India, the Central Asian Republics, and the Philippines have had an important impact on improving revenue collection, energy delivery, and system reliability. Egypt's Power Sector Support Project boasts one of USAID's most successful power sector reform programs. Since 1994, USAID has worked with the Government of Egypt to provide technical assistance to enhance power station efficiency, reduce losses in transmission, and introduce time-of-day metering that regulates the flow of electricity. These interventions, in addition to ongoing support that USAID has pro-

vided to the Egyptian Electricity Authority for the Aswan High Dam to generate hydropower, have resulted in considerable savings in annual carbon dioxide emissions. USAID's Energy Conservation and Environment Project in Egypt has similarly fostered broad awareness about the benefits of clean technologies, and led the country to develop a Strategic National Action Plan under the FCCC, as well as a National Energy Efficiency Strategy.

USAID has worked worldwide to help energy providers operate more independently and efficiently, and to improve management, financial viability, and infrastructure planning. In India, for example, USAID helped establish ten new state-level utility Regulatory Commissions, which are already reviewing new applications for targeted tariff reforms. In Bangladesh and other South Asian countries, USAID supported new energy programs that promote gas and power sector restructuring, regulatory reforms, and regional cooperation in energy trade. In Moldova, USAID assistance helped de-monopolize the energy sector which will lead to privatization of electricity distribution companies, and initiated tariff reforms that will stimulate energy efficiency investments.

Under its Global Climate Change Program in the Philippines, USAID has catalyzed the natural gas industry to offset coal-fired power plants and introduced power sector reforms that will reduce greenhouse gas emissions by as much as 20 million metric tons by 2003 with no adverse impact on economic growth. USAID has also succeeded in decreasing emissions by helping convert energy industries in several countries from state-owned to market-driven enterprises.

In addition to improving the efficiency of energy supply, managing energy demand has been a key approach to reducing wasteful energy consumption and lowering greenhouse gas emissions. For example, in 1999, training in project financing and performance contracting in Romania led to efficiency gains that saved

100,000 mega-watt hours, helped improve local air quality, and avoided 82,720 metric tons of carbon dioxide emissions.

In Indonesia, USAID's work with the Ministry of Mines and Energy to address energy subsidies led to a government plan to increase the price of electricity by 29 percent and the price of petroleum products by 12 percent, creating broad disincentives to use carbon-emitting fossil fuels. In India, USAID assisted the government to develop a new Energy Regulatory Reform Act that will reduce power subsidies, promote tariff reform, and encourage investments in biomass/bagasse-based cogeneration in most Indian states.

Energy Efficiency. USAID has promoted energy efficiency technologies and practices that reduce greenhouse gas emissions while achieving cost savings, conserving resources, and reducing local pollution. In 1999, USAID helped avoid the equivalent of over 2.4 million metric tons of carbon dioxide emissions through energy efficiency programs participating in the Climate Change Initiative.

USAID worked in Egypt to support the adoption of a National Energy Efficiency Strategy and, under a public-private energy efficiency council, financial sector reforms that would encourage productive investments in energy efficient technologies. The new strategy is projected to create a \$2 to \$3 billion market in energy efficiency goods and services and significantly decrease Egypt's greenhouse gas emissions. Under the Egyptian Environmental Policy Program, USAID seeks to promote energy efficiency through policy reform initiatives that promote best practices, clean technologies, market-based incentives, and privatization in the energy and industrial sectors.

In Mexico, USAID's Steam and Combustion Efficiency Pilot Project has promoted high efficiency motors, compressors, pumps, and lighting to demonstrate the linkage between reducing emissions and increasing energy efficiency. In 1999, this effort resulted in a reduction of more than 325,000 metric tons of carbon dioxide emissions. Energy audits have also been used to support efficiency adjustments and short-term, low cost

system upgrades in 24 steam-generation facilities. USAID has also worked with a local non-governmental organization (NGO), Trust for Energy Efficiency (FIDE), to introduce energy efficient labeling for consumer and industrial products that can encourage consumption practices that reduce greenhouse gas emissions.

In Ukraine, USAID cooperated with DOE, the Pacific Northwest National Laboratory (PNNL), and the NGO Arena-Eco, to identify energy efficiency opportunities in six industries. To date, participating industrial plants have invested \$1.2 million of their own funds in new energy efficiency technologies, demonstrating their long-term commitment to adopting efficiency measures and recognition of the important cost-saving opportunities that result from more sustainable industrial practices. Additional support will seek to help industrial plants structure financing for larger energy efficiency projects in the near term.

USAID worked in partnership with the Tennessee Valley Authority (TVA) and the Electric Power Research Institute (EPRI) to promote energy efficiency in thermal power plants in India, primarily through adoption of environmental management systems and clean technologies. As a result, better-than-estimated heat rate improvements were observed in the power plants, with cumulative carbon dioxide emissions avoided estimated at 1.6 million metric tons. Similar benefits are expected at the Bharat Aluminum Company power plant used to wash coal, where a mere 1.5 percent improvement in boiler efficiency is expected to reduce carbon dioxide emissions by about 1.2 million metric tons.

Renewable Energy. As developing country economies continue to grow, many countries have a unique opportunity to adopt new, advanced, renewable energy technologies such as wind, solar, hydro, or biomass energy. In 1999, renewable energy programs implemented under the Initiative helped avoid the equivalent of over 1 million metric tons of carbon dioxide emissions that otherwise would have been produced as a result of the burning of fossil fuels.

USAID has helped improve access to renewable technologies through technical assistance and training, demonstration projects, and targeted policy interventions.

For example, USAID has worked closely with the Government of Brazil to implement a number of new laws providing federal incentives to electric utilities investing in renewable energy technologies. These efforts also included support for decentralized renewable energy systems to remote, off-grid areas.

USAID's work in Mexico has involved a combination of support for renewable technology markets, rural electrification with renewable systems, and improved national renewable energy planning. The Agency also provided technical assistance to design a national-scale rural electrification program to provide renewable power for schools and health clinics, and to provide potable water. In 1999, USAID helped install over 100 renewable energy systems in Mexico that will generate over 8,600 MW-h of electricity over their lifetimes—displacing demand for additional fossil fuel-based power generation. The majority of this power will come from a large wind and photovoltaic hybrid project that has been approved under the U.S. Initiative on Joint Implementation (USIJI), and is expected to avoid approximately 100,000 metric tons of carbon dioxide emissions over a 30-year lifetime. Since 1994, ten Mexican states have installed approximately 200 renewable energy systems, totaling about 100 kW in capacity, and have averted over 5,700 metric tons of carbon dioxide emissions.

Under a similar effort in Bangladesh, USAID partnered with Grameen Shakti, a subsidiary of Grameen Bank, to develop photovoltaic energy in the remotest parts of the country where energy from fuelwood is in high demand and conventional grid electricity will not be available in the foreseeable future. USAID efforts in the Philippines also worked to provide energy to remote areas by introducing small hydroelectric and solar power plants in conjunction with new national and state policies to encourage investments in renewables, as well as training in the financing, technology, and implementation of renewable energy projects.

Several other renewable energy projects in Asia have made progress in implementing and marketing solar, wind, and hydro resources. USAID has provided technical assistance and training in India and Nepal to promote low-cost solar-powered water pumping and purification systems. In Nepal, USAID promoted broader regional cooperation and trade in cleaner power that will help displace fossil fuel-based energy elsewhere in South Asia that generate greenhouse gas emissions and contribute to local pollution.

Clean Energy. A number of USAID projects have made climate change an important component of clean energy initiatives, helping to avoid about 450,000 metric tons of carbon dioxide emissions in 1999. Natural gas, biomass, and processed fossil fuels such as “cleaner coal” can provide significant reductions in local air pollution while avoiding greenhouse gas emissions of conventional fuels.

Under the West African Gas Pipeline Project, for example, USAID has worked with energy officials in Nigeria, Togo, Benin, and Ghana to develop a new natural gas pipeline to alleviate the region's energy crisis. Promoting close collaboration between government and private sector partners, the project is expected to provide more reliable access to electricity while reducing greenhouse gas emissions from gas flaring in Nigerian oil fields.

