

Originally Processed With FOIA(s):
2017-0310-F

FOIA Number:
2017-0310-F

FOIA MARKER

**This is not a textual record. This is used as an
administrative marker by the George Bush Presidential
Library Staff.**

Record Group/Collection: George H.W. Bush Presidential Records
Collection/Office of Origin: Counsels Office, White House
Series: Holmstead, Jeffrey, Files
Subseries: Environmental Subject Files

OA/ID Number: 45131
Folder ID Number: 45131-002

Folder Title:
Global Climate Change [2][2]

Stack:

Row:

Section:

Shelf:

Position:

Notes on Selected Attendees at
Aspen Institute Senior Policy Makers Meeting
on
International Environment Policy
Aspen, Colorado - July 25-28, 1991

List of Participants

Nobutoshi Akao* Ambassador for the Global Environment and Pacific-Asian Economic Cooperation, Ministry of Foreign Affairs, Tokyo

Akao is the top Japanese delegate to the Climate Convention negotiations. He is the co-chair (with Mexico) of Working Group I of those negotiations, which covers "appropriate commitments to limit net emissions of CO2 and other GHGs."

Emeka Anyaoku Secretary-General of the Commonwealth

Timothy Atkeson Assistant Administrator, Office of International Activities, U.S. Environmental Protection Agency

Marcos Castrioto Secretary of Foreign Policy, Ministry of Foreign Relations (Brazil)
de Azambuja*

The Brazilian foreign ministry is generally an ardent (and often obstinate) advocate of resource transfers to developing nations.

E. Curtis Bohlen Assistant Secretary for Oceans, Environment and Science, U.S. Department of State

Laurens Jan Brinkhorst Director-General, Commission of the European Communities

Top EC official on environment. Dutch. Attended the White House Conference in April 1990. Very crafty, smooth; consummate "Eurocrat" -- moves easily in international settings. Interested in creating a European EPA and in EC power over member nations; therefore interested in the U.S. federal system and federal power over the states. Generally prefers to emissions trading.

Harlan Cleveland Hubert H. Humphrey Institute of Public Affairs, University of Minnesota

Aging guru of international financial assistance. Worked on Green Revolution in 1960s. Urged creation of an International Development and Cooperation Agency.

Christine K. Debrah Member of the National Commission for
Democracy, Ghana

Really tough, bright. Wants dollars, but listens to ideas.

Michael Deland* Chairman, Council on Environmental Quality

William D. Eberle Co-chairman, The United States and the World
Economy Program, The Aspen Institute

Gus Edgren Assistant Administrator and Director, Bureau
for Programme Policy and Evaluation, United
Nations Development Programme

Generally well thought-of. Important figure in UNDP.

J. Hugh Faulkner Executive Director, Business Council for
Sustainable Development

Shinji Fukukawa Executive Vice President, Kobe Steel, Inc.

Robert E. Grady* Associate Director, Natural Resources, Energy
and Science, Office of Management and Budget

C. Boyden Gray* Counsel to the President of the United States

Robert Kennedy* Chairman and CEO, Union Carbide Corporation

K. Kesavapany Director for International Organization,
Ministry of Foreign Affairs, Singapore

Jose Lutzenberger* Secretary of the Environment, Brazil

Brazil is a pivotal player in climate and forestry issues. Lutzenberger is a former NGO activist and thought to be a bit more of an environmentalist than the rest of the Brazilian government -- some say he was brought on to the tune of "let's hire our biggest critic." Jose Goldemberg, Secretary of Science & Technology, often speaks for the Brazilian Government on environmental issues; Goldemberg has been favorable to the US views on "comprehensive approach" and the need for national autonomy/flexibility in devising any response strategies.

William Mansfield Deputy Director, United Nations Environment
Programme (UNEP), Kenya

Olara Otunnu* President, International Peace Academy, New
York

Peter Peterson* The Blackstone Group

Vladimir Petrovsky* Ministry of Foreign Affairs, Moscow
Lewis Preston* Chairman, Executive Committee, J.P. Morgan & Company
Moeen Qureshi Senior Vice President, The World Bank

The World Bank is increasingly involved in environmental issues. Its development projects are now starting to take account of environmental concerns. The Bank also helps run the new "Global Environmental Facility (GEF)."

Shridath Ramphal* Former Secretary-General of the Commonwealth
Nafis Sadik Executive Director, United Nations Fund for Population Activities
Emil Salim* Minister of World Population and the Environment, Indonesia
Maurice Strong Secretary-General, UNCED

In charge of the UNCED. Also ran the 1972 UN Conference on Environment (the "Stockholm Conference"). Canadian.

Crispin Tickell Warden, Green College, Oxford University
Former UK Ambassador to the United Nations. Widely known in international environmental circles.

Haldor Topsoe* Chairman and CEO, Haldor Topsoe/AS

Robert M. White President, National Academy of Engineering

Wrote an article in Scientific American (July 1990) favoring a "no regrets" strategy on climate, citing CEA study on costliness of emissions reductions, and looking comprehensively at all GHGs and sectors.

Tim Wirth* United States Senator, Colorado

Runs "Project 88" reports favoring use of economic incentives.

Qian Yi Environmental Engineer, Qinhua University, China

* Not confirmed

Attendees of Note at the Preceding

**Aspen Institute Working Group on
International Environment Policy
Aspen, Colorado - July 18-25, 1991**

(these attendees may stay through July 28)

List of Participants

Laurens Jan Brinkhorst Director-General, Environment, Nuclear Safety
and Civil Protection, Commission of the
European Communities (Brussels)

See above.

Christine Dawson Policy Planning Staff, U.S. Department of State

Jean-Claude Faby Director, New York Office, UNCED Secretariat

Skillful.

Robert Fri President, Resources for the Future

Scott Hajost EDF

William Nitze President, Alliance to Save Energy

R.K. Pachauri Director, Tata Energy Research Institute, India

*Favorably inclined toward economic analyses of climate issues;
participated in IPCC Economics drafting group in Geneva, March
1991. Also favors development of biotechnology industry; his
Institute is sponsoring biotech research. Does not appear to
be hung up on resource transfer demands.*

Alberto Szekely Mexico

*Formerly at Mexican foreign ministry (SRE), now in private
business. Generally quite at odds with US, often hostile.*

Edith Brown Weiss EPA/OGC/International

THE WHITE HOUSE

WASHINGTON

November 19, 1991

MEMORANDUM FOR EOP/GLOBAL CHANGE STRATEGY TASK FORCE

FROM: D. ALLAN BROMLEY *DB*

SUBJECT: EOP Strategy Task Force Meeting

In preparation for the Strategy Task Force meeting on Thursday, there will be an informal EOP/STF meeting on Wednesday, November 20, 1991, at 5:00 p.m. in Room 358 of the Old Executive Office Building to review possible strategies for negotiating a successful framework convention on climate change.

The Department of State has just provided three documents for review prior to the meeting and these are attached for your reference. The first, "Outline of Process under Convention", describes the process which might be set into motion under a framework convention designed to focus on national strategies prepared in the context of each country's technical and socio-economic circumstances. The second, "Technology Cooperation Related to Global Climate Change - a Selected Inventory", is a compilation of United States activities involving technology cooperation related to global climate change. Both of these papers have been distributed to the full Global Change Strategy Task Force.

The third paper, "Issue Discussion Paper", presents the Department of State's discussion of the issue: whether to promote a framework convention focused on national strategies, including assisting developing countries with the preparation of such strategies [in lieu of a convention which focuses on targets and timetables]. This paper will serve as the focus of our discussions on Wednesday and should be treated as CLOSE HOLD. It has not been distributed to the full Strategy Task Force but could be made available to the group on Thursday.

If you have any questions or would like additional information, please do not hesitate to call Nancy Maynard at x6202.

DRAFT

~~CONFIDENTIAL~~

Outline of Process under Convention

The desirable outcome of negotiations is a process-oriented convention, with the focus on technical and policy/political review of national reports, not on emissions targets and timetables. Assistance to developing countries, including technology cooperation and financial assistance, would play a role at certain junctures of the process.

1. National Reports

-- The cornerstone of the convention should be a requirement that each party prepare (and subsequently update) a national report. Reports might be prepared on a staggered basis to facilitate review.

-- The report would have three basic components:

- o relevant national circumstances;

- o a national emissions inventory;

- o based on feasibility studies, a description of the specific actions being taken or expected to be taken with respect to:

- each gas in each sector, including an estimate of the net reduction in greenhouse gas emissions achieved or likely to be achieved as a result of each action, an estimate of the costs associated with each action, and a description of the methodology used in making the estimates involved; and/or

- adaptation measures.

-- Regarding developing countries, there might be flexibility as to the third component of the report, as well as timing of the report and updates. Further, developing countries might, on a voluntary basis, additionally include in their reports proposed projects (including specific technologies they envision would be necessary to implement such projects) and an estimate of the costs associated therewith.

-- Developing countries would need a limited amount of assistance to implement the obligation to develop national reports. Such assistance could come from a variety of sources, including bilateral cooperation involving both the private and public sectors, existing multilateral organizations and, as necessary, the Global Environmental Facility.

~~CONFIDENTIAL~~

DECLASSIFIED

PER DOS WAIVER, November 6, 2015

By MM NARA, Date 2/7/2018

2. Review

-- The process to review national reports should take place on two levels:

- o first at the technical level, to be conducted by an advisory committee on implementation (subordinate to the Conference of the Parties); and

- o then at the policy/political level, to be conducted by the Conference of the Parties with respect to individual reports, if necessary, and in the aggregate to determine overall progress. The advice of the science committee would be factored into this review.

Advisory Committee on Implementation

-- On the technical side, the advisory committee on implementation would review reports:

- o to consider the specific actions identified to determine whether the estimated net reductions could in fact be realized;

- o to consider whether the methodologies used to make the estimates are technically valid;

- o if proposed projects had been identified, to consider whether they would be likely to achieve the net greenhouse gas reductions anticipated and whether or not the estimated costs were consistent with the scope of the proposed projects.

-- The committee would prepare a report of its findings and transmit them to the Conference of the Parties.

-- The committee would be open-ended, would consist of government experts from a variety of fields, and would meet as often as necessary.

Clearinghouse

-- After the advisory committee on implementation had assessed proposed projects, and costs, put forward by developing countries, it could be useful to schedule a meeting between potential donors (both bilateral and multilateral) and representatives of the states/regions involved. The objective would be to ascertain whether any donor wished to assist in the implementation of a proposed project (e.g., through assistance in the procurement of necessary technologies). (Just as there would be no obligation on developing countries to implement proposed projects, there would be no obligation on developed

countries to provide assistance.) For donor states, such bilateral assistance could be reported as part of their national strategy. For multilateral organizations, the meeting could provide an opportunity to consider projects for inclusion in their development assistance portfolios.

Conference of the Parties

-- On the policy/political side, the Conference of the Parties would:

- o consider the findings of the advisory committee on implementation;
- o consider thematic aspects of the reports of the parties;
- o review the aggregate actions of the parties to assess the totality of the global response, taking into account the advice of the scientific committee on scientific (including socio-economic) aspects of climate change;
- o identify countries eligible for receiving assistance to help them fulfil their obligations under the convention; and
- o develop policy guidance that could be forwarded to the GEF concerning the funding and relative priority of projects identified by developing countries in their national reports.

DRAFT

CLOSE HOLD

#22-Holmstead

ISSUE DISCUSSION PAPER

ISSUE FOR DECISION: Whether to promote a framework convention focused on national strategies, including assisting developing countries with the preparation of such strategies.

BACKGROUND

The United States wants a Framework Convention on Climate Change that could be signed at the UNCED in June 1992. Three main issues prevent agreement: the proposal of the European Community for CO2 targets and timetables for industrialized countries, and demands from developing countries for both "preferential, non-commercial technology transfer" and "adequate, new and additional financial resources."

The U.S. will not accept a Convention with targets and timetables, but we are prepared to develop one focused on national strategies, which each party would develop in the context of its own political and socio-economic circumstances. Plans would be reviewed under the Convention in terms of their projected results and potential for implementation. This approach would commit us to a long-term, dynamic process, which could encourage countries to take actions that are scientifically sound and economically feasible.