A number of other USAID programs have demonstrated the benefits of clean energy. In Bangladesh, USAID is working with the national government to assess the country's natural gas reserves and the feasibility of gas and power exports. Under the Ukraine Natural Gas Project, USAID and DOE have evaluated the potential for retrofitting and partially replacing 96 inefficient gas supply units in 23 compressor stations along the three main Ukrainian gas pipelines—retrofits that would generate savings of about 800 million cubic meters of natural gas every year. In response to Ukraine's First National Communication to the FCCC, USAID has also worked to develop commercial coal bed methane (CBM) activities in four mines that would lead to a significant reduction of methane emissions.

Promotion of cleaner fuels in the Philippines has resulted in dramatic increases in energy savings, from 3,300 MW-h in 1998 to over 305,000 MW-h in 1999. USAID has also facilitated collaboration between U.S. firms and local private- and public-sector partners in conducting a feasibility study to provide cleaner fuel technologies to unelectrified rural markets in Palawan.

Industrial Emissions. Considerable opportunities exist within the energy-intensive industrial sector to mitigate greenhouse gas emissions while simultaneously improving overall efficiency and productivity. This can be accomplished by promoting the adoption of cleaner production practices and environmental management systems. In Mexico, for example, USAID and DOE are working to develop greenhouse gas emissions benchmarks for key industries, as well as energy efficiency initiatives in the public sector. These efforts in Mexico have demonstrated that investments in resource

management systems (RMS) are technically sound, and pay for themselves through energy and other savings in a few months to a few years.

USAID has also supported the adoption of environmental management systems (EMS) in industries. In the Philippines, USAID supported the adoption of ISO 14000 certification—a voluntary system that promotes environmental management improvements in production practices—at a Ford Motor Company plant and throughout its chain of 38 suppliers. Fujitsu Ten Corporation (Philippines) followed Ford’s lead and recently announced plans to change its purchasing practices and raise awareness among its own suppliers.

In Chennai, India, USAID worked with a starch manufacturing company in the Salem District of Tamil Nadu to recover methane emissions from its tapioca-processing effluents. USAID commissioned a feasibility study by the New Jersey Institute of Tech-

Box 1. Expanding Markets for Climate Technologies

As the economies of developing countries continue to expand, many are expected to generate a growing portion of greenhouse gas emissions. These countries can now take advantage of climate change mitigation technologies to increase productivity and efficiency and improve local environmental quality at the same time that they reduce greenhouse gas emissions from major economic sectors.

USAID recently released a report, *Market Opportunities for Climate Change Technologies and Services in Developing Countries*, predicting dramatic growth over the next ten years for climate change mitigation technologies and services in developing country markets. According to the report, by 2010 this market is expected to grow from \$29.9 billion today to as much as \$64.9 billion. The largest market share will be in Asia, accounting for 55 percent of the total, followed by Latin America, Africa, the Middle East, and Eastern Europe. The market expansion results largely from the growing consensus in many developing countries that leaner productivity and greater efficiency are critical for economic success.

Fifty-three percent of the growing market demand in climate-friendly technologies will be in the energy sector, as a result of mounting energy demands and growing interest in efficiency, renewables, and cleaner fuels. The energy sector generates the largest portion of greenhouse gas emissions yet is among the fastest growing sectors in most developing countries. Growing interest in energy efficiency, renewable energy, and clean fuel technologies will be a major factor for growth in climate change technology sales to the energy sector.

Technologies for the commercial and residential sectors such as efficient lighting, energy conservation in buildings, appliances, and air conditioning represent 26 percent of the market, while the industrial sector represents 11 percent. Climate change technologies for the transportation sector, the second largest contributor to greenhouse gas emissions, promote mass transit, alternative fuel vehicles, fuel efficiency, and intelligent transportation systems.

nology (NJIT) which found that the 800 manufacturing facilities of Salem produce enough methane to generate about 80 MW of power. Based on the study, the Salem Chamber of Commerce and Industry implemented a demonstration project with USAID assistance to convert the recaptured methane for fuel use, an achievement that was recognized with the 1999 “Energy Project of the Year-International” award from the Association of Energy Engineers—the world’s largest international association of energy and environmental professionals. Based on this initial success, the Tamil Nadu Energy Development Agency has invited public bids for the construction of a biomethanation plant for energy recovery from starch effluents.²³

Helping Cities Respond to Climate Change. USAID recognizes the important linkages that exist between promoting sustainable urban development and addressing climate change. While rapidly urbanizing cities are among the chief contributors to global greenhouse gas emissions, cities in the developing world are among the most vulnerable to the effects of climate change, such as severe weather, floods, droughts, and sea level rise. (See Box 2.) Recognizing the important role cities have in identifying and addressing local priorities, USAID’s approach involves forming direct partnerships with local authorities and organizations to help reduce greenhouse gas emissions from motor vehicles, industries, buildings, and municipal operations. The results of these efforts are expected to improve basic urban

Box 2. Addressing Climate Change and Urbanization

As cities of the developing world continue to undergo rapid industrialization and population growth—creating additional strain on already overburdened municipal resources, infrastructure, and services—they will contribute an increasing portion of the world’s greenhouse gas emissions. Covering just 2 percent of the Earth’s surface, by some measures cities account for roughly 78 percent of the carbon emissions, from motor vehicles, industrial activity, electricity use, and municipal waste.²⁴ Urban transportation, energy use, industrial activities, and open landfills are the leading sources of greenhouse gases. Cities also add significantly to the growing strain on the biosphere’s natural process of carbon sequestration. Urban demand for wood and other natural resources furthers destruction of forests and wetlands in many developing countries.

Many cities are also vulnerable to climate impacts, such as more frequent and intense storms and floods, water shortages, rising sea levels, and migration from rural areas. Coastal megacities are particularly at risk to sea level rise, which may reach as much as 95 centimeters by 2100.²⁵ Tropical storms such as Hurricane Mitch or recent flooding in India, Mozambique, and Venezuela may occur with greater frequency. Coupled with poor sanitation, increased flooding may likewise hasten the spread of disease and related health risks. Likewise, an increased frequency of floods and other effects of changing weather patterns are expected to hasten the spread of disease and related health risks. Like climate change, urbanization is a major global phenomenon with unmistakable social, economic, and environmental implications worldwide. In the next 25 years, 90 percent of the expected growth of urban populations will take place in developing countries.²⁶ Cities will face increasing strain as growing populations and industrial activities place additional burdens municipal resources, infrastructure, and basic services.²⁷

As urbanization and other development challenges continue to grow, cities will increasingly become political, economic, and environmental focal points for implementing climate-friendly solutions, where multiple development priorities and challenges often converge simultaneously. With increased devolution of government authority, cities will provide key leadership in addressing urbanization with many of the same cost-saving solutions that address climate change. USAID has taken action on several fronts (see text) to work in partnership with developing country municipalities to identify strategic and technological approaches to mitigate greenhouse gas emissions from motor vehicles, industries, buildings, and municipal operations, and to begin to understand the risks of climate impacts and key approaches for adapting to climate variability.

services such as water supply, waste management, housing, and sanitation, and help save municipal revenues.

The centerpiece of the Agency's strategy to address climate change and urbanization is Cities for Climate Protection, a program designed to assist developing country municipalities to meet prevailing social and economic development challenges through "no regrets" approaches that reduce the urban contribution to climate change. In partnership with the International Council on Local Environmental Initiatives (ICLEI), USAID is working with local governments and private industry to support policy reforms, training, and demonstration projects; estimate emissions forecasts; conduct emissions inventorying; set local emissions reduction goals; develop a greenhouse gas reduction action plan; and promote public-private partnerships. To date, USAID has worked with 11 cities in Mexico and the Philippines, and is currently launching new partnerships in India, Indonesia, and South Africa.

USAID has started to identify a number of key opportunities to address energy, climate change, and local development needs through cross-cutting synergies that exist when working in an urban context. In many cities in India, for example, where water demand is growing, pumping is unreliable, inefficient, and often consumes as much as 60 percent of the municipal budget. At the same time, water tables have dropped at a considerable pace. USAID efforts to introduce new, energy-efficient water pumps in the city of Ahmedabad, for instance, have dramatically reduced costs, improved water delivery, conserved energy, and reduced overall greenhouse gas emissions.

Urban Transportation. The transportation sector often generates the greatest source of urban air pollution, such as suspended particulates, carbon monoxide, nitrous oxides, and ground-level ozone, and is a major contributor to greenhouse gas emissions. Efforts to introduce inspection and maintenance of motor vehicles, improve mass transit, encourage cleaner fuels, and improve transportation and land use planning can have dramatic results for local air quality, health, and re-

duced carbon dioxide emissions.

Several USAID programs seek to reduce greenhouse gas emissions from motor vehicles while also reducing lead, particulates, and smog-forming emissions. In Egypt, USAID's Cairo Air Improvement Program (CAIP) includes a vehicle emissions testing program that promotes greater fuel efficiency, conversion of vehicles to cleaner compressed natural gas (CNG), and vehicle emissions testing (VET). Owners of vehicles that fail the test are given information on tune-up benefits and service locations. If recommendations are implemented, fuel savings of 17 percent could be achieved per vehicle. To date, over 25,000 vehicles have been spot-tested, and USAID expects as many as 1.3 million to be tested under the program by 2002. Through joint venture private sector partnerships with CAIP, USAID has also helped convert approximately 20,000 vehicles in Cairo to CNG fuel. Over 100 CNG buses are also expected to be in operation by the end of 2000. With the growing number of conversion centers, commercial fueling stations, and CNG vehicles, Egypt now ranks eighth in the world in CNG use.

USAID has also launched a vehicle testing activity in India based on a public-private partnership. This partnership has supported inspection and maintenance for over 65,000 drivers of Delhi's two-wheelers, collecting emissions and vehicle data that may be used to support voluntary programs and compliance with future emissions regulations.

Urban Buildings, Infrastructure, and Energy Use. One of the most important and often overlooked opportunities to avoid energy costs—as well as greenhouse gas emissions—has been in building efficiency. More energy-efficient lighting, heating, and cooling systems, as well as building weatherization and improvements in building design that make buildings more compatible with local climatic conditions, can lead to significant cost and energy savings. Likewise, commercial and residential buildings can be constructed using materials made from less energy-intensive processes, and thus avoid greenhouse gas emissions.

Under two “eco-homes” projects in South Africa, USAID helped construct 1,470 energy efficient homes, saving over 200 metric tons of carbon dioxide per year by reducing consumption of heating fuels. These homes serve as important models in a country undergoing tremendous housing development. To help replicate the benefits of this effort, USAID supported the establishment of a network for sharing technical expertise and awareness, as well as a “Green Professionals” program, providing technical aid to housing builders to ensure that energy efficiency design is utilized.

Efforts in Poland, Ukraine, Bulgaria, and Romania have also recognized the important role of local governments in addressing energy, climate change, and urban development priorities. USAID’s work in Poland has introduced new policies for cities that promote energy efficiency, planning, and financing for efficiency projects. USAID assistance leveraged local financing for energy efficiency projects in five cities, producing energy savings in schools, apartment buildings, and streetlighting. The projects were implemented through energy services companies (ESCOs) including a municipally-owned ESCO developed through the USAID program. USAID’s program also helped establish the Polish Network of Energy Cities to disseminate energy efficiency experience to cities throughout Poland.

In Kyiv, Ukraine, USAID funds provided to the Pacific Northwest National Laboratory identified energy efficiency opportunities in the city’s municipal buildings in conjunction with a prospective World Bank loan. Under the Lviv Municipal Energy Efficiency Project, USAID funded a demonstration project to weatherize and install heat controls at a boarding school, which provided both considerable savings for the school and avoided 120 metric tons of carbon dioxide emissions. USAID’s partners have conducted a number of energy audits for other municipal buildings in Lviv, and trained the city’s district heating companies in strategic planning. In addition, USAID helped Lviv and surrounding cities establish a fifteen-member Energy Efficiency Commission, and create a new NGO, the Ukrainian Network of Energy Efficient Cities (UNEEC). Loosely patterned after the Polish Network

of Energy Cities, the UNEEC will provide a mechanism for sharing information between cities on how energy efficiency can relieve the burden of high energy costs on municipal budgets. USAID has already begun replicating its successes in Lviv in five other Ukrainian cities.

In Bulgaria, a continuing USAID energy efficiency pilot project for hospitals in the cities of Gabrovo, Stara, Zagora, Plovdiv, and Varna has also shown significant reductions in heating costs, energy consumption, and greenhouse gas emissions. These projects reduced the hospitals’ energy demand by 40 percent during the winter season and improved the quality of health care by lowering secondary re-infection rates, shortening the length of hospital stays and thereby lowering health care costs. The USAID Bulgaria program also created a Municipal Energy Efficiency Network, through which 31 additional municipalities are learning how to identify similar efficiency opportunities. In Romania, USAID worked in Constanta, the second largest city, to design a comprehensive municipal project that addresses the district heat distribution system and end-use improvements in the city’s schools.

Protecting Carbon Sinks through Forest Conservation and Land Use Management

One of the greatest concerns for developing countries is the rapid destruction of their tropical and temperate forests. Current estimates indicate that every year between 5 million and 17 million hectares of forests are cleared worldwide.²⁸ These forests play a critical role in maintaining much of the world’s biodiversity, providing valuable natural resources, and absorbing and retaining atmospheric carbon. Expansion of slash-and-burn agriculture, forest clearing for cattle ranches, new settlements, and unsustainable logging practices have each contributed to deforestation and have eliminated large tracts of the world’s carbon sinks.

Deforestation contributes significantly to the problem of increasing greenhouse gas emissions. The world’s forests and other natural systems serve an important role in the planet’s carbon cycle, storing a considerable portion of the global carbon stock. When these systems are altered due to activities such as timber har-

vesting, clear cutting, or expansion of agriculture, the important function of absorbing and storing (i.e., sequestering) carbon is removed. In addition, the carbon that was being stored in the biomass both above and below ground is then released into the atmosphere over time through decomposition and decay. Between 1990 and 1995, about 129,000 hectares of tropical rain forests were reported to be destroyed on an annual basis in the developing world.²⁹ Forest burning and unmanaged forest fires also cause carbon to be released back into the atmosphere, contributing directly to global greenhouse gas emissions. It is estimated that approximately 20 percent of annual global carbon emissions result from land use changes to forested

ecosystems.³⁰

A key goal of the Climate Change Initiative is to conserve and protect carbon stocks while also promoting sustainable forest management and biodiversity. The Initiative focuses on many of the world's most critical forests and protected areas located in Central and South America, Central Africa, Southeast Asia, and the Russian Far East. In 1999, USAID forestry and land management programs protected or conserved more than 57 million hectares of natural and managed areas, and initiated over 390 policy measures as well as 625 capacity building activities involving over 450 organizations.

Box 3. USAID's Parks-in-Peril Program

Since 1990, the Parks in Peril Program (PiP)—a partnership between USAID, The Nature Conservancy, and local NGOs—has become Latin America's largest, most successful site-based conservation effort. Working in 37 protected areas in 15 countries, PiP has helped protect over 11 million hectares of natural forests, of which 6.3 million contain substantial carbon stocks.

PiP supports local governments, NGOs, and communities by strengthening capacity to manage and conserve protected areas, providing technical research and



manuals on conservation techniques and practices, and supporting targeted policy reforms. The cornerstone of PiP has been working with local partners to develop technical and financial resources to ensure long-term self-sufficiency. Assistance has addressed strategic planning, ecological monitoring, financial accounting, GIS analysis, and community-based management. Many protected areas now no longer require intensive assistance, and enjoy on-site management, improved financing, and community support.

PiP has introduced over 140 policy interventions in a variety of areas, such as establishing resource-use fees to fund conservation, ecological corridors, private lands conservation, conservation easements, policy analysis, debt buy-back, and tax incentives. In Ecuador's Podocarpus National Park, for example, PiP supported a local beekeepers' association to assess a voluntary tax on its production. All revenue from this tax will be dedicated to park conservation.

PiP had also shown success in community resettlement, an important approach to conservation. For instance, PiP's partners worked with the Guatemalan government to help the Vega Larga community voluntarily resettle to a farm outside of the Sierra de las Minas Biosphere Reserve, allowing for the recovery of 1,350 hectares in one of the richest and most ancient cloud forests in the Reserve.