We would rely on a country study process composed of assessments of national conditions, GHG emissions inventories, and feasibility analyses to develop national strategies. Such an approach could be applied to all countries to varying degrees and thereby encourage a global approach to the Convention. To reassure developing countries and countries with economies in transition that they will have the technical expertise and financial resources to prepare such strategies, we propose to offer technology cooperation to assist them in meeting their commitments under the Convention.

TECHNOLOGY COOPERATION AND THE FRAMEWORK CONVENTION

In consultation with private sector representatives, the U.S. has promoted the concept of "technology cooperation" in response to demands for "preferential technology transfer." Technology cooperation involves a broad range of activities that include soft, as well as hard, technology: technology needs assessments, technology development and transfer, training, technical assistance, and capacity building. Most of these activities are already a part of our bilateral assistance programs.

~~CONFIDENTIAL~~

DECLASSIFIED

PER DOS WAIVER, November 6, 2015

By MM NARA, Date 2/7/2018

CLOSE HOLD

~~CONFIDENTIAL~~

-2-

A selected inventory indicates that U.S. sponsored technology cooperation related to climate change is already extensive: over \$100 million in 1991 for those countries covered by the inventory. Promoting such cooperation in the climate negotiations provides us with an opportunity to get credit for what we are already doing, better rationalize and integrate ongoing efforts, and, if appropriate, identify new cooperation opportunities.

We propose that technology cooperation under the climate convention be focused initially on developing country needs related to the preparation of assessments of national conditions, emissions inventories, and feasibility studies designed to develop national strategies. Cooperation and assistance would be restricted to developing countries committed to undertaking these activities. Such an approach would involve packaging existing activities, reprogramming resources, and supporting the country study process needed for developing countries to prepare national strategies.

THE ROLE OF THE PRIVATE SECTOR

As mentioned, the private sector supports reformulating the technology transfer issue in terms of technology cooperation because technology cooperation promotes respect for IPR and recognizes that the role of government is limited to facilitating the commercial process through which most technology transfer takes place. This facilitative role proved important under the Montreal Protocol, when U.S. sponsored country studies with developing countries often resulted in commercial relations with and contracts for U.S. firms. Japan and Germany learned that lesson well and are already positioning themselves to take advantage of the climate issue.

In the event the U.S. decides to promote technology cooperation under the climate convention, some American private sector representatives are already considering complementary actions their companies or industries might take. Ideas include a "corporate green corps", using retired executives to train companies abroad to conduct energy audits, and the establishment of a technology center for energy efficiency products and practices. U.S. support for technology cooperation should encourage such actions. Technology cooperation may not be cost free, but it can be a good investment in U.S. commercial interests abroad.

~~CONFIDENTIAL~~

FINANCIAL IMPLICATIONS

Financial assistance will be required to help developing countries prepare national strategies or components thereof. Resources needed to carry out assessments of national circumstances, emissions inventories, and feasibility studies could be in-kind or in cash and could come from various sources, including bilateral cooperation, existing multilateral organizations and, as necessary, the GEF.

At most 140 countries (132 "developing countries" and 8 "economies in transition") might need assistance in preparing national strategies. However, significantly fewer are likely to join the convention initially. Some countries e.g., small African states, Central American nations, and small island states, have expressed interest in prereparing strategies on a regional rather than national basis.

Estimated costs for preparing full feasibility studies (including emissions inventories and impact studies) run about \$250,000 for small countries to \$2 million for large countries such as China, Brazil, India and the USSR. Total funding needs could thus amount to approximately \$100 million (average cost of \$700,000 for 136 countries -- \$95.2 million -- plus \$8 million for the four largest countries).

However, we would expect no more than 60 developing countries/economies in transition to sign the convention initially (including the largest countries). In addition we may achieve some savings by combining certain countries in regional studies. Thus, we expect initial funding needs to be about \$50 million. On a voluntary basis, the U.S. might make a contribution in line with the UN scale, in which case our share would be about \$12.5 million for the first phase of country studies under the Convention.

JUSTIFICATION FOR POTENTIAL EXPENDITURES

A Convention based on national strategies, including technology cooperation for developing countries to prepare them, serves several U.S. interests:

--it recognizes the long-term nature of the problem and the need for a dynamic, global response based on sound analysis;

-- it shifts discussion away from targets and timetables;

-- it addresses developing country calls for technology transfer and financial assistance through a practical, cost-effective process that links assistance to commitments;

-- it recognizes the role of the private sector and encourages its involvement through facilitative relationships and the identification of business opportunities.

~~CONFIDENTIAL~~

-4-

RECOMMENDATION

At the December negotiating session the U.S. Delegation should seek agreement on an approach to the Convention involving commitments to the preparation and review of national strategies and the assurance of support for developing countries in this process. The delegation should explore the outlines of a technology cooperation package that would enable developing countries to carry out assessments of national circumstances, GHG emissions inventories and feasibility studies as a means for developing such strategies.

~~CONFIDENTIAL~~

TECHNOLOGY COOPERATION

RELATED TO

GLOBAL CLIMATE CHANGE

A SELECTED INVENTORY

DRAFT



United States of America

CAUTION

This document has not been given final patent clearance and is for internal use only. If this document is to be given public release, it must be cleared through the site Technical Information Office which will see that the proper patent and technical information reviews are completed in accordance with Energy Systems Policy.

TECHNOLOGY COOPERATION

RELATED TO

GLOBAL CLIMATE CHANGE

A SELECTED INVENTORY



United States of America

Contents

Introduction	1
Energy Efficiency	5
Energy Supply	23
Agriculture	45
Forestry and Natural Resources	63
Climate Science	87
Coastal Zones	109
Other	115
Resources	125
Compiler's Notes	129

Introduction

The possibility that man-made emissions of greenhouse gases may contribute to global climate change requires all countries to seek a more sustainable path to economic growth and development. To respond to this challenge, we need to establish a global partnership based on cooperation among all countries—a partnership designed to promote environmentally sound and sustainable growth, wise management of our natural resources, and efficient use of our industrial capacity all around the world.

Technology cooperation with developing countries and countries with economies in transition constitutes a crucial element in the international community's efforts to respond to global climate change. Such cooperation should address both hard and soft technology needs and include priority concerns, such as technology needs assessment, technology development, technical assistance, training, and institution or capacity building, as well as technology transfer in the traditional sense of the phrase. In calling for a cooperative process, we recognize that the successful transfer of knowledge, know-how, or machinery depends upon a two-way relationship based on mutual interests and benefits and that it relies heavily on the creativity and dynamism of the private sector. The proper role of government is to promote and facilitate this process.

Governments have already initiated a considerable range of activities involving technology cooperation related to global climate change. To provide a clearer picture of existing resources, the United States has compiled the following selected inventory of its activities in this area. The inventory covers energy efficiency, energy supply, agriculture, forestry and natural resources, climate science, coastal zones, and other activities. It demonstrates that considerable cooperation is already under way and that improved coordination of existing resources may be one of the most cost-effective response measures we can take. Although it is difficult to estimate the total cost of such U.S.-sponsored activities, an initial survey indicates that it was well above \$97 million in FY 1991. A prospective look at upcoming budgets makes clear that this amount will grow as we gain a clearer understanding of the science of climate change and the measures individual countries believe make sense for them to take in response.

Concerns about climate change provide us with an important opportunity to strengthen cooperation among growing nations in order to create a cleaner, more prosperous future for us all. We hope that this inventory will contribute to the further development of that process.

Energy Efficiency

ENERGY EFFICIENCY

Project Name	Mexico City Air Quality Research Initiative
Purpose	Provide governments in Mexico an ability to identify and evaluate options to improve air quality in Mexico City.
Countries	Mexico
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Energy Los Alamos National Laboratory Mexican Petroleum Institute, PEMEX, SEDUE, Federal District Government (Mexico City)
Sector	Transportation, other energy-using sectors
Technology	Modeling, simulation, policy analysis, air quality monitoring, collaborative research
U.S. Funding	\$200,000 in FY 1990; \$1.5 million in FY 1991; \$1.5 million in FY 1992; \$1.0 million in FY 1993
Description	The project will identify major options for improving the air quality in the Mexico City basin and evaluate the potential environmental, economic, and social impact of these options. Several of the options will likely improve the energy efficiency of Mexico City's transportation sector, thereby slowing the increase in CO ₂ emissions. Although undertaken to improve a local air quality problem, this project will enhance the country's ability to respond to similar problems in the future and to conduct independent evaluations of options for reducing greenhouse gas emissions. Developing, testing, and validating models that can be used to evaluate what will happen to local air quality when patterns of fossil fuel combustion change will be a major activity of the project.

ENERGY EFFICIENCY

Project Name	Krakow Clean Fossil Fuels and Energy Efficiency Project
Purpose	Reduce air pollution in the city of Krakow by promoting efficiency in energy supply and energy use.
Countries	Poland
Contacts— U.S. Agency	Department of Energy/Fossil Energy/CE, Agency for International Development
U.S. Resource	Pittsburgh Energy Technology Center, Brookhaven National Laboratory
Cooperating Agency	Ministry of Environmental Protection, Natural Resources, and Forestry; City of Krakow, Poland
Sector	Residential and commercial buildings, industry
Technology	Efficient end-use equipment, building design, demand analysis, clean coal technologies
U.S. Funding	\$20 million over three years beginning in FY 1991; \$1.5 million in FY 1991 specifically for energy efficiency.
Description	The Department of Energy is assisting the city of Krakow in improving the energy efficiency of and reducing emissions from industrial and residential boilers. The project will analyze the costs and efficiency of the city's district heating system for the purpose of identifying opportunities for improving efficiency. It also will evaluate the costs and energy savings to be expected from installing thermostats, meters, valves, and insulation in a variety of boiler houses and residential settings. Much of the city's heating system uses coal, and the project will examine the feasibility of switching from coal to either natural gas or electricity. The early phases of the project will provide assistance in engineering analysis and in pilot tests of combustion techniques to improve efficiency and air quality from boiler houses, small furnaces, and district heating systems, which tend to be small and generally inefficient operations. Later phases will help prepare pre-feasibility studies for procuring equipment and services.

ENERGY EFFICIENCY

Project Name	Regional Energy Efficiency Project
Purpose	Promote energy efficiency and environmentally sound energy use.
Countries	Poland and other countries in Eastern Europe
Contacts— U.S. Agency	Agency for International Development, Department of Energy, Environmental Protection Agency
U.S. Resource Cooperating Agency	Several private companies and industry organizations Cooperating agency not identified
Sector	Electric power, end use sectors
Technology	Energy efficiency, energy markets
U.S. Funding	\$11.9 million in FY 1991
Description	This project assists Eastern European countries in setting up policies and institutions to improve energy efficiency. It includes technical assistance and training programs on how to use coal more cleanly and efficiently; training programs in energy efficiency technologies and practices; technical cooperation among utilities in the United States and Eastern Europe; and assessments of renewable resources. The Department of Energy plans to arrange professional internships for Polish technicians and economists in U.S. utilities. The project will help reorient the region's energy sector from a planned to a market economy. The U.S. agencies are cooperating with the World Bank, the European Community, and the International Energy Agency.

ENERGY EFFICIENCY

Project Name	Emergency Energy Program
Purpose	Assist in implementing energy efficiency measures that can be taken in the short term.
Countries	Poland and other countries in Eastern Europe
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development Expert staff at several U.S. energy companies Cooperating agency not identified
Sector	Energy use in industry
Technology	Energy efficiency, energy audits
U.S. Funding	\$10 million in FY 1991
Description	The Emergency Energy Program is designed to help East European countries implement short-term energy efficiency measures. The Agency for International Development has organized teams of experts from U.S. energy companies to identify and implement low-cost measures to improve energy efficiency in industries. These measures include energy audits and the installation of energy-saving equipment. The program will train Polish officials in conducting energy audits and in energy price reform. The program is expected to identify opportunities for longer-term investments from private and public sources and to lead to additional cooperative energy projects with the United States. Implementation of the project began in Poland in February 1990.