Forest Conservation and Reforestation. USAID is taking steps to address rapid deforestation in the Amazon tropical rain forest of Brazil—one of the largest carbon sinks in the world—where, according to USAID, 14 percent of the original forest, about 55 million hectares, has been destroyed since 1970. Deforestation is the leading cause of greenhouse gas emissions in Brazil, and recent research has shown that during the severe 1998 El Niño drought, human and natural impacts made Amazon forests particularly vulnerable to accidental fires. To address this issue, USAID has stepped up efforts to strengthen local institutions, support research, and improve forest management and agricultural practices. USAID-funded scientists have conducted new studies using satellite imagery to analyze deforestation trends and better understand specific risks from drought, illegal logging, accidental fires, and agriculture practices.

As in Brazil, unsustainable forestry and land use practices in Mexico account for a third of the nation's carbon dioxide emissions. USAID's support for the Parks-in-Peril Program (see Box 3) has helped protect over 1.75 million hectares of forest in Mexico by strengthening legal protections and providing equipment and training for park managers in 11 national parks and bioserves. Together with the DOE, USAID recently funded a study to examine the possibility of providing long-term financial sustainability for forest management, agroforestry, and conservation efforts in Mexico's Calakmul Biosphere Reserve through the use of market-based mechanisms.

In support of conservation efforts in Bolivia, USAID has worked with Bolivian authorities and NGOs to address threats from illegal settlements and agricultural clearing, activities that place many of the country's protected areas at high risk. USAID has helped park management authorities—both government agencies and NGOs—to develop the necessary local capacities to adequately manage these protected areas. By 2002, USAID expects over 3.6 million hectares of Bolivian parks to be well managed as a result of the Agency's assistance. For example, USAID is the principal donor providing assistance and training to the Izoceno indigenous group to help them improve management

of the 3.4 million-hectare Kaa Iya del Gran Chaco National Park. In 1999, over 600 hunters from 23 communities participated in 38 workshops to determine how to apply new research in local management efforts. USAID helped incorporate an environmental education program into the local school curriculum, and helped prepare and implement the park's first management plan.

USAID has similarly worked to strengthen park management in Paraguay. Through its support of Defensores del Chaco National Park, the first public-private partnership for park management in the country was established. To strengthen the protection capacity of the park, 40 rangers were trained at a national training workshop for park guards, environmental education seminars were held with local stakeholders in the buffer zone surrounding the park, and the physical infrastructure was improved. In the search for economic alternatives to deforestation in Paraguay, USAID supported the creation of three additional nature reserves in 1999.

Under its regional program for Central America, USAID has focused efforts on the conservation of the Meso American Biological Corridor. Influenced by USAID, the countries of Panama and Costa Rica have adopted standardized methodologies for the management of protected areas. USAID has also introduced innovative management models, such as the establishment of conservation easements and the registration of privately-owned protected areas. With respect to sustainable forestry practices, USAID has promoted shade-coffee certification and marketing.

Working in close collaboration with Russian NGOs, USAID has promoted conservation and reforestation initiatives in the Russian Far East and Siberia by establishing forest protection legislation and "green accounting" practices, while also supporting forest education, fire prevention, and pest control. One of the key successes of USAID's program in Russia has been its comprehensive reforestation program in Khabarovsk Krai, where high-quality seedlings are produced in containers and replanted in areas with environmental conditions that previously were thought

to be too severe to reforest artificially. Prior to the program, the greenhouses produced 6,500 seedlings annually. In 1999, the greenhouses generated 2.5 million seedlings, and up to 10 million trees are expected to be transplanted annually by 2005 under the program. The success of this program, which proved to be effective both economically and environmentally, has been replicated in other locations of the Russian Far East and Siberia.

Since 1995, USAID has been supporting the Bulgarian national nature protection management system through a direct in-kind contribution to the Global Environmental Facility (GEF). The USAID-GEF Biodiversity Project has provided support to the Ministry of Environment and Water in strengthening Bulgaria's protected area network, with a specific focus on the Rila and Central Balkan National Parks, totaling 179,622 hectares. By providing policy development assistance, promoting sustainable economic use of biological resources, and building local capacity to manage the parks, the Project has contributed significantly towards the sustainable management and conservation of important carbon sinks in the region.

USAID is working to protect forests in Indonesia by promoting reduced-impact harvesting to minimize adverse environmental and social impacts of logging and help ensure the permanence and viability of forest stands after harvest. Working with government agencies and private land holders, USAID is helping to decrease clearcutting and reduce residual waste timber that can accumulate in forests and become fuel for fires in the dry season. These efforts have had substantial benefits both in protecting carbon stocks and in avoiding carbon dioxide emissions from forest fires.

Fire Prevention and Control. Forest fires, caused either deliberately, for agricultural clearing, or accidentally, have recently reached international crisis levels. (See Box 5.) Forest fires can considerably exacerbate the problems of deforestation, with severe consequences for biodiversity, wetlands, and urban populations alike. Fires also lead to significant carbon dioxide emissions. By preventing large-scale fires, forests, which serve as effective, long-term carbon sinks, are preserved and carbon dioxide emissions are avoided.

Box 4. Noel M. Kempff Joint Implementation Forestry Project in Bolivia

USAID works to strengthen developing and transition country participation in the FCCC by promoting involvement in joint implementation (JI), a Convention tool that enables countries to be recognized for emissions reductions through investments in other countries. JI activities of the U.S. center on the pilot program of the U.S. Initiative on Joint Implementation (USIJI), a collaborative effort by 8 federal agencies. Located in the province of Velasco in eastern Bolivia, the Noel Kempff Mercado Climate Action Project, is a forest protection JI project that combines elements of park expansion, long-term park protection, and development of sustainable forest product enterprises. This innovative carbon sequestration project is a partnership between a range of public and private sector actors, including the Government of Bolivia and Fundacion Amigos de la Naturaleza (FAN), a Bolivian NGO managing the 1,523,446-hectare Noel Kempff National Park. The park has been threatened due to excessive logging within the park as well as the advancing agricultural frontier. The Nature Conservancy, American Electric Power, PacifiCorp and British Petroleum America are collaborating partners in this project. USAID assisted in the development of this project by providing extensive technical commentary on proposal drafts, and by providing start-up support for FAN.

As a result of this project, the park is expected to double in size, and create new income-generating activities that will contribute to the preservation and protection of the entire park. These activities will include an endowment fund, commercialization of orchids and other products, and an ecotourism program. Mitigation activities will also extend beyond the park boundaries through economic opportunities for local populations. Overall, investors will provide over \$7 million over the course of 30 years, and the project is expected to contribute to the sequestration of 14.5 million metric tons of carbon.

To address the growing crisis of forest fires, USAID has been working in Latin America, Asia, Africa, and the Russian Far East to strengthen fire preparedness and prevention capabilities of governments, NGOs, and local communities.

Following the 1997 and 1998 wildfire disasters in Mexico, USAID, the Government of Mexico (GOM), and local NGOs jointly developed a wildfire prevention and land restoration program to mitigate environmental, health, and climate effects from forest fires. USAID helped lead several efforts to adopt policies discouraging slash-and-burn agriculture, improve collaboration between Mexico's federal government and NGOs, and provide training on fire prevention and wildfire management. As a result, local fire brigades were able to control and extinguish fires much more effectively, and in 1999 Mexico experienced a pronounced decrease in the area normally affected by fires. More recently, USAID and the GOM have been working together to assess the amount of carbon potentially sequestered as a result of the GOM's fire restoration efforts. The purpose of this project is to assess the technical and methodological issues surrounding the measurement of carbon at wildfire sites that are being restored. Similar support for fire-fighter training and improved forest policy in Guatemala helped keep the total area normally affected by fire at a minimum in 1999. As a result, only 2,600 hectares burned in 1999 in the 3 million-hectare National Park system, compared to 260,000 hectares that were affected by fires in 1998.

With assistance from USAID, the Indonesian government enacted new requirements to extinguish coal seam fires, a dramatic change from the previous policy that let fires burn uncontrolled. This new policy has led to an increased awareness and reporting of fires, and caused 79 coal seam fires to be extinguished in Indonesian Borneo in 1999. Because of the new decree and local publicity, reporting of coal seam fires has increased significantly and the Ministry has continued to put out fires without additional USAID assistance.

In Madagascar, USAID has used satellite imagery technology to identify night fires and verify on-going activities to reduce slash-and-burn agriculture. These efforts are already having an impact in areas of key biodiversity habitats, and playing an important role in understanding Madagascar's contribution to global carbon sequestration.

In Brazil, USAID is promoting the integration of satellite detection techniques in conjunction with on-the-ground community mobilization and local awareness activities. For example, USAID has conducted experimental burns to develop more accurate biomass consumption rates and smoke emissions from tropical ecosystems in southern Brazil. USAID has funded laboratory tests to complement field data, as well as assessments of comparative fire risks between conventionally logged and reduced impact harvesting sites. The Agency has also lead research efforts in fire risk and training in fire fighting.

Box 5. The Growing Menace of Forest Fires

Forest fires contribute significantly to global climate change, both by causing additional loss of carbon stocks and by releasing carbon into the atmosphere. Tropical forest fires caused by agricultural clearing have been particularly severe in recent years. During the 1997-98 season in Indonesia, for example, fires were reported in 23 of Indonesia's 27 provinces, in an area totaling over 10 million hectares. Fires blanketed the entire region in haze, affecting about 70 million people and covering a 1-million-square kilometer area reaching as far away as Thailand and the Philippines. In the 1999 season, another 500 "hot spots" were detected in Sumatra's Riau province alone.³¹ Similarly, satellite data for the Amazon region shows a 50 percent increase from 1996 to 1997 in the number of forest fires set by farmers to clear land for cultivation or pasture.³² These fires may increase pressure on adjacent virgin forests by expanding access to formerly remote sites.³³

As a result of devastating 1998 and 1999 forest fires in Khabarovsk Krai in Russia, USAID has worked to improve fire-fighting capability and to protect key forest resources in the Krai. For example, over 430 new two-way radios and antennas have been purchased to begin improving radio communication for early fire detection and response. This new equipment has significantly reduced the need for patrols to travel off-road several hours at a time to stop fire outbreaks, saving time and resources while improving overall fire response capabilities.

Promoting Community-Based Forest Management.

While government and non-governmental institutions often play a critical role in forest management, local communities can be instrumental in protecting forests by monitoring and managing forest resources in a manner that meets their own needs while maintaining forest health. Because local communities may have a direct stake in preserving forest resources, they are often highly effective in collaborating with government authorities to protect forests threatened by illegal logging, fires, or migrant settlers. Local communities also relieve the burden on government resources in overseeing forest practices in often distant forest regions.

Because of the important and highly effective role of community-based forest management (CBFM) in protecting forests and therefore carbon sinks, USAID has promoted extensive CBFM activities worldwide, engaging local and indigenous communities in planning, mapping, management, monitoring, and protection of forest resources.

In the Philippines, USAID assisted in transferring over 625,000 hectares of forest to local management by working with local communities to establish clear boundaries for community management, control agricultural clearing, and implement local management and monitoring plans. After four years, about 5.5 million hectares of forestland—over 60 percent of the country's open access forests—are now under community management. Without such interventions, the country's forest cover would have declined by an estimated six percent in the same period. USAID support

was also instrumental in securing several critical policies, including an Executive Order that mandates community-based forest management as a national policy, and an Administrative Order defining implementation rules and regulations. As a result of overall support, by 2010 USAID expects to have increased Philippine forest cover by 19 percent and to have placed all open-access forestland under community management.

In Indonesia, USAID is strengthening the management rights of local indigenous peoples by helping communities to map forests, control logging, and limit agricultural expansion on local lands. USAID has worked at nine sites in Indonesia to help communities map local natural resources and to strengthen their official rights to manage the forests, promote favorable timber practices, and protect ancestral lands. Indonesian officials have also increasingly relied on indigenous communities to manage park areas, such as in Lore Lindu National Park, where the local community has already proven to be more effective than the park rangers in keeping illegal loggers and poachers from operating in their part of the national park, comprising over 220,000 hectares of forestland. Community maps have been used to facilitate park management in 20 areas.

Other countries have achieved similar success, such as Nepal, where over 125,000 hectares of forest have been transferred to 1,600 newly-trained Community Forest User Groups (CFUGs). In a country where rural families rely on forests for 90 percent of their energy requirements, these groups play an important role in promoting self-sufficiency in forest resource management. Many of the forests turned over to communities are in highly degraded conditions. Community management and protection has enabled accelerated regrowth and increased productivity, as well as helped to protect biodiversity through more sustainable management of non-timber forest products. Since initiating the program, USAID has facilitated the transfer of 125,909 hectares of forest areas to CFUGs in Nepal while providing training in democratic procedures, management plan preparation, and development of non-timber forest product markets. An estimated 2.5 million cubic meters of biomass are being produced

for energy use in the forests where USAID has supported the transfer of management to CFUGs.

Similarly, in rural Madagascar USAID has supported efforts to grant authority to 36 community-based associations to manage over 225,000 hectares of critical forest lands. In Guatemala, USAID is expecting by 2001 to help shift management responsibilities to local groups for nearly 500,000 hectares of the Maya Biosphere Reserve. Local communities now actively manage about five percent of these lands, while monitoring and protecting the remainder from illegal uses. (See Box 6.)

Sustainable Agriculture and Agroforestry. USAID is taking steps to capitalize on highly promising improvements in agricultural practices in developing countries that also help sequester carbon. Activities such as agroforestry, conservation tillage, crop rotation and residue management, land restoration and conversion,

improved water management, and soil fertility management planning have increased both soil carbon content and the agronomic productivity of cropping and pasture systems. Many of these practices also contribute to crop productivity gains and preservation of valuable agricultural or wooded lands. (See Box 7.)

USAID has worked throughout Uganda and Madagascar to support sustainable farming systems and agroforestry to improve agricultural output while enhancing carbon storage in agriculture. Comprehensive approaches employed include tree, shrub, and grass boundary planting to retain soil, increase water infiltration, and expand hectares under perennial vegetation. This work has included training in composting and mulching, as well as the construction and use of biogas converters and fuel-efficient stoves for household use. In Uganda, USAID has also helped establish on-farm woodlots that will reduce pressures to exploit nearby indigenous forests. USAID is also providing community resource centers that support forest management technology transfer and the creation of nurseries for trees that will provide food, fuel, and high-value trees.

In Bangladesh, USAID is helping to combine fertilizer efficiency and reduced tillage techniques to reduce nitrous oxide emissions from rice paddies. Leaving straw mulch in paddy rice prevents paddy water from turning acidic, which reduces the amount of ammonia fertilizer in the water. The new tillage practices have reduced emissions from paddies and helped to avoid the need for additional fertilizer.

Working in Albania, USAID supported efforts to improve degraded lands through the demonstration and extension of sustainable agroforestry technologies. USAID's demonstration and training project has led to broad replication of new agroforestry techniques in over 20,000 hectares of forestlands throughout Albania's farming community without additional USAID assistance.

Box 6. Sustainable Agriculture and Carbon Sequestration in the Maya Biosphere Reserve

Guatemala's Maya Biosphere Reserve (MBR) forms the core of the largest tract of intact tropical forests remaining in Meso-America, representing nearly 19 percent of Guatemala's territory. Small farmers, with nowhere else to go, have traditionally burned forests to plant corn in the ashes, moving on to clear new land after just two or three crops. Two separate analyses by the Guatemalan government found that if forest clearing trends continued unabated, by 2015 the 2 million hectare MBR would be destroyed. USAID's program in Guatemala works to reduce deforestation rates and promote carbon sequestration by supporting improved land and resource use practices by the local population, an improved policy framework, and stronger local institutions through technical assistance, training, and support for a farmer-to-farmer extension network. As of 1999, USAID's support has led to the protection of approximately 700,000 hectares from conversion.

Promoting Developing and Transition Country Participation in the Framework Convention on Climate Change

Advancing a global solution to climate change requires participation by all Parties to the FCCC. A key component of the Climate Change Initiative is to increase developing and transition country participation in the FCCC. In cooperation with other U.S. Government agencies, USAID plays an important role in Convention negotiations and other technical meetings developing strategies related to capacity building, technology cooperation and targeted policy reform. In 1999, USAID supported 124 policy advances related to FCCC participation, more than double the total in the previous year. (See Box 8.)