ENERGY EFFICIENCY

Project Name	Energy Structures and Evolution
Purpose	Describe and analyze how the transportation and industrial sectors of various countries use energy.
Countries	Eastern Europe, China, and developing countries
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Energy Lawrence Berkeley Laboratory Cooperating agency not identified
Sector	Transportation, manufacturing
Technology	Demand analysis
U.S. Funding	\$150,000 in FY 1990; \$150,000 in FY 1991; \$180,000 to \$200,000 in FY 1992
Description	The first studies of energy use in the U.S.S.R., as well as an analysis of energy issues in Eastern European countries, China, and developing countries, were conducted as part of this project. Future work will integrate this data into a bottom-up scenario model of energy use that will be developed to test long-term energy demands. The project will develop a computer data base and worldwide electronic network communication of the information developed.

ENERGY EFFICIENCY

Project Name	Greenhouse Gas Emissions: Policy Studies
Purpose	Understand sources and trends of greenhouse gas emissions in developing countries and Eastern Europe.
Countries	Eastern Europe, China, and other developing countries
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Energy Lawrence Berkeley Laboratory Cooperating agency not identified
Sector	All end-use sectors
Technology	Policy analysis, collaborative research
U.S. Funding	\$250,000 in FY 1990; \$699,000 in FY 1991; \$1.1 million in FY 1992
Description	This project is intended to develop a comprehensive understanding of sources and trends in greenhouse gas emissions, focusing primarily on the use of fossil fuels and other activities related to energy production and use. The project supports collaborative research to project trends in emissions and assess mitigation strategies, including improvement of energy efficiency in all economic sectors. It also will perform an environmental impact assessment of global climate change, again by funding collaborative research. Approximately one-fourth of the project resources is used to analyze the energy system in China and alternatives to coal use there. Information developed as part of this project will support the Department of Energy's participation in the Intergovernmental Panel on Climate Change.

ENERGY EFFICIENCY

Project Name	Energy Policy Development and Conservation
Purpose	Assist developing countries in making effective energy policy and in improving the efficiency of energy use.
Countries	Active in more than 30 countries, with specially significant technical cooperation in India, Pakistan, the Philippines, Egypt, Indonesia, Sri Lanka, Costa Rica, and Liberia
Contacts— U.S. Agency U.S. Resource	Agency for International Development RCG/Hagler Bailly, Inc.; Oak Ridge National Laboratory; International Development and Energy Associates, Inc.; Lawrence Berkeley Laboratory
Cooperating Agency	Varies with individual country
Sector	All economic and energy sectors, with emphasis on electric power and industry
Technology	Integrated resource utility planning, energy planning and analysis, energy conservation technologies, data systems
U.S. Funding	The project runs from FY 1982 to FY 1992, with expenditures of \$9.9 million in FY 1991.
Description	This project has two major parts. One emphasizes electricity load management, efficient energy use in the industrial and electric power sectors, information dissemination and training, and roles for the private sector. This part has been especially active in the Philippines, Pakistan, Egypt, and other countries. The second part promotes innovation in the power sector; encourages participating nations in carrying out independent, effective energy planning and policy making; and promotes coordination among donor organizations. In recent years, the second part has been especially active in India. The project includes major efforts to improve energy efficiency, improve decision making in the electric power sector, apply innovative energy technologies, and promote India's ability to conduct energy and environmental analyses and make decisions based on those analyses independently.

ENERGY EFFICIENCY

Project Name	ASEAN Energy Conservation and Management
Purpose	Encourage adoption of energy-efficient design and maintenance and strengthen the ability of countries in Southeast Asia to manage energy and technology.
Countries	Thailand, Malaysia, Indonesia, Philippines, Singapore, Brunei
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development Lawrence Berkeley Laboratory Asian Institute of Technology, various national agencies in participating countries
Sector	Commercial buildings
Technology	Energy-efficient building design
U.S. Funding	\$5 million from FY 1985 to FY 1990
Description	This project supported applied research in the cooperating countries on daylighting, natural ventilation, and other topics for use in improving the energy efficiency of commercial buildings. The project sponsored workshops and seminars; conducted regional training courses, and prepared and disseminated technical handbooks, newsletters, and other materials to agencies and to the private sector.

ENERGY EFFICIENCY

Project Name	Energy Policy Planning and Efficiency
Purpose	Improve efficiency of energy use and alleviate projected energy shortages.
Countries	Central America
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Cooperating agency not identified
Sector	Electric utilities, commercial and industrial end-users
Technology	Energy policy analysis, energy planning
U.S. Funding	U.S. funding not reported
Description	Using seminars, training, and other formats, this project will help educate private firms and other energy users about energy issues so that they can participate more effectively in the processes of energy planning and policy making. The project also will provide technical training and assistance to government and utility officials who have responsibility for energy policy. This will help them explore a wider range of technological, institutional, and policy options for reducing the amount of public investment needed in new supplies of electric power. Several of these options, including regional cooperation, demand management, and end-use efficiency, hold potential to reduce the rate of growth in emissions of greenhouse gases.

ENERGY EFFICIENCY

Project Name	Energy Demand Management
Purpose	Develop and implement a national energy demand management program.
Countries	Morocco
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Ministry of Energy and Mines, National Engineering University
Sector	Industry (agro-industry, construction materials, hotels)
Technology	Energy demand management, energy efficiency
U.S. Funding	\$5 million from FY 1988 to FY 1993
Description	This project conducts energy audits of major industrial energy users, prepares feasibility studies of potential investments to improve efficiency of energy use by these users, and finances applications of proven technology in selected firms. The project also helps develop Moroccan institutional resources to continue these activities by collecting and distributing information about case studies in Morocco; conducting training courses and workshops; sponsoring internships in the United States for Moroccan engineers; sponsoring the preparation of technical publications, newsletters, and a data base describing energy use; and supporting development of and participation in professional organizations for energy managers.

ENERGY EFFICIENCY

Project Name	Energy Efficiency, Robert College, Istanbul
Purpose	Improve energy efficiency.
Countries	Turkey
Contacts— U.S. Agency	Agency for International Development
U.S. Resource	U.S. resource not identified
Cooperating Agency	Robert College, Istanbul, Turkey
Sector	Buildings
Technology	Retrofits of buildings and energy systems
U.S. Funding	\$575,000 from FY 1980 to FY 1990
Description	A grant allowed Robert College to carry out a variety of small projects to reduce the school's energy consumption and associated costs. These projects included installing double-paned windows in classroom buildings, repairing and insulating roofs, and improving the heating system.

ENERGY EFFICIENCY

Project Name	Science and Technology for Development
Purpose	Promote the use of energy-efficient industrial and commercial technologies in Egypt and to improve Egypt's ability to use these technologies
Countries	Egypt
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Cairo University; Ministry of Industry; Federation of Egyptian Industries (FEI)
Sector	Industry, commercial
Technology	Energy conservation
U.S. Funding	U.S. funding not reported
Description	The project demonstrates energy-conserving technologies in industrial and commercial facilities and promotes adoption of these technologies in additional installations. Emphasis is placed on technologies that have been proven in the United States and other countries; these include microprocessor-based process controls, automatic combustion control, waste heat recovery, and cogeneration of heat and power. The project provides training and other technical assistance in energy auditing, design, installation, and operation. Grants are available to pay part of the foreign exchange costs for these applications. The project will demonstrate approximately 60 technologies in chemical, cement, metallurgical, and other settings and will identify barriers to the adoption of similar technologies in other settings.

ENERGY EFFICIENCY

Project Name	Energy Management Consultation and Training
Purpose	Improve energy management by industrial end-users.
Countries	India
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Cooperating agency not identified
Sector	Industry
Technology	Energy management
U.S. Funding	\$3 million in FY 1991
Description	The project will provide training in energy to managers in the Indian industrial sector, which accounts for over half of that country's commercial energy use and has been severely affected by the country's energy crisis. The training will include improvements to the efficiency of both energy supply and energy use. About 50 persons will receive training in the United States to become trainers and trainers of trainers, and about 1000 engineers and plant managers will receive intensive short-term training in India.

ENERGY EFFICIENCY

Project Name	Strategies for Reducing Greenhouse Gas Emissions
Purpose	Develop energy strategies that promote efficient use of energy and reduce emissions of greenhouse gases.
Countries	Poland, Czechoslovakia
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation
U.S. Resource Cooperating Agency	Pacific Northwest Laboratory Polish Ministry of Industry and Ministry of Environment; Czechoslovakian Ministry of Foreign Affairs; Institute of Forecasting, Czechoslovakian Academy of Sciences
Sector	Electric power, industry, energy end-use sectors
Technology	Policy analysis, energy analysis
U.S. Funding	\$180,000 in FY 1990
Description	The economies of Poland and Czechoslovakia have very high energy intensities. This pattern of energy use is damaging the environment of these countries and contributes large amounts of greenhouse gases to the atmosphere. The Pacific Northwest Laboratory is working to create a Foundation for Energy Efficiency in each country to assist its efforts to promote economic development and protect the environment. Each foundation will promote efficient use of energy by providing training, conducting energy analyses, developing financial incentives, encouraging the use of least-cost planning for utility services, and initiating other projects, including potential joint ventures and technology cooperation. The Pacific Northwest Laboratory is working with counterparts to negotiate the legal and logistical matters required to establish the foundations and will provide technical assistance to them once they are established. Finally, the project is funding a case study, conducted by the director of Czechoslovakia's Office of International Economic Cooperation, that will determine technical and economic impacts of reducing greenhouse gas emissions from the Czechoslovakian economy. A similar case study for Poland was completed two years earlier.

ENERGY EFFICIENCY

Project Name	Strategies for Reducing Greenhouse Gas Emissions
Purpose	Develop energy strategies that promote efficient use of energy and reduce emissions of greenhouse gases.
Countries	Hungary
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation
U.S. Resource	Pacific Northwest Laboratory; Regional Environment Center for Central and Eastern Europe, Budapest
Cooperating Agency	Several organizations in Hungary; the Association for Conservation of Energy, London
Sector	End-use sectors
Technology	Policy analysis, energy analysis
U.S. Funding	\$90,000 in FY 1990
Description	This project is exploring the possibility of establishing an Energy Efficiency Center in Hungary similar to those being set up in Poland and Czechoslovakia. Although interest in such a center is prompted by Hungary's desire to promote economic development while protecting its environment, the center's activities to improve energy efficiency also would support reductions in emissions of greenhouse gases.

ENERGY EFFICIENCY

Project Name	Economic Studies of Approaches to Reduce Emissions of Greenhouse Gases
Purpose	Conduct research on a variety of topics related to global climate change.
Countries	China, India, Brazil, Mexico, Nigeria, South Korea, Indonesia, Venezuela
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Environmental Protection Agency/Division of Climate Change Lawrence Berkeley Laboratory Cooperating agency not identified
Sector	Energy supply, forestry, residential and commercial buildings
Technology	Demand analysis, energy policy analysis, collaborative research
U.S. Funding	\$405,000 in FY 1990; \$635,000 in FY 1991; \$400,000 in FY 1992
Description	This project encompasses a number of activities that support collaborative research on energy use, forestry, and emissions of greenhouse gases. Major activities include analyses of the costs and barriers to reducing CO ₂ emissions in China, India, Brazil, and Mexico, with a comprehensive case study of costs to be performed in Mexico and a comprehensive inventory of greenhouse gas emissions to be prepared in Brazil. The project also supports an integrated analysis of emissions and options from the forestry and energy sectors and a study of strategies to improve the efficiency of household electricity use in Southeast Asia. Results from the research are disseminated through workshops and discussions with officials in the participating countries.