Capacity Building. USAID implemented over 70 capacity building activities designed to strengthen participation in the Convention in 1999. This included promoting efforts to integrate climate change into national development strategies; establishing emissions inventories; developing national climate change action

plans; promoting procedures for receiving, evaluating, and approving joint implementation proposals; and establishing growth baselines for linking greenhouse gas emissions to economic growth.

For example, through the USAID Climate Change Center in Ukraine, established in 1999, USAID provides support to the Government of Ukraine to strengthen capacity in establishing national administrative structures, developing a national climate change inventory program, and preparing investment projects. In preparation for the sixth Conference of the Parties (COP-6) to the FCCC, USAID provided assistance to the Government of Kazakhstan to analyze the costs and benefits of greenhouse gas abatement and to continue preparing its national emissions inventory.

Through the U.S. Country Studies Program (USCSP), USAID assisted the Philippines in developing a national action plan in 1999 that inventories greenhouse gas emissions, assesses vulnerability, and recommends mitigation strategies. In conjunction with USCSP, USAID also sponsored a regional workshop in Dakar, Senegal to provide technical training and capacity-building to

Box 7. Carbon Sequestration Opportunities through Sustainable Agriculture

While scientific analysis of carbon sequestration opportunities in agriculture is still only beginning, some studies indicate that improved agricultural practices have the potential to sequester more carbon in soil than is caused to be emitted from farming practices overall as a result of land use conversion and fossil fuel combustion. Preliminary estimates indicate that applying improved agricultural practices that increase carbon content in degraded soils could result in sequestering as much as 3 billion metric tons of carbon annually. While much additional study will be needed to ascertain the precise benefits of sustainable agriculture, these early findings show the potential promise of improving agricultural practices to reduce greenhouse gas emissions.

USAID has taken several steps to begin to gain a clearer understanding of climate change implications of agricultural practices. As a result of one study in the tropical savanna, for example, it was found that one hectare of managed pasture grasses can convert as much as 52 tons per year of carbon dioxide into organic matter. In tropical Latin America, USAID scientists estimate that these grasslands alone may remove up to 2 billion tons of carbon dioxide per year from the atmosphere.

New agricultural technologies and conservation practices also have the potential to save marginal lands, and protect the forests on those lands. A USAID-sponsored report of the Consultative Group on International Agricultural Research (CGIAR) suggested that between 200 and 400 million hectares are preserved in the developing world as a result of crop productivity efforts. These land savings comprise about 40 percent of wooded or forest lands, making them even more valuable as carbon sinks and biodiversity reserves. If land savings resulting from forage and livestock productivity gains are also taken into account, another 50 million hectares of land can be conserved.

13 countries in West and Central Africa from Benin, Burkina Faso, Central Africa Republic, Chad, Cote d'Ivoire, Guinea, Guinea Bissau, Gambia, Niger, Senegal, and Togo. Topics addressed at the workshop included greenhouse gas emissions inventories; vulnerability and adaptation assessment in the sectors of climate and baseline scenarios, agriculture, and water resources; and mitigation assessments.

In India, the Confederation of Indian Industry, the largest trade association in India, established the Climate Change Information Center with USAID assistance to facilitate investment in climate-friendly projects. Through the world-wide Energy and Environment Training Program, USAID offered targeted climate change training courses on the economics of climate change in 13 countries.

Technology Cooperation. USAID helps to promote the diffusion of climate friendly technologies to developing and transition countries in pursuit of the objectives of Article 4.5 of the FCCC. Through work with governments, environmental groups, and the private sector, USAID implements activities worldwide that include human and institutional capacity building, demonstration projects, information dissemination, investment facilitation, research, and regulatory and technical barrier removal. Together with DOE and the U.S. Environmental Protection Agency (EPA), USAID developed a pilot project to act as a model for technology transfer under the FCCC. (See Box 9.)

Policy Advances. In 1999, USAID was instrumental in helping countries to develop national policies that brought them closer to meeting the requirements of participation in the FCCC. In total, 124 policies relating to climate change were introduced, adopted, implemented, or enforced. Examples from several key countries are provided below.

In the Philippines, the Department of Energy integrated climate change into the Philippine Energy Plan. In addition, the Manila Observatory, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), the Philippine Department of

Box 8. Joint Implementation

USAID works to strengthen developing and transition country participation in the FCCC by promoting involvement in Activities Implemented Jointly (AIJ), a concept adopted in Article 4.2(a) of the FCCC, which provides for Parties to meet their obligation to reduce greenhouse gas emissions "jointly with other parties." In 1993, the U.S. announced a pilot joint implementation program, the U.S. Initiative on Joint Implementation (USIJI), as part of the U.S. Climate Change Action Plan.

USIJI encourages U.S. businesses and NGOs to voluntarily use their resources and innovative technologies and practices to reduce greenhouse gas emissions and promote sustainable development worldwide. Voluntary international partnerships offer the potential to achieve greater and more cost-efficient emission reductions worldwide than would be possible in each country alone. The USIJI now includes 51 projects in 25 countries, representing a diversity of technologies that range from energy efficient homes to power plant conversions. The projects are reviewed and selected by an evaluation panel comprised of senior representatives from eight federal agencies, including USAID.

Energy (PDOE), and Forest Management Bureau of the Department of Environment and Natural Resources (DENR) jointly conducted an inventory of greenhouse gas sources and sinks. The Interagency Committee on Climate Change completed the National Action Plan which will serve as the basis for the National Communications to be submitted to the FCCC. The Environmental Bureau of the DENR implemented an approval process for AIJ proposals, and guidelines for monitoring and verifying greenhouse gas emissions have been implemented by the Manila Observatory and PAGASA.

In Central Asia, USAID worked with several countries to develop climate-friendly policies. Kazakhstan, for example, submitted a bid at COP-5 to become a member of Annex I and Annex B countries under the FCCC. In so doing, it became the first country to express a desire to take on a voluntary commitment to reduce its greenhouse gas emissions. It also revised its inventory of emissions for 1990 and 1994, assembled data on

emission for years up to 1998, and estimated emissions scenarios based on modeled projections of future emissions. Finally, the Government of Kazakhstan also established a national climate change office. Both Uzbekistan and Turkmenistan also submitted an initial National Communication to the FCCC in 1999 with support from USAID.

USAID's leadership has also been instrumental in supporting the creation of climate change authorities in partner countries. With USAID support in Ukraine, the Government created an Interagency Commission on Climate Change (ICCC) and submitted its first National Communication and Emissions Inventory to the FCCC. In Mexico, the national government established an Interagency Commission on Global Climate Change with USAID assistance. The Mexican Congress considered a global climate change bill outlining how Mexico could integrate climate change considerations into national strategic, energy, and sustainable development goals.

Addressing Vulnerability and Adaptation to Climate Change Impacts

An important objective of the Climate Change Initiative is to strengthen the capacity of developing countries and countries with economies in transition to adapt to the impacts of climate change. In this area, USAID implements a range of programs worldwide in such sectors as water resources management, agriculture, forestry, and disaster assistance. Although many results from these activities are incorporated into the indicators that record policy improvements and capacity building activities, highlights of the Agency's efforts in 1999 to address vulnerability and adaptation are provided below.

Sea level rise is perhaps the most direct impact of warming global temperatures and climate change. The countries at great risk to this impact are the small island nations and developing countries with low-lying coastal areas. USAID is therefore supporting on-

Box 9. Technology Cooperation Agreement Pilot Project (TCAPP)

In partnership with the U.S. Environmental Protection Agency and the U.S. Department of Energy, USAID implements the Technology Cooperation Agreement Pilot Project (TCAPP), a global effort to promote the transfer of climate-friendly technologies to developing countries. Working in Brazil, China, Kazakhstan, Korea, Mexico, Egypt, and the Philippines, TCAPP has emerged as the leading model for private-sector driven technology transfer under the FCCC.