Energy Supply

ENERGY SUPPLY

Project Name	International Options for Renewable Energy Technologies
Purpose	Identify opportunities for using renewable energy technology.
Countries	Mexico, India
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation
U.S. Resource Cooperating Agency	National Renewable Energy Laboratory Cooperating agency not identified
Sector	Energy in several end-use sectors
Technology	Energy technology
U.S. Funding	\$50,000 in FY 1990
Description	Developing countries are projected to account for a growing portion of future anthropogenic emissions of greenhouse gases. If these countries are to play an active role in strategies to slow climate change, then they need to be able to develop policy options that are compatible with objectives of economic development and growth. The National Renewable Energy Laboratory is conducting case studies of renewable energy in Mexico and India, whose future energy technology choices and energy use will have major impacts on greenhouse gas emissions and global climate change. Other case study countries will be selected over the next several months. By identifying and analyzing opportunities to use renewable energy technologies to accelerate sustainable economic growth and higher standards of living in developing countries, greenhouse gas emissions may be reduced.

ENERGY SUPPLY

Project Name	Pre-Feasibility Assessment of the Potential to Reduce Atmospheric Methane Emissions from Coal Mining
Purpose	Determine the feasibility of capturing and using methane from coal mines.
Countries	Poland
Contacts— U.S. Agency	Environmental Protection Agency/Office of Air and Radiation; Agency for International Development
U.S. Resource Cooperating Agency	U.S. resource not identified Cooperating agency not identified
Sector	Industrial, mining
Technology	Coal-bed methane recovery
U.S. Funding	\$100,000 in FY 1990
Description	The project assessed the magnitude of Poland's coal-bed methane resource, the availability of technologies to recover and use this resource, and the economic feasibility of developing such projects; the institutional, regulatory, and other issues that could affect project development; and the environmental benefits and costs associated with resource development. The project will follow up with additional efforts to encourage the development of coal bed methane in Poland and elsewhere in Eastern Europe.

ENERGY SUPPLY

Project Name	Photovoltaic Design Assistance Center
Purpose	Provide information and other assistance to potential users of photovoltaic energy systems.
Countries	Mexico, Dominican Republic, Honduras
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Energy Photovoltaic Design Assistance Center Cooperating agency not identified
Sector	Electric utility, electricity end-users
Technology	Photovoltaic technology
U.S. Funding	\$100,000 for FY 1990 or FY 1991
Description	The center provides contact between potential users of photovoltaic systems, suppliers of systems and components, and qualified engineers who evaluate needs and available equipment. One of its major responsibilities is providing assistance to international projects sponsored by organizations such as the World Bank and the Agency for International Development. The center has conducted feasibility analyses and field evaluations of systems ranging in size from a few watts to several megawatts and provides information to the photovoltaic industry, utilities, and system designers.

ENERGY SUPPLY

Project Name	Energy Technologies and Policies in Asian Countries
Purpose	Assist developing countries in understanding how changes in the structure of their economies influence emissions of greenhouse gases.
Countries	China, India, Korea, Thailand, Indonesia
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Energy Argonne National Laboratory; East-West Center, Hawaii Cooperating agency not identified
Sector	All energy supply and energy consuming sectors
Technology	Energy and economic planning
U.S. Funding	\$100,000 in FY 1991; \$50,000 in FY 1992
Description	The ability to formulate and implement energy policies to control or reduce emissions of greenhouse gases in developing countries depends on the structure of their economies. Although new technologies could allow countries to reduce the rate of increase in their greenhouse gas emissions, this study has found that the current structures of these economies may prevent reductions of emissions from present levels. The study will identify opportunities for making significant structural changes in these countries, together with institutional changes that might be necessary to induce or facilitate structural change. The goal is to assist developing countries in understanding how they can adopt domestic policies that would allow them to participate in global energy commitments.

ENERGY SUPPLY

Project Name	Technology Characterization Inventory
Purpose	Compile and maintain information on energy supply and end-use technologies for use in planning and analysis.
Countries	All countries participating in the Intergovernmental Panel on Climate Change
Contacts— U.S. Agency	Department of Energy/Office of Policy Planning and Analysis/Office of Environmental Analysis
U.S. Resource Cooperating Agency	Pacific Northwest Laboratory, other U.S. national laboratories Intergovernmental Panel on Climate Change, Working Group III, Energy and Industry Subgroup
Sector	Energy supply, conversion, and storage and end-use sectors
Technology	Information about technologies with potential for limiting greenhouse gas emissions
U.S. Funding	\$75,000 in FY 1991; \$500,000 in FY 1992
Description	This project is preparing an inventory of technologies that could be used to support policies to reduce greenhouse gas emissions. The inventory will contain descriptions of the performance, costs, and market characteristics of each technology, along with information describing the status of its development, its potential applicability in different regions, and its potential to limit emissions of greenhouse gases. Information will be collated into a systematic and consistent format, which will permit any country to retrieve the data available for the technologies included. U.S. national laboratories will construct the initial version of the inventory, but other international organizations will have the opportunity to contribute and maintain current information. An early version will be presented to the Energy and Industry Subgroup at its Geneva meeting in February 1992 and will be made more widely available thereafter.

ENERGY SUPPLY

Project Name	Integrated Energy and Environmental Planning
Purpose	Train staff from developing countries in integrated analysis of energy and electric power systems.
Countries	Algeria, China, Indonesia, Mexico, Peru, Poland, Romania, Sudan, Turkey, Venezuela
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Energy Argonne National Laboratory Sonelajaz, Algeria; China Institute of Nuclear Industry Economics, Beijing Economic Research Institute of Water Resources and Electric Power, China; National Atomic Energy Agency for Nuclear Studies, PLN State Electricity Enterprise, Indonesia; SEMIP, Comision Federal de Electricidad, Mexico; Ministeria de Energia y Minas, Peru; Polish Academy of Science, Poland; Institut d'Etudes et Projets Energetiques, Romania; National Energy Administration, Sudan; Delet Planlama Teskilat, SAM Institute of Energy Technology, Turkish Electricity Authority, Turkey; Ministerio de Energia, Venezuela
Sector	Energy demand and energy supply
Technology	Microcomputer-based energy and power planning model
U.S. Funding	\$120,000 in FY 1991; \$150,000 expected in FY 1992
Description	This project provides an extensive eight-week training course for representatives from developing countries on how to conduct integrated energy and environmental analyses. Participants first go through an analysis of the energy system, including all energy demand and supply sectors. The resulting energy system design is then run through an environmental impact analysis, which includes consideration of air pollution, water pollution, solid waste generation, and land use. Emissions of CO ₂ and other greenhouse gases are included in the air pollution analysis. Participants evaluate alternative strategies for mitigating the environmental effects, complete a country case study, and return home with the model for further studies. Argonne National Laboratory has been conducting these courses in cooperation with the International Atomic Energy Agency.

ENERGY SUPPLY

Project Name	Renewable Energy in Response to Global Warming
Purpose	Understand the potential of renewable energy in reducing carbon emissions in developing countries.
Countries	Mexico and India
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation; Environmental Protection Agency/Air and Energy Engineering Research Laboratory
U.S. Resource Cooperating Agency	National Renewable Energy Laboratory Solar Energy Laboratory, National Autonomous University of Mexico
Sector	Residential, transportation, commercial, industrial, and agricultural sectors
Technology	Demand analysis
U.S. Funding	\$100,000 in FY 1990
Description	This study assesses the potential of renewable energy to reduce carbon emissions by displacing conventional fuels. Mexico and India were chosen because of their growing energy demand, availability of fossil resources, and demonstrated interest in renewable energy. Reports on the potential of renewable energy for Mexico and India will be issued in 1992.

ENERGY SUPPLY

Project Name	Policy Planning and Renewable Energy
Purpose	Promote efficient use of Egypt's energy resources.
Countries	Egypt
Contacts— U.S. Agency U.S. Resource	Agency for International Development Argonne National Laboratory, U.S. National Aeronautics and Space Administration
Cooperating Agency	Government of Egypt, Organization for Energy Planning and Analysis, Qattara Hydro RE Authority, Egyptian Electricity Authority
Sector	Electric power, industry, agriculture
Technology	Renewable energy, energy planning, policy analysis
U.S. Funding	Project extends from FY 1982 to FY 1991; funding not reported
Description	This project consists of two subprojects. The first is to strengthen Egypt's capacity to collect and analyze data needed for energy policy planning. Staff from Argonne National Laboratory and other U.S. agencies are training Egyptian staff, transferring analytical tools and materials, establishing procedures for data base development and analysis, and acquiring computer hardware and software to conduct analyses. The second subproject conducts field tests of renewable energy technologies and promotes their use in a variety of agricultural, food processing, and village energy applications.

Project Name	Program for Acceleration of Commercial Energy Resources
Purpose	Develop, introduce, and test operational models for indigenous technology innovation and development in the Indian energy sector.
Countries	India
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Ministry of Energy; Industrial Credit and Investment Corporation of India
Sector	Electric power, industrial users of electricity
Technology	Energy research and development
U.S. Funding	\$20 million from FY 1990 to FY 1993
Description	The objective of the project is to develop a model for research, development, and commercialization of energy technology in India. It will support between four and six consortia of manufacturers collaborating with research institutes or energy users to develop technologies to mitigate shortages of electricity. The consortia will receive support for analysis, design, manufacture, laboratory testing, and field testing of prototypes. In addition, the project will grant 10 to 25 competitive awards for longer-term research to develop biomass and solar energy, convert low-grade coal, and improve the efficiency of electricity supply and end-use equipment. The project also will help formulation of an energy research and development strategy and prepare supporting studies.

ENERGY SUPPLY

Project Name	PUSPIPTEK Energy Research Laboratory
Purpose	To establish a national energy research and development laboratory.
Countries	Indonesia
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Energy Research Laboratory (PERL); National Center for Research, Science, and Technology (PUSPIPTEK); Agency for Development and Application of Technology (BPPT)
Sector	Electric power, industry
Technology	Energy research and development
U.S. Funding	\$12.3 million in FY 1983 to FY 1992
Description	The objective of this project is to establish a national energy research and development laboratory (PERL), whose primary activity will be to develop new energy technologies needed for Indonesian industrial development. The project provides a mixture of graduate-degree training, non-academic on-the-job training, seminars, and exchange visits between PERL staff and outside institutions. The project also helps PERL equip a library, analytical laboratory, and general support workshop. Research of PERL will emphasize coal, biomass, and solar energy systems but also will encompass social, economic, and technical analyses of energy technologies and projects.

ENERGY SUPPLY

Project Name	Renewable Energy Applications and Training
Purpose	Promote the use of renewable energy systems in developing countries.
Countries	Global in scope but especially active in Central America, the Caribbean, North Africa, and South and Southeast Asia
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development Oak Ridge National Laboratory; International Development and Energy Associates, Inc. Numerous agencies; varies with country
Sector	Electric power; industrial, residential, commercial users
Technology	Energy planning; renewable energy (solar, wind, small hydro, biomass)
U.S. Funding	\$11 million from FY 1985 to FY 1990; \$5.4 million for FY 1991; additional funding authorized through FY 1994.
Description	This project strives to improve the effectiveness and performance of renewable energy technologies in developing countries. It identifies good fits between technology and local needs and also conditions for long-term sustainability of the technology, including institutions for managing it. Among other activities, the project acts as a facilitator to assist developing countries in preparing projects for investment support from various funding sources. The project has strong ties to U.S. industry through the U.S. Export Committee for Renewable Energy and to the multi-agency Committee for Renewable Energy Commerce and Trade. Specific activities have included small hydro development in Central America and biomass use in India.

ENERGY SUPPLY

Project Name	Biomass Energy Systems and Technology
Purpose	Promote use of biomass energy resources.
Countries	Numerous developing countries
Contacts— U.S. Agency U.S. Resource	Agency for International Development Winrock International; Tennessee Valley Authority; several Department of Energy national laboratories; Department of Agriculture research centers
Cooperating Agency	National energy agencies and industrial firms in developing countries
Sector	Industrial, especially agro-industry
Technology	Biomass energy, waste management, cogeneration
U.S. Funding	Project extends from FY 1989 to FY 1992, with expenditures of \$1.4 million in FY 1991.
Description	This project promotes investment in commercially proven technology to recover energy as a by-product from the disposal of crop wastes, wood wastes, and municipal solid wastes. The project funds applied research, analyses of proposed investments, implementation of investments, and analysis of local policies likely to affect the success of these investments. A project advisory committee evaluates the environmental soundness of proposed investments, especially those that would use wood or wood waste resources.

ENERGY SUPPLY

Project Name	Rural Electrification
Purpose	Increase the reliability of electric power service in rural areas of the Philippines.
Countries	Philippines
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified National Electrification Administration and 93 rural electric cooperatives
Sector	Electric power
Technology	Methods for improved management, loss reduction
U.S. Funding	\$3.5 million in FY 1991
Description	Some rural electric cooperatives in the Philippines experience line losses as high as 50% because they lack spare parts and hardware and because of the way that the Philippine system of cooperatives is organized and operated. This project will help reduce these losses and make the Philippine system of rural electric cooperatives more commercially viable by supporting institutional reforms, improving the effectiveness of cooperatives, and providing essential equipment to selected cooperatives experiencing the highest loss rates. The project will improve the financial, managerial, and technical abilities of individual cooperatives and will study the feasibility of introducing regionally based centers to provide and service equipment. Training will be provided in system engineering and construction, equipment operation and maintenance, meter testing and repair, and in financial and general management.

ENERGY SUPPLY

Project Name	Energy Training Project
Purpose	Provide training to energy professionals from developing countries on the identification, exploration, production, and use of energy resources.
Countries	Selected developing countries
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development Numerous U.S. universities and other organizations Government ministries, utilities, and energy firms in developing countries
Sector	Electric power, energy supply, energy-use sectors
Technology	Energy planning, energy management, policy analysis, resource and technology development
U.S. Funding	Project runs from FY 1987 to FY 1992, with expenditures of \$3.1 million in FY 1991.
Description	The project provides long- and short-term academic and nonacademic training to energy professionals from public- and private-sector energy organizations in selected developing countries. Training is targeted to the needs of these professionals, but the project supports training in energy management, policy analysis, resource and technology development, and energy planning. The project is expected to provide short-term training to 1830 persons; 60 internships of 9 to 12 months in U.S. utilities, public organizations, and petroleum or resource exploration companies; and support for 100 persons in obtaining M.S. degrees in geology, economics, energy analysis, and other fields from U.S. institutions.

ENERGY SUPPLY

Project Name	Cooperative Activities to Reduce Methane Emissions from Coal Mining
Purpose	Reduce releases of methane from coal mining by expanding opportunities for recovering and using methane.
Countries	China
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Environmental Protection Agency/Office of Air and Radiation U.S. resource not identified Ministry of Energy
Sector	Coal mining
Technology	Collaborative research, policy analysis
U.S. Funding	\$200,000 in FY 1990
Description	Methane emissions from coal mining account for roughly 10% of world anthropogenic methane emissions. It is estimated that more methane is released from coal mining in China than in any other country. Recovering and using this methane would reduce emissions of this gas, which is a more potent greenhouse gas than CO ₂ . The Environmental Protection Agency and the Ministry of Energy have agreed to undertake a cooperative comprehensive assessment of the potential of coal-bed methane to contribute to China's energy needs, to examine policies to promote use of methane as a resource, and to consider developing projects to expand the recovery and use of methane in China.

ENERGY SUPPLY

Project Name	Skawina Clean Coal Retrofit Project
Purpose	Demonstrate a high-efficiency cleanup technology to reduce air pollution.
Countries	Poland
Contacts— U.S. Agency	Department of Energy Office of Fossil Energy, Agency for International Development
U.S. Resource	Pittsburgh Energy Technology Center
Cooperating Agency	Ministry of Environmental Protection, Natural Resources, and Forestry
Sector	Electric power
Technology	Flue-gas scrubbing system
U.S. Funding	\$9.8 million in FY 1990
Description	This project adds emission control equipment to a coal-burning power plant in Krakow, Poland, to help improve local air quality. The retrofit is expected to involve improvements to the plant's heat rate that will enhance its efficiency and reduce its CO ₂ emissions as well as reduce the sulfur dioxide emissions that are the primary target of the project. This project is intended to serve as a prototype for installation of similar technology elsewhere in Eastern Europe.

ENERGY SUPPLY

Project Name	Cooperation to Deploy Clean Coal Technologies
Purpose	Promote commercial deployment of clean coal technologies.
Countries	Chile, Costa Rica
Contacts— U.S. Agency	Department of Energy Office of Fossil Energy/Office of Policy, Planning, and Evaluation
U.S. Resource	Pittsburgh Energy Technology Center, Morgantown Energy Technology Center
Cooperating Agency	National Energy Commission of Chile; Ministry of Natural Resources, Energy, and Mines, Costa Rica
Sector	Electric power, industrial energy use
Technology	Information about clean coal technologies
U.S. Funding	\$15,000 in FY 1990; \$12,500 in FY 1991
Description	Although the initial impetus to develop clean coal technologies was to reduce air pollution and improve environmental quality near coal-burning facilities, some of the clean coal technologies that have been demonstrated at commercial scale also allow substantial improvements in plant efficiencies. These improvements allow energy to be supplied using less coal, thereby emitting smaller amounts of greenhouse gases. This project promotes more widespread use of clean coal technologies by funding of exchanges of technical information about these technologies, joint technical evaluations of the performance of these technologies, and site visits to demonstration facilities in the United States.

ENERGY SUPPLY

Project Name	Biomass Energy Development in Yunnan Province
Purpose	Determine the feasibility of an integrated biomass energy system to supply energy, reduce deforestation, and reduce net emissions of greenhouse gases.
Countries	China
Contacts— U.S. Agency	Department of Energy Biofuels System Division, Committee on Renewable Energy Commerce and Trade
U.S. Resource	Oak Ridge National Laboratory; University of Tennessee; Winrock International
Cooperating Agency	National Environmental Protection Agency; Yunnan Forestry Bureau; Yunnan Environmental Science Institute; Yunnan Provincial Planning Committee
Sector	Electric power, biomass energy, deforestation
Technology	Biomass energy technology
U.S. Funding	\$41,000 in FY 1990
Description	The Department of Energy sponsored an initial feasibility study of a site proposed for an integrated biomass energy system in the Yunnan Province. The study determined that the biomass supply would be adequate for the facility, that the facility was the least expensive alternative for supplying energy demand, and that demand would allow the facility to recover its costs. A follow-up study, not funded by the federal government, has resolved additional questions and reaffirmed the feasibility of the system. The U.S. participants are awaiting a proposal from officials in Yunnan to develop two biomass-to-electric generating facilities based on renewably grown biomass and direct combustion technology. The project would support national Chinese policies regarding reforestation and protection of the Yangtze river system.

Agriculture

AGRICULTURE

Project Name	Sahel Water Data and Management
Purpose	Improve forecasting of water resources for crop production.
Countries	Sahel
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified AGRHYMET Regional Center, Niamey, Niger, and other national AGRHYMET centers in the region
Sector	Agriculture, water resources
Technology	Hydrologic, climatic, and meteorological forecasting
U.S. Funding	\$21.2 million from FY 1987 to FY 1993
Description	This activity receives funding from several donors in addition to the United States. Funding from the United States provides hardware, software, technical assistance, and training for the use of remote sensing, telecommunications, and data processing to collect, analyze, and disseminate hydrologic, climatic, and meteorological information to forecast crop production. Training programs include equipment maintenance, equipment operation, cartography, remote sensing, statistics, and agrometeorology.

AGRICULTURE

Project Name	Natural Resource Management
Purpose	Develop and apply technologies appropriate to sustainable agricultural production and rehabilitation of degraded areas.
Countries	Guinea
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Ministry of Agriculture and Animal Resources
Sector	Natural resources
Technology	Methods for natural resource management and planning
U.S. Funding	\$3 million in FY 1991
Description	Increases in the number of people and livestock are placing pressure on forest, soil, and hydrological resources in some parts of Guinea. This project will help local populations to develop and apply appropriate technologies in agroforestry and livestock integration, sustainable agricultural production, and rehabilitation of environmental degradation. Complementary activities will improve management of forestry resources to help reduce deforestation and protect biological diversity. The project is part of a multi-donor effort to halt degradation of the most seriously degraded and hydrologically important area of Guinea.

AGRICULTURE

Project Name	Natural Resources Management
Purpose	Foster sustainable management of natural resources.
Countries	Rwanda
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Ministry of Agriculture, Office of Tourism and National Parks, Director General of Forests, Rwandan Institute of Agronomic Sciences, National University of Rwanda, and other agencies
Sector	Natural resources (wetlands, soil conservation, forests)
Technology	Methods for planning and managing the use of natural resources; wetland training laboratory
U.S. Funding	The project runs from FY 1989 to FY 1994, with expenditures of \$1.7 million in FY 1991.
Description	The project will improve management of wetlands, fish culture, agroforestry, hillside soil conservation, and forests and will provide assistance in environmental planning. It supports research at cooperating agencies and construction and operation of several research and demonstration centers. In five communes, the project will support existing nurseries, conduct agricultural research, and develop forestry plans. The project also funds public conservation and technical assistance, training, and academic education for resource managers. The project also will assist three private conservation organizations to work with the host government to protect two montane forests.

AGRICULTURE

Project Name	Farming System Research
Purpose	Create research systems that can develop and diffuse new technology appropriate to the needs of farmers in the region.
Countries	Kenya, Botswana, Malawi, Tanzania, Zimbabwe, Lesotho, Swaziland, Burundi, Rwanda, Sudan, Somalia
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified International Maize and Wheat Improvement Center (CIMMYT); agricultural ministries and various national research institutions within the participating countries
Sector	Agriculture
Technology	Research and development capacity
U.S. Funding	\$34,000 in FY 1991
Description	The project contributes education and training to help develop national systems for conducting research on farming systems and to integrate these systems with capacity to perform on-farm research. Emphasis is on research to develop and diffuse innovative agricultural technologies suited to the needs of representative farmers in the participating countries. Some of the existing national research institutions are expected to make changes to accommodate farm-systems research. The project will train approximately 500 people and will support the participation of approximately 100 people from the region in international workshops to improve skills and exchange information. The research capacity supported by this project will be important both for developing more sustainable agriculture and for responding to variations in meteorology or climate.

AGRICULTURE

Project Name	Bean Research in East Africa
Purpose	Strengthen existing agricultural research programs.
Countries	Kenya, Uganda, Somalia
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified International Center for Tropical Agriculture, national agricultural research institutions in the participating countries
Sector	Agriculture
Technology	Research and development, bean production technologies
U.S. Funding	U.S. funding not specified
Description	The Agency for International Development is providing funds for the International Center for Tropical Agriculture to collaborate with the national agricultural research programs in the participating countries to improve bean production technology within both traditional and nontraditional cropping systems. The funding will provide short-term training and workshops to assist networking among bean researchers in East Africa. The United States is participating with other donors in this effort. The research supported by this project will be important both for developing more sustainable agriculture and for responding to variations in meteorology or climate.

AGRICULTURE

Project Name	Plant Resistance to Insect Attack
Purpose	Understand causes of insect resistance in crops and develop methods for detecting this resistance so that it can be used to reduce insect damage.
Countries	Kenya
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified International Center of Insect Physiology and Ecology, Kenya
Sector	Agriculture
Technology	Collaborative research
U.S. Funding	Project runs from FY 1990 to FY 1992; U.S. funding not specified
Description	This project supports research by the International Center of Insect Physiology and Ecology on how sorghum, maize, and cowpeas resist damage by insects; on methods for detecting this resistance; and on breeding resistant crop strains. The objective of the research is to identify the biophysical and biochemical mechanisms of plant resistance, the ways that insects respond to these mechanisms, and the genetic base of resistant cultivars. The project also helps expand existing formal and informal cooperative relationships with international research centers and with national research programs in Africa through exchanges of germ plasm, cooperative field research, training, and publication of results in refereed journals. Research supported by this project will be important both for developing more sustainable agriculture and for responding to changes in the natural range of insects that would accompany changes in climate.