Under TCAPP, country teams develop technology cooperation frameworks that identify climate-friendly technologies that will meet development goals and reduce greenhouse gas emissions. In addition, the technology cooperation frameworks identify potential barriers to the deployment of these technologies. TCAPP then works with in-country government agencies, businesses, and NGOs, to develop and implement actions that will remove barriers and facilitate technology transfer. A key element of TCAPP has been attracting private investment. TCAPP actively engages over 400 U.S., international, and local businesses to help develop specific projects and to provide invaluable input regarding the removal of market barriers. Over 10 bilateral and multilateral donors also are working with USAID in this initiative.

Specific recent accomplishments related to the development of new projects and policies include facilitating the development of at least 13 new clean energy business investment projects in the participating countries and initiating work on over 10 additional prospective projects. If these projects are fully implemented, they will result in up to \$100 million of new investment deals and reductions in greenhouse gas emission of up to 200,000 tons of carbon per year over the lifetime of the projects. TCAPP is also facilitating 22 actions to remove energy market barriers, including renewable energy policy reforms in the Philippines, development of an industrial ESCO pilot program in Mexico, a sugar mill cogeneration financing workshop in Brazil, energy auditing training in Korea, and development of refinery energy efficiency pilot projects in Egypt.

going training efforts in assessing the vulnerability to rising sea level. In 1999, USAID collaborated with the Alliance of Small Island States (AOSIS) to sponsor a workshop in the Marshall Islands to address this issue.

Facing drought and food security challenges, many countries in Sub-Saharan Africa are also vulnerable to climate change. In South Africa, USAID is working to build in-country capacity to reduce vulnerability to drought. Specifically, the Agency worked with the South African government to improve management of water services in the Mpumalanga Province, a severely under-serviced area, and the Bushbuckridge Water Board, to increase its capacity to better manage water services to over a million residents. Support for the Municipal Infrastructure Investment Unit, which successfully assisted Dolphin Coast in signing a concession contract with a private consortium of foreign and South African partners, has also resulted in increased efficiency of water delivery.

In Uganda, USAID has supported the installation of the regional Famine Early Warning System (FEWS) to build capacity with rapid rural appraisals, targeting of food aid, and disseminating climate and meteorological information to farmers. In Central Africa's Congo Basin, USAID is implementing a multi-year forestry and biodiversity program to study vulnerability of tropical rainforest species.

As shown by the devastation of Hurricanes Mitch and Georges in 1998, natural disasters can have severe long-term environmental, economic, and social consequences for developing countries. In the wake of Hurricane Mitch, USAID joined a multi-agency effort to strengthen worldwide climate-related disaster preparedness and mitigation, particularly in Mexico and Central America. In collaboration with the Central American Center for the Prevention of Natural Disasters, the Agency established a training and technical assistance program to develop adaptation plans for extreme climatic events. Through its transnational watershed program, USAID supported watershed rehabilitation and the installation of stream gauges and early warning systems in Honduras. USAID has also sup-

ported energy sector reconstruction efforts designed to enhance to the capability of the Central American energy facilities to survive catastrophic weather events, while at the same time promote environmentally sustainable energy use.

In the Philippines, USAID provided support to institutionalize integrated coastal resource management (CRM) tools and practices in local governments, local offices of the Philippines' Department of Environment and Natural Resources, and Fishery Resources Management Project sites.

Partnerships and Resources Leveraged

To multiply the impact of its programs, USAID strongly believes in joining forces with other donor agencies and the private sector. With the Climate Change Initiative, the Agency has taken a similar approach in leveraging resources with collaborating partners to undertake international projects. USAID leverages funding through the Development Credit Authority (DCA), which allows developing countries to access loans through credit guarantees for a range of investments, including climate-friendly technologies and infrastructure, as well as through direct and indirect leveraging of funding for ongoing or replicated USAID activities.

Development Credit Authority.

Under the Climate Change Initiative, USAID plans to use DCA over five years to leverage \$250 million in commercial capital for "climate friendly" investment projects. DCA may be used to finance a range of "climate friendly" projects from various sectors, including greenhouse gas mitigation activities in the energy and industrial sectors, urban areas, and profitable forestry and land use activities that protect carbon stocks. In 1999, USAID used DCA to promote investments in energy efficiency by guaranteeing a \$10 million project in Poland. The Agency also initiated steps to begin supporting an investment in Bulgaria, which will access up to \$6.25 million in funding for a pipeline of municipal energy efficiency projects. Additional efforts will be under way over the course of the Initiative

to meet its target in DCA-assisted funding.

Direct and Indirect Leveraged Funding for USAID-Initiated Activities.

USAID has leveraged funding from a variety of multi-lateral and bilateral donors, foreign governments, NGOs, and the private sector. USAID measures leveraged funding both in terms of directly leveraged financial resources, which support ongoing or continuations of USAID projects, and indirectly leveraged funding, which supports replications of activities originally initiated or conceived by USAID.

While it is difficult to calculate an exact figure that measures USAID's ability to leverage funding from other donors and institutions, the Agency has nevertheless sought to assess its overall impact in promoting innovative approaches and activities that address climate change with its partners. Based on data collected from all Agency programs participating in the Initiative, in 1999 USAID leveraged over \$600 million in direct funding to its ongoing activities, and over \$950 million in indirect funding for activities that replicated or built on USAID projects or initiatives. This funding supported activities promoting greenhouse gas emissions reductions from the energy sector, industry, and urban areas, as well as protection of carbon sinks through forestry, land use, and biodiversity conservation activities.

Examples of funding that supported ongoing USAID activities in energy, industries, and cities are numerous. For instance, USAID leveraged \$18 million from the World Bank in Ukraine to support energy efficiency in government buildings in Kyiv. USAID's efforts to introduce clean energy in India encouraged private sugar mills to obtain \$66 million in loans to construct new bagasse cogeneration units. Direct sales of climate-friendly technologies to Asian private sector firms constitute another source of leveraged funding. The U.S.-Asia Environmental Partnership (US-AEP) estimates that its assistance led to nearly \$6.6 million in confirmed sales of U.S. technologies in 1999. In Indonesia, USAID leveraged \$750,000 from Japan's

New Energy Development Organization (Japan-NEDO) to identify technology retrofits that would improve production efficiency and reduce greenhouse gas emissions in power plants.

Funding leveraged from international institutions such as the Global Environment Facility (GEF), United Nations Development Programme (UNDP), or World Bank to replicate USAID activities was considered to be another important accomplishment in 1999. In Egypt, the \$5.1 million GEF/UNDP-funded Greenhouse Gas Reduction Project built upon a national energy efficiency initiative started under USAID's Egyptian Environmental Policy Program with the Government of Egypt. Similar efforts in the Philippines have led to significant expansion of climate-friendly initiatives. In 1999, GEF provided \$3.8 million to establish a renewable energy service company (RESCO) in partnership with a private technology vendor and the Governments of Aklan and Palawan Provinces, as well as a \$305,000 grant to help reduce policy barriers to renewable energy. GEF likewise provided \$150,000 to support follow-up to USAID's efforts to support Government of Philippines participation under the FCCC, through preparation of the country's Initial National Communication to the United Nations.

USAID has also had considerable success in partnering with other donors, institutions, and governments to support ongoing forest and biodiversity conservation efforts. For example, USAID's Parks-in-Peril program in Mexico leveraged a total of \$3.47 million in direct funding and \$557,936 in indirect funding from local and federal governments, Mexican NGOs and foundations, the World Bank, GEF, and private firms. USAID leveraged over \$3 million to support its Maya Biosphere Reserve project in Guatemala from outside sources, and used a two-to-one matching fund program with several organizations to collect \$1.8 million in additional funding for the reserve. In Uganda, USAID support has helped the Mgahinga and Bwindi Impenetrable Forest Conservation Trust grow to approximately \$6 million, and leveraged an additional \$1 million from the Government of Denmark to support the Agency's

community conservation in 25 parishes adjacent to the Bwindi and Mgahinga National Parks.

The Agency experienced similar successes in promoting replication of its efforts in the forestry and land use sectors. For example, building on earlier USAID successes, The Nature Conservancy received a \$5.4 million grant from a U.S. utility to purchase 1,800 hectares of ranchland in Guaraquecaba, Brazil for a climate action project under the Parks-in-Peril program. TNC also obtained \$1.5 million to enlarge protected areas of the Chaco, Paraguay, \$1 million to protect a park for migratory birds in Ecuador, \$500,000 to support community-based agroforestry in Rio Bravo, Belize, as well as funding for more than 10 other Parks-in-Peril projects building directly on prior USAID-supported efforts.