AGRICULTURE

Project Name	Agroforestry
Purpose	Promote use of soil- and land-conservation measures to achieve sustainable increases in farm productivity.
Countries	Haiti
Contacts— U.S. Agency U.S. Resource	Agency for International Development CARE; Southeast Consortium for International Development; Pan American Development Foundation
Cooperating Agency	Cooperating agency not identified
Sector	Agriculture, forestry
Technology	Agroforestry, soil conservation, collaborative applied research
U.S. Funding	Project runs from FY 1989 to FY 1993, with expenditures of \$4.2 million in FY 1991.
Description	The project supports research to improve seeds and germ plasm of orchard species, other trees, and forage crops for use by Haitian farmers on hillsides. Research will also be undertaken to improve nursery technology and non-nursery methods for introducing species and to determine what combinations of hedgerows, alleys, shrubs, grass, forage, and trees are best for soil conservation and erosion control. The project will provide support for producing seedlings at existing centralized nurseries and for continuing efforts to develop community-level nurseries. The project will develop training and extension manuals and provide information about appropriate methods for crop selection, planting, managing, harvesting, and soil conservation.

AGRICULTURE

Project Name	Hillside Agriculture
Purpose	Promote production of perennial tree crops to improve farm incomes, reduce soil erosion on hillsides, and protect watersheds.
Countries	Jamaica
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Ministry of Agriculture; Jamaica Agricultural Society; a variety of Jamaican firms, cooperatives, agencies, and research institutions
Sector	Agriculture
Technology	Perennial tree crops, farm management, soil conservation
U.S. Funding	Project runs from FY 1987 to FY 1994, with expenditures of \$200,000 in FY 1991.
Description	The project provides grants to qualified organizations in Jamaica for a variety of activities, all related to the production of perennial tree crops and the reduction of soil erosion on hillsides. Activities funded will promote the participation of farmers and communities in decision making about crop selection, production, harvesting, processing, and marketing. These include pilot activities to apply new methods for managing growth both of individual trees and of stands, a farm savings program to raise production capital, efforts to strengthen the management of commodity associations, and efforts to eliminate obstacles in processing land titles. The project will develop extension programs to disseminate improved technologies to two targeted watersheds. Field staff and farmers will receive technical assistance and support for networking and exchanging information.

AGRICULTURE

Project Name	Access to Land, Water, and Other Natural Resources
Purpose	Improve understanding of relationships between land tenure, development, and resource management and apply this understanding to development policies.
Countries	Global coverage
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development University of Wisconsin Land Tenure Center Cooperating agency not identified
Sector	Agriculture
Technology	Collaborative research
U.S. Funding	Project runs from FY 1989 to FY 1992, with expenditures of \$120,000 in FY 1991.
Description	This project supports basic and applied research on relationships between systems of land and resource tenure and sustainable agricultural development, growth in rural incomes, and management of natural resources. All applied research involves collaboration with institutions in the host countries, and, where possible, personnel from these institutions lead field investigations. In addition, the project funds research apprenticeships at U.S. institutions. Research focuses on how land markets and ownership affect investment, efficiency, and equity of resource use; how land tenure affects natural resource management and the adoption of technologies to conserve resources and sustain use of the land; and ways of changing tenure and the institutions that support tenure systems in order to promote rural development.

AGRICULTURE

Project Name	Sustainable Land Use Management
Purpose	Establish grassroots extension service to promote conservation activities that support sustainable land use.
Countries	Ecuador
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development Peace Corps; CARE Soils Department of the Ministry of Agriculture
Sector	Agriculture, soil conservation
Technology	Soil conservation, agroforestry, natural resource management
U.S. Funding	Project extends from FY 1990 to FY 1996, with expected total expenditures of \$2.1 million from FY 1990 to FY 1996.
Description	CARE will hire and train local extension agents who share the cultural background of the country's Andean farmers to provide agricultural extension services. The services are intended to persuade Andean farmers to accept new techniques related to soil conservation, ecologically sound agricultural practices and crop management, agroforestry, irrigation, and complementary production activities. Promotion will be directed to approximately 9000 individual farmers as well as 160 rural communities. Participants who make progress in land-use management will receive technical assistance and training for other income-earning activities.

AGRICULTURE

Project Name	Agricultural Research
Purpose	Strengthen agricultural research and develop programs to generate and deliver appropriate agricultural technologies to farmers.
Countries	Bangladesh
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Bangladesh Rice Research Institute; Bangladesh Agriculture Council; Bangladesh Agriculture Research Institute; other national agricultural research agencies
Sector	Agriculture
Technology	Agricultural research and development
U.S. Funding	Project extends from FY 1981 to FY 1993, with expected total expenditures of \$48.2 million from FY 1981 to FY 1993.
Description	The project integrates Bangladesh's fragmented agricultural research system and develops programs to generate appropriate agricultural technologies and deliver them to farmers. Funding supports agricultural research, including field trials and farm-level monitoring, with changes in research and development to respond to results of monitoring. Training will be provided in Bangladesh and through exchanges and scholarships for foreign study. Crop research focusing on soils, water management, pest and weed control, and harvesting will strengthen the ability of the country, its research organizations, and its farmers to respond to changes in climate. Approximately 2000 extensionists are expected to receive training by the end of the project, and 11,000 farmers are expected to participate in field days and special training.

AGRICULTURE

Project Name	South Pacific Region Agricultural Development
Purpose	Strengthen the ability to perform agricultural research, education, and extension services in the South Pacific region.
Countries	South Pacific
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development University of Hawaii, Cornell University University of the South Pacific, Fiji
Sector	Agriculture
Technology	Agricultural research, education, and extension services
U.S. Funding	Project extends from FY 1980 to FY 1991, with total expected expenditures of \$13 million from FY 1980 to FY 1991.
Description	The University of the South Pacific is the regional institution of higher education for the island nations of the Pacific. The project is upgrading agricultural programs at the university by supporting the addition or expansion of courses in extension, agricultural education, agricultural engineering, crops and soils, and nutrition and food technology. Much of this upgrade is supported by training, but the project also supports development of an agricultural library to serve national and regional personnel and changes in curriculum to place greater emphasis on socioeconomic concerns. In addition, the project provides support to improve the university's outreach program and for direct funding of agricultural research. The services being developed under this project will be useful in helping the region's small farmers respond to climate change.

AGRICULTURE

Project Name	International Effects of Climate Change on Agriculture
Purpose	Estimate the effects of climate change on global food production and trade.
Countries	Brazil, Mexico, Costa Rica, Egypt, India, Indonesia, Thailand, China
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation
U.S. Resource Cooperating Agency	Goddard Institute for Space Studies; Pennsylvania State University University of Birmingham Atmospheric Impacts Research Group, United Kingdom; Centro Nacional de Pesquisa de Trigo, Brazil; Centro Agronomical Tropical de Investigacion y Ensenanza, Costa Rica; Ministry of Agriculture, Egypt; Indian Agricultural Research Institute, India; Centre for Soil Research, Indonesia; Ministry of Agriculture and Cooperatives, Thailand; Jiangsu Academy of Agricultural Sciences, China
Sector	Agriculture, world trade
Technology	Collaborative research
U.S. Funding	\$400,000 in FY 1990
Description	This project uses the expertise of in-country experts to determine the impacts of climate change on agriculture in more than 20 countries throughout the world. The principal investigators are using crop and economic models to analyze the effects of climate change on global food production, prices, and trade and regional food deficits. To date the project has produced preliminary estimates of changes in crop yields and has developed models to project global agricultural production and trade. Several case studies of potential impacts on countries vulnerable to food deficits have been initiated. The findings of these assessments will be used to identify and analyze adaptive responses to reduce the adverse effects of climate change and to evaluate the potential consequences on agricultural production and trade for the United States.

AGRICULTURE

Project Name	Effects of Stratospheric Ozone Depletion and Climate Change on the Rice Ecosystem
Purpose	Understand how ozone depletion and climate change could affect production of rice.
Countries	Philippines, Bangladesh, China, India, Malaysia, Korea, Thailand
Contacts— U.S. Agency	Environmental Protection Agency/Office of Research and Development and Office of Air and Radiation
U.S. Resource Cooperating Agency	Environmental Research Laboratory—Corvallis International Rice Research Institute, Philippines; Bangladesh Rice Research Institute, Bangladesh; Chinese National Rice Research Institute, China; Zhejiang Agricultural University, China; Tamil Nadu Rice Research Institute, India; Cuttack Rice Research Institute, India; Crop Experiment Station, Korea; University Pertanian Malaysia, Malaysia; Mardi, Kuala Lumpur, Malaysia; Kohn Kaen University, Thailand; Kyoto University, Japan; Wageningen Agricultural University, The Netherlands
Sector	Agriculture, ozone depletion
Technology	Collaborative research
U.S. Funding	\$1.6 million in FY 1990
Description	Any effects on rice production resulting from climate change or increased ultraviolet radiation from ozone depletion would have dramatic consequences for Asian food supplies. The goal of this project is to provide a risk characterization of the consequences of stratospheric ozone depletion and global climate change on the wetland rice ecosystem. The Environmental Research Laboratory—Corvallis is working with scientists at the International Rice Research Institute to conduct laboratory, phytotron, and field experiments on the effects that increases in ultraviolet-B, CO ₂ , and temperature would have on rice plants and their major diseases and insect pests. Experiments also are being conducted to characterize how climate affects methane emissions from rice fields. Simulation models are being used to estimate the impacts of climate change on rice production throughout Asia. Scientists collaborating on the project are at the cooperating agencies listed above.

AGRICULTURE

Project Name	Assessment of Methane Emissions from Livestock
Purpose	Identify and overcome barriers to reducing emissions of methane from livestock.
Countries	China
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Environmental Protection Agency/Office of Air and Radiation U.S. resource not identified Department of Agriculture, China
Sector	Agriculture, livestock
Technology	Collaborative research
U.S. Funding	\$75,000 in FY 1991
Description	Livestock contribute about 20% of global methane emissions. Lack of knowledge and funding hamper the implementation of options, such as changes to diets or health maintenance practices, that might reduce these emissions while increasing the productivity of livestock agriculture. These barriers vary for different countries, depending upon economic, social, and institutional structures. Programs are being developed to identify and overcome the barriers in the dairy and meat industries in China. The first phase of this work is an assessment of the feasibility of strategically providing dietary supplements to reduce methane production.

AGRICULTURE

Project Name	Restoring Grassland Communities
Purpose	Evaluate and exchange plant materials and technology to improve and restore grassland communities.
Countries	China
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Agriculture U.S. resource not identified Grassland Research Institute; Inner Mongolia College of Agriculture and Animal Husbandry
Sector	Grasslands, germ plasm exchange
Technology	Grassland germ plasm testing, field plot techniques
U.S. Funding	Funding not reported
Description	The United States and China agreed to establish a testing network for grassland germ plasm. This project established field plots in China for evaluating germ plasm as part of this network. Staff from the Department of Agriculture visited test plots at three locations in China and provided training and experience in field plot techniques of design, layout, and planting. Scientists from both countries collaborated in developing factors for evaluating growth in the plots and plans for the long-term exchange of germ plasm. Similar field plots will be developed in the United States for use in testing exchanged plant material. The project is expected to provide information and plant resources for restoring grasslands in both countries and for managing the adaptation of grasslands to changing climate.

Forestry and Natural Resources

FORESTRY AND NATURAL RESOURCES

Project Name	Senegal Reforestation Project
Purpose	Mobilize large-scale popular participation in tree planting in Senegal.
Countries	Senegal
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Soil Conservation and Reforestation Division of the Ministry for Protection of Nature
Sector	Forestry
Technology	Nurseries, forest-product market analysis, advertising
U.S. Funding	The project runs from FY 1986 to FY 1993, with expenditures of \$2 million in FY 1991.
Description	In cooperation with the government of Senegal, the project is developing and implementing recommendations to encourage local participation in tree planting. Activities include analysis of Senegal's institutions and policies affecting forests and local participation in natural resource planning and management. The project also provides technical, marketing, and motivational information; supports a media campaign to encourage participation; and provides matching cash grants to local groups. In addition, support is given to establish nurseries; train forest service administrators and field agents; and encourage development of processing and marketing capacity for tree products such as fruits, gums, and nuts.