Conclusion

As reported by the IPCC and other scientific bodies around the world, climate change is already under way, and is likely to continue if worldwide trends in greenhouse gas emissions, deforestation, and other environmental impacts are not slowed or reduced. USAID's Climate Change Initiative is an effort to respond to the needs of developing countries and countries with economies in transition by mitigating greenhouse gas emissions, protecting carbon stocks, supporting participation in the U.N. Framework Convention on Climate Change, and reducing their vulnerability to climate impacts.

Under the Initiative, the Agency has utilized approaches that link climate change with its ongoing programs, leveraging opportunities to improve the worldwide response to climate change, while promoting economic development, improving living conditions and public health, and protecting the environment. Although USAID has made much progress under its Climate

Change Initiative and previous climate change programs much work remains to be done.

This report represents Agency results under the Climate Change Initiative for 1999. Reporting will continue through the life of the Initiative, which is scheduled to end with Fiscal Year 2002. Under the Initiative, USAID will continue to work with its partners in addressing climate change in developing and transition countries, and will seek to assess its overall impacts through Agency-wide performance monitoring and reporting for 2000, 2001, and 2002. As the Initiative continues, cumulative data will provide an increasingly accurate understanding of U.S. Government efforts to address climate change in collaboration with its developing and transition country partners. USAID hopes to use the guidance these trends provide in future efforts to address the causes and impacts of climate change as part of its sustainable development programs.

USAID Climate Change Contacts

Bureau for Global Programs

G/ENV Climate Change Team

Ko Barrett

Phone: (202) 712-5445

Email: kbarrett@usaid.gov

Virginia Gorsevski

Phone: (202) 712-1463

Email: vgorsevski@usaid.gov

Duane Lakich Muller

Phone: (202) 712-5304

Email: dlakich@usaid.gov

Carrie Stokes

Phone: (202) 712-0457

Email: cstokes@usaid.gov

G/ENV Office of Environment and Natural Resources

Jean Brennan

Phone: (202) 712-5416

Email: kbarrett@usaid.gov

G/ENV Office of Energy, Environment, and Technology

Robert MacLeod

Phone: (202) 712-4473

Email: rmacleod@usaid.gov

Bureau for Africa

Paul Bartel

Phone: (202) 219-0249

Email: pabartel@usaid.gov

Jim Graham

Phone: (202) 219-0453

Email: jgraham@usaid.gov

Bureau for Asia and the Near East

Judith Barry

Phone: (202) 712-5518

Email: jbarry@usaid.gov

Cindy Lowry

Phone: (202) 712-5436

Email: clowry@usaid.gov

John Wilson

Phone: (202) 712-5436

Email: clowry@usaid.gov

Bureau for Latin America and the Caribbean

Jeff Brokaw

Phone: (202) 712-5623

Email: jbrokaw@usaid.gov

Gil Jackson

Phone: (202) 712-0809

Email: gjackshon@usaid.gov

Europe and Eurasia

Fred Guymont

Phone: (202) 712-1700

Email: fguyont@usaid.gov

Ira Birnbaum

Phone: (202) 712-1459

Email: ibirnbaum@usaid.gov

Angela Crooks

Phone: (202) 712-4071

Email: acrooks@usaid.gov

Alicia Grimes

Phone: (202) 712-1642

Email: agrimes@usaid.gov

Loren Schulze

Phone: (202) 712-4133

Email: lschulze@usaid.gov

Bureau for Policy and Program Coordination

James Hester

Phone: (202) 647-9012

Email: jhester@usaid.gov

Endnotes

- Intergovernmental Panel on Climate Change, Working Group I, *Third Assessment Report, Summary for Policymakers* (January 21, 2001), 6. (Hereinafter IPCC, *Third Assessment Report*.)
- ² *Id.*
- ³ Lester Brown, *et al*, WorldWatch Institute, *Vital Signs 2000*, (2000), 66. (Hereinafter: WorldWatch, *Vital Signs 2000*.)
- ⁴ *Id.*
- ⁵ IPCC, *Third Assessment Report*, 4.
- ⁶ WorldWatch, *Vital Signs 2000*, 67.
- ⁷ U.S. Department of Energy, *International Energy Outlook 2000* (2000), available at: <http://www.eia.doe.gov/oiaf/ieo/index.html>. (Hereinafter: *International Energy Outlook 2000*.)
- ⁸ IPCC, *Third Assessment Report*, 8.
- ⁹ WorldWatch, *Vital Signs 2000*, 20.
- ¹⁰ Between 1990 and 1998, carbon emissions from developing countries increased by 34 percent. See *International Energy Outlook 2000*.
- ¹¹ *Id.*
- ¹² *Id.*
- ¹³ *Id.*
- ¹⁴ WorldWatch, *Vital Signs 2000*, 66.
- ¹⁵ *Id.*
- ¹⁶ UK Research Programme, *Climate Change and Its Impacts: A Global Perspective*, (December 1997), available at: <http://www.meto.govt.uk/research/hadleycentre/pubs/brochures/B1997>. This map displays coastal areas at risk to sea level rise, divided into regions. The two coastal regions of South Asia (consisting of India, Sri Lanka, Bangladesh, and Burma) and Southeast Asia/Asia-Pacific (consisting of Indonesia, Thailand, Cambodia, Vietnam, and the Philippines) each contain populations over 50 million at risk to sea level rise. The African Atlantic, African coast on the Indian Ocean, and the Far East (coastal China and Japan) each contain between 10 and 50 million people at risk. The shaded coastlines in eastern North America and Europe are most vulnerable to wetland loss.
- ¹⁷ United Nations Framework Convention on Climate Change, Article 2, available at: <http://www.unfccc.org/resource/conv/index.html>.
- ¹⁸ *Id.*, Article 4.
- ¹⁹ Framework Convention on Climate Change Secretariat, *Kyoto Protocol Status of Ratification* (27 November 2000), available at <http://www.FCCC.org/resource/kpstats.pdf>.
- ²⁰ P.L. 101-167, section 534.
- ²¹ U.S. Agency for International Development, *Global Climate Change: The USAID Response, A Report to Congress* (July 1994).
- ²² *Id.*
- ²³ “Biomethanation” is the process of converting liquid or solid organic waste to biogas and fertilizer through anaerobic microbial digestion. See <http://www.teriin.org/renew/tech/biometh/about.htm>.
- ²⁴ Molly O’Meara, *Reinventing Cities for People and the Planet, WorldWatch Paper 147* (June 1999), 7.
- ²⁵ Secretariat of the United Nations Framework Convention on Climate Change, *Climate Change Information Sheet 11: Sea levels, oceans, and coastal areas* (January 1997). The “best estimate” for sea level rise over the next century is 50 cm. Global average sea level has already risen by 10 to 25 cm over the past 100 years. *Id.*
- ²⁶ See *e.g.*, World Resources Institute, *et al*, *World Resources 1997-98* (1997), 3.
- ²⁷ *Id.*
- ²⁸ World Resources Institute, *et al*, *World Resources 2000-2001*, 90. (Hereinafter: *World Resources 2000-2001*.) By comparison, the size of Austria is approximately 8.3 million hectares. (One hundred hectares is the equivalent of one square kilometer.)
- ²⁹ Food and Agriculture Organization of the United Nations, *State of the World’s Forest* (1997).
- ³⁰ *Id.*, 48.
- ³¹ See World Resources Institute, *Trial by fire: Forest Fires and Forestry Policy in Indonesia’s Era of Crisis and Reform* (July 2000), 1, 8, 10.
- ³² *World Resources 2000-2001*, 185.
- ³³ *Id.*, 186.

U.S. Agency for International Development
Bureau for Global Programs, Field Support and Research
Global Environment Center
Washington, D.C. 20523-3800

Environmental Information Clearinghouse (EIC)
PADCO, Inc.
1025 Thomas Jefferson St., NW
Suite 170
Washington, DC 20007-5209