FORESTRY AND NATURAL RESOURCES

Project Name	Natural Resources Management
Purpose	Improve ability to develop natural resource policies and conserve globally significant biological reserves.
Countries	Indonesia
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development Several U.S. universities and other institutions Ministry of Forestry
Sector	Forestry, biodiversity, other natural resources
Technology	Natural resource planning and management, policy analysis, environmental analysis
U.S. Funding	The project runs from FY 1990 to FY 1997, with expenditures of \$836,000 in FY 1991.
Description	The project will help the national government develop the ability to formulate and analyze policies to manage natural resources. The project also will provide support to the provincial government of one of the outer islands in identifying resource-depletion problems and strengthening its ability to plan and manage natural resources. Finally, the project will support conservation of several globally significant biological reserves in one region of the country by strengthening the management of reserves and inventorying existing resources. Focusing on one region will reduce the number of problems to be addressed. The project will supply technical assistance, training, and research to identify trends in resource degradation, develop resource management plans, and manage nature reserves. Training in U.S. universities will be provided for 20 to 25 graduate-degree candidates.

FORESTRY AND NATURAL RESOURCES

Project Name	Forestry Development
Purpose	Increase the productivity and sustainability of forestry production systems by improving policies and forest management.
Countries	Nepal
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development Several U.S. universities and other institutions Ministry of Forests and Soil Conservation
Sector	Forestry, residential and commercial energy use
Technology	Institutional development, methods for resource analysis and planning, promotional activities
U.S. Funding	The project runs from FY 1989 to FY 1995, with expenditures of \$1.1 million in FY 1991.
Description	This project works in conjunction with projects sponsored by other countries to strengthen the ability of Nepal's Ministry of Forests and Soil Conservation to implement the country's master plan for forestry. This project will provide long- and short-term technical assistance to help the Ministry institutionalize its planning activities; improve its ability to conduct analyses; and develop strategies for managing its own organization, personnel, information, and technology. The project also supports the expanded use of residential and commercial cookstoves. To do so, it will provide technical assistance to the government's community forestry division and various communities and organizations to develop, produce, and market these stoves.

FORESTRY AND NATURAL RESOURCES

Project Name	Rapti Development Project
Purpose	Increase agricultural and forestry production.
Countries	Nepal
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Ministry of Agriculture, Ministry of Forestry and Soil Conservation, Ministry of Panchayat and Local Development
Sector	Forestry, agriculture
Technology	Methods for managing forest and agricultural resources
U.S. Funding	The project runs from FY 1987 to FY 1995, with expenditures of \$735,000 in FY 1991.
Description	Among many activities, the project will test a livestock production model that involves grazing control, herd management, and fodder production. It also will support more than 300 local groups managing forests and plant 11,700 hectares of protected forestland. District governments will receive assistance in producing and planting seedlings for use in stabilizing roads, trails, and canals; protecting watersheds; and controlling gullies. The project will help create local groups and associations of small farmers, conduct pilot activities to integrate local groups into the Panchayat local government structures, and create household and other small enterprises, all to ensure the sustainability of the forestry and agricultural activities.

FORESTRY AND NATURAL RESOURCES

Project Name	Institute of Forestry
Purpose	Improve Nepal's ability to meet its needs for trained foresters and resource managers.
Countries	Nepal
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Triguhvan University Institute of Forestry, Nepal
Sector	Forestry
Technology	Forestry education and curricula
U.S. Funding	The project runs from FY 1987 to FY 1995, with expenditures of \$700,000 in FY 1991.
Description	The project continues the work of an earlier one to upgrade the capacity of the Institute of Forestry to train foresters and natural resource managers at the bachelor of science and certificate levels, especially in community forestry management. The project supports curricula improvement, such as additional practical and field laboratory work and cooperation with village groups managing community forests. The project will train faculty, develop field and laboratory manuals, provide grants for faculty research, and improve the administrative structure of the institute. The project also will fund visiting advisors and scholars and provide vehicles, computers, equipment, library materials, and classroom and laboratory facilities. Over the life of the project, 200 individuals will receive bachelor of science degrees and 1000 individuals will receive certificates from the institute.

FORESTRY AND NATURAL RESOURCES

Project Name	Sustainable Uses for Biological Resources
Purpose	Improve the conservation of biodiversity and associated natural resources.
Countries	Ecuador
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Cooperating agency not identified
Sector	Agriculture, forestry
Technology	Natural resource management
U.S. Funding	\$750,000 in FY 1991
Description	This project will develop, test, and implement economic activities that will help improve the conservation of Ecuador's biodiversity and natural resources. The project will identify sustainable economic opportunities for local groups living in or near fragile areas and will conduct research on biological resources to better understand them and their potential economic use. Ecuadorean scientists, managers, and community leaders will receive both short-term in-country training and long-term participant training in natural resource management. The project also will support public and private organizations in their analyses and discussions of policies with the Ecuadorean government.

FORESTRY AND NATURAL RESOURCES

Project Name	Natural resources management
Purpose	Improve management of renewable natural resources and protection of tropical forests in the Maya Biosphere Reserve.
Countries	Guatemala
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified National Council for Protected Areas; National Environmental Commission; Conservation Studies Center; Forestry and Wildlife Directorate; Institute of Anthropology and History
Sector	Forestry, biodiversity
Technology	Natural resource management, collaborative research
U.S. Funding	\$5.4 million in FY 1991
Description	This project will promote sustained use of renewable natural resources in the Maya Biosphere Reserve while protecting the reserve's biological diversity and tropical forests. Much of the project's efforts are focused on the reserve itself and include support for training guards, developing the physical infrastructure for protecting the reserve, managing tourism, and increasing the participation of nearby communities in protecting and managing the reserve. The project will support research to identify and develop sustainable economic activities to be conducted in and around the reserve and will support development of demonstration plots and extension services to help promote adaption of these activities. In addition, the project also supports efforts to strengthen environmental education at the primary, secondary, and college level and to make decision makers and the general public more aware of the environment.

FORESTRY AND NATURAL RESOURCES

Project Name	Forestry Development
Purpose	Improve the management of commercial pine forests and the efficiency with which harvested trees are processed into forest products.
Countries	Honduras
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Honduran Forestry Corporation
Sector	Commercial forestry
Technology	Forest management, soil conservation, forest product processing
U.S. Funding	The project runs from FY 1987 to FY 1994, with expenditures of \$1.9 million in FY 1991.
Description	The project supports a Honduran policy to encourage private firms to manage lumber processing and marketing, leaving the Honduran Forestry Corporation free to concentrate on managing the forest resource. The Forestry Corporation will receive assistance to improve its financial management and operating procedures. Pilot forestry management programs will be established and given responsibility for developing plans for forest protection, developing systems of roads and trails to permit and manage commercial logging, and conducting silviculture programs to maintain forest productivity. The project establishes a rotating fund to finance small-scale forest enterprises by area residents and will conduct a national educational campaign on the preservation of forest resources. The project also will help establish an organization to provide technical assistance and credit to loggers and the sawmill industry for marketing and process improvements.

FORESTRY AND NATURAL RESOURCES

Project Name	Support for Environmental Management
Purpose	Improve environmental awareness and management in the Eastern Caribbean region.
Countries	Eastern Caribbean
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified National and regional nongovernmental organizations operating in the region
Sector	Forestry, marine resources, coastal zones, agriculture, tourism
Technology	Environmental education, watershed management, environmental education
U.S. Funding	\$1.7 million in FY 1991
Description	Agriculture and tourism are major sources of economic growth in the Eastern Caribbean, and they are threatened by land-based pollution that degrades coastal zones. The project will develop pilot programs for selected watersheds to demonstrate effective ways to resolve these problems. These programs will vary with the watershed but are anticipated to include integrated pest management, practices to control soil erosion, agroforestry, park management, reef and fisheries management, and monitoring of water quality. The project will establish a fund to finance grassroots work by cooperatives and nongovernmental organizations to enhance natural resource management. The project also will support environmental education and training through a variety of institutions and media; and it will encourage reforms in laws regulating natural resource planning, management, and use.

FORESTRY AND NATURAL RESOURCES

Project Name	Environmental and Natural Resource Management
Purpose	Support sustainable natural resource use in Central America.
Countries	Belize, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. Department of Agriculture; National Park Service; Peace Corps Tropical Agriculture Center for Research and Education, Costa Rica; Panamerican Agricultural School
Sector	Agriculture, forestry
Technology	Resource planning and management, information management
U.S. Funding	Project runs from FY 1989 to FY 1995, with expenditures of \$2.4 million in FY 1991.
Description	The project will support environmental education, promote changes in policy, and provide assistance to improve management of natural resources as ways of supporting sustainable use of natural resources in the region. It will provide support for environmental monitoring; publication of maps and other environmental information; and environmental education through training, research grants, scholarships, and exchanges of environmental professionals. The project will establish five pilot wildlands management reserves and buffer zones and develop conservation corps to supplement the staff managing these reserves. The project will support technical assistance, training, and research for a number of watershed management activities; demonstrate commercial forest management techniques; and provide technical assistance and training for protecting agricultural plants from insects and other pests.

FORESTRY AND NATURAL RESOURCES

Project Name	Agroforestry
Purpose	Assist developing countries in managing their natural resources and increasing the benefits they receive from forests.
Countries	Global
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified International Council for Research in Agroforestry, Kenya
Sector	Forestry, agriculture
Technology	Agroforestry management, land management
U.S. Funding	Project runs from FY 1982 to FY 1992; level of funding for recent years not specified.
Description	The project supports research by the International Council for Research in Agroforestry to develop methods for identifying land-use problems on marginal lands in developing countries, analyzing constraints to improving land management, and identifying options to overcome these constraints. The council will systematically collect information about important and promising agroforestry systems worldwide, develop research and development priorities, and report global statistics on trends in agroforestry. The council uses project support to develop a diagnostic handbook and curricula for training in the diagnosis of land-use problems and their amelioration through improved agroforestry practices.

FORESTRY AND NATURAL RESOURCES

Project Name	Conservation of Biological Diversity
Purpose	Promote sustainable economic development through better conservation and use of biological resources.
Countries	Selected developing countries
Contacts— U.S. Agency U.S. Resource	Agency for International Development World Wildlife Fund, Nature Conservancy, International Institute for Environment and Development
Cooperating Agency	Cooperating agencies in developing countries not identified
Sector	Forestry, biological resources
Technology	Collaborative research, resource management, conservation education
U.S. Funding	\$725,000 in FY 1991
Description	This project supports collaborative research and training of scientists in developing countries to help them better formulate proposals for research and development funding from existing sources. It promotes exchange of information about conservation activities through technical seminars and other means. It also supports pilot field demonstrations of new approaches to conservation education and protection of natural resources, ongoing efforts by the World Wildlife Fund to integrate conservation and community development, and ongoing efforts by the Nature Conservancy to adapt its Conservation Data Centers model to developing countries.

FORESTRY AND NATURAL RESOURCES

Project Name	Management of Natural Resources and Environment
Purpose	Improve the management of natural resources and the environment as a way of promoting sustainable economic and social development.
Countries	Thailand
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified National Environment Board; Prince of Songkla University; National Coastal Resource Management Advisory Committee; National Parks and Wildlife Conservation Divisions of the Royal Forest Department; Thailand Development Research Institute; Federation of Thai Industries; others
Sector	Forestry, coastal zones, biological resources
Technology	Natural resource planning and management, policy analysis,, biological resource conservation collaborative research
U.S. Funding	Project runs from FY 1988 to FY 1995, with expected total expenditures of \$44 million from FY 1988 to FY 1995.
Description	The project will help develop the capacity within numerous public and private organizations in Thailand to manage natural resources and the environment. It will support development of resource and environment planning for four to six coastal areas in the southern part of the country, provide technical assistance for policy analysis and coastal resource management, and develop a center for applied research and extension activities in coastal resources management. Seminars will be sponsored on problems caused by industrialization, and technical assistance will be provided to help develop site-specific responses to these environmental or worker health and safety problems. The project also supports collaborative research; development of rural resource management planning at the provincial level; and strengthening of the abilities of several agencies of the Thai government to carry out their management, training, or public education responsibilities.

FORESTRY AND NATURAL RESOURCES

Project Name	Forestry Initiative
Purpose	Establish a program of coppice forestry production in Nepal's mid-hill region.
Countries	Nepal
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development Argonne National Laboratory Ministry of Forests and Soil Conservation
Sector	Forestry, fuelwood, forage, forestry research, forest management
Technology	Coppice forestry production
U.S. Funding	Project extends from FY 1986 to FY 1992, with total expected expenditures of \$130 million from FY 1986 to FY 1992.
Description	The project provides technical and financial assistance to establish a program of coppice forestry in Nepal's mid-hill region based on fast-growing trees. Species are being chosen on the basis of community preferences, adaptability to high elevations, and suitability for supplying different forest products. A permanent, multipurpose tree nursery will be established to produce planting stock and to conduct applied research relating to plant propagation and the nutritional and water requirements of species. A research and demonstration facility will be established adjacent to the nursery to conduct research on forest cropping systems; evaluate yields of different species; and analyze the economical, social, and environmental effects of adopting national- and community-scale high-yield tree production systems. The project supports training in Nepal and in the United States for Nepali technicians, administrators, professional foresters, farmers, and students.

FORESTRY AND NATURAL RESOURCES

Project Name	Forest Resources for a Stable Environment
Purpose	Support the protection and management of natural areas.
Countries	Costa Rica
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Cordillera Development Foundation, Costa Rica
Sector	Forestry, natural reserves
Technology	Forest management, forest planning
U.S. Funding	Project extends from FY 1989 to FY 1996, with total expected expenditures of \$7.5 million from FY 1989 to FY 1996.
Description	The project provides funds to hire forest rangers; construct operational centers throughout the Central Cordillera region; and hire staff for the Cordillera Development Foundation, a newly established private organization that will manage several protected areas and perform environmental education and extension services. The foundation will develop management plans for 12 legally protected areas, revise boundaries as appropriate, and work to transfer private holdings within the areas to the government. The foundation will develop guidelines and regulations for forestry in buffer zones near several of the protected areas. To help create employment opportunities for landowners in the buffer zones, the foundation will establish a small commercial enterprise to acquire and manage forest land in buffer zones and process the wood that it harvests. Finally, the project supports reforestation of areas that have been cleared but that are not suitable for agriculture and will promote the integration of trees into local farming systems.

FORESTRY AND NATURAL RESOURCES

Project Name	Environmental Management Systems
Purpose	Protect tropical forests and biodiversity.
Countries	Central America
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development New York Botanical Garden Neotropical Foundation; Caribbean Conservation Corporation; national and other institutions in participating countries
Sector	Forestry, natural resources, protected areas, biodiversity
Technology	Resource planning and management, environmental education
U.S. Funding	Project extends from FY 1988 to FY 1991, with expected total expenditures of \$1.2 million from FY 1988 to FY 1991.
Description	The project helps to establish and manage parks and protected areas, promotes sustainable use of natural resources in areas surrounding parks and reserves, and supports environmental education. It will also help the Neotropical Foundation establish biodiversity survey centers in national parks, train park guards to help with the surveys, and develop data needed for sustainable management of the parks. The Caribbean Conservation Corporation will receive funds to establish and support conservation and natural resource management in and around Costa Rica's Tortuguero National Park. The New York Botanical Garden will conduct an ethnobotanical survey to identify forest plants used in native medicinal treatments in Belize to help preserve and disseminate this knowledge.

FORESTRY AND NATURAL RESOURCES

Project Name	Masoala Conservation and Development
Purpose	Establish a national park and promote integration of biodiversity into rural development planning.
Countries	Madagascar
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development Missouri Botanical Garden Directorate of Waters and Forests
Sector	Biodiversity, forestry, rural development
Technology	Natural resources management and planning
U.S. Funding	Project extends from FY 1988 to FY 1991, with expected total expenditures of \$650,000 from FY 1988 to FY 1991.
Description	The project will help establish a national park in northeast Madagascar that will support boundary surveys, socioeconomic studies, and development of park management plans; training park personnel; and conducting a public awareness program. The project funds field training of Malagasy scientists and students in biodiversity inventory and conservation. It also supports programs in rural development intended to reduce pressure on natural resources, including irrigation, training, reforestation, development of fishery resources, and improvements in village health care.

FORESTRY AND NATURAL RESOURCES

Project Name	Tropical Deforestation and Climate Change Case Studies
Purpose	Understand impacts of tropical deforestation and develop options to reduce resulting emissions of greenhouse gases.
Countries	Brazil, Nigeria, India, Indonesia, Thailand, Malaysia, China
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation
U.S. Resource Cooperating Agency	Lawrence Berkeley Laboratories INPA, Manaus, Brazil; University of Ibadan, Nigeria; Indian Institute of Science; Gajah Mada University, Indonesia; Secretary of Science, Technology, and Energy, Thailand; Forestry Research Institute, Malaysia; Chinese Academy of Forestry Forest Research Institute, China
Sector	Forestry
Technology	Policy analysis, collaborative research
U.S. Funding	\$145,000 in FY 1990
Description	Tropical deforestation by logging and burning is estimated to contribute 10–30% of current global CO ₂ emissions. This project is organizing a network of forestry, agriculture, and land-use specialists from developing countries who will conduct case studies to assess and model rates of deforestation, the resulting emissions of greenhouse gases, and the effects of potential technologies and land-use management options on reducing the rate of deforestation. Potential options include reforesting degraded lands and grasslands and promoting agroforestry and other strategies for sustainable economic development. The results will be disseminated through several workshops and through discussions with government officials in the cooperating nations and the United States.

FORESTRY AND NATURAL RESOURCES

Project Name	International Impacts of Climate Change on Forests
Purpose	Evaluate how climate change will affect forests.
Countries	Costa Rica, Venezuela, others
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation
U.S. Resource Cooperating Agency	University of Virginia Universidad de los Andes, Venezuela
Sector	Forestry
Technology	Collaborative research, policy analysis
U.S. Funding	\$235,000 in FY 1990
Description	This study is evaluating the effect that climate change and responses to it might have on forests in selected regions of the world. This study will examine potential effects at regional and global scales for several possible scenarios of climate change. It will examine transitions between forest, grassland, and other types of ecosystems and evaluate changes in forest composition and productivity. Policy researchers in selected countries are evaluating appropriate changes in the management of forest resources and conservation areas. It is anticipated that the network of researchers developed by this project will continue to examine impacts and to develop policy options for reducing or responding to these impacts.

FORESTRY AND NATURAL RESOURCES

Project Name	Effects of Land-Use Changes on Exchanges of Trace Gases Between the Atmosphere and Biosphere
Purpose	Understand how changes in land use affect emissions and absorption of greenhouse gases.
Countries	Costa Rica, Venezuela
Contacts— U.S. Agency	Environmental Protection Agency/Office of Research and Development
U.S. Resource	Environmental Research Laboratory, Athens; National Science Foundation
Cooperating Agency	Instituto Venezolano de Investigaciones Cientificas; cooperating institution in Costa Rica not identified
Sector	Forestry, agriculture, climate science, land use change
Technology	Collaborative research
U.S. Funding	\$100,000 in FY 1990
Description	Tropical environments are undergoing dramatic land-use changes in response to population growth and industrial development. As wet forests are converted to agricultural and urban land uses and as unmanaged grasslands are managed more intensively for agricultural production, major impacts on emissions of carbon dioxide, methane, nitrous oxides, and other important gases are expected. This project develops experiments on wet tropical forests in Costa Rica and savannas in Venezuela to identify and analyze relationships between land-use management and the sources and sinks of greenhouse gases.

FORESTRY AND NATURAL RESOURCES

Project Name	Tropical Forestry Program
Purpose	Support international organizations assisting developing countries.
Countries	Global
Contacts— U.S. Agency U.S. Resource	Department of Agriculture U.S. Forest Service, state forest departments, private forestry companies
Cooperating Agency	International organizations providing assistance to developing countries, including the World Bank, several United Nations organizations, and several nongovernmental and local organizations
Sector	Forestry and natural resources
Technology	Technical assistance, training in forest management
U.S. Funding	Approximately \$1.4–1.8 million related to climate change issues in FY 1991, some of which may be from U.S. organizations outside the federal government.
Description	This program is a continuing activity that provides technical assistance, training, and other support to international organizations who, in turn, are helping developing countries meet their more immediate technical needs or increase their skill levels. Through mid-1991, the program has assisted roughly 80 organizations, funding 68 projects, of which 27 were training activities. The cooperating agencies have contributed an additional \$2.2 million to fund these projects related to climate change. Some of the projects involve a single country, others are regional, and some, such as the World Forest Resource Assessment, was global. The descriptions provided for most projects were insufficient to list them separately, but funding identified above is related to global change issues such as management forests and natural reserves, environmental education, and exchange of technical information about controlling fires in tropical forests.

Climate Science

CLIMATE SCIENCE

Project Name	Carbon Dioxide Research Program
Purpose	Support collaborative research to obtain unique regional data on climate and atmospheric composition.
Countries	China
Contacts— U.S. Agency	Department of Energy/Office of Energy Research/Environmental Sciences Division
U.S. Resource Cooperating Agency	Team of scientists from universities, federal agencies, and industry Chinese Academy of Sciences, Institutes of Geography and Atmospheric Physics
Sector	Basic climate research, agriculture
Technology	Collaborative research
U.S. Funding	\$190,000 in FY 1990 to support field research, equipment, and Chinese scientists, plus \$400,000 to support U.S. scientists at U.S. institutions; for FY 1991 the respective expenditures are \$112,000 and \$493,500.
Description	Joint research on CO ₂ began in 1987. The research covers four topics: analysis of general circulation models of the climate; preparation and analysis of paleo, historical, and instrumental climate information and data; comparisons of models to data in order to study relationships between large-scale and regional-scale climates; and methane emissions from rice paddy fields. The research is described in nearly 100 publications.

CLIMATE SCIENCE

Project Name	Atmospheric Radiation Measurement Pilot Study
Purpose	Conduct measurements to be used to improve models of global climate.
Countries	Papua New Guinea
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Energy/Office of Energy Research Pacific Northwest Laboratory, Los Alamos National Laboratory Cooperating agency not identified
Sector	Climate systems research
Technology	Collaborative research
U.S. Funding	Not specified, FY 1991
Description	This project will conduct measurements of solar and infrared radiation at a surface site in the tropical western Pacific, in conjunction with measurements made by research aircraft. These measurements are part of a program designed to improve the way general circulation models and related models treat cloud processes. The measurements are intended to enhance understanding of how cirrus and stratus clouds formed from deep tropical convection affect the surface radiative energy budget and sea-surface temperatures. This study is a pilot study for the program, which will establish a test-bed for cloud and radiation measurements in the western tropical Pacific in early FY 1994.

CLIMATE SCIENCE

Project Name	Scientific Exchanges, Workshops, and Training
Purpose	Support collaborative climate research.
Countries	Brazil
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Commerce/Office of Global Programs Numerous climate research organizations Brazilian climate scientists at several institutions
Sector	Climate research
Technology	Collaborative research, information exchange, technical training
U.S. Funding	U.S. funding not specified; began in 1988 and is listed as ongoing.
Description	Operating under the U.S.-Brazil Science and Technology Agreement, this project supports collaborative research with Brazilian institutions and scientists. It includes support for exchanges of U.S. and Brazilian scientists for both short and medium terms and for convening a scientific workshop to address various aspects of regional and global climate variability, from interannual to interdecadal time scales. The project also supports training Brazilian technicians in the use and maintenance of oceanographic instrumentation.

CLIMATE SCIENCE

Project Name	Sea Level Research and Information
Purpose	Collect information about sea level.
Countries	Brazil, China, India, Indonesia, Malaysia, Mexico, Nigeria, Philippines, Senegal
Contacts— U.S. Agency	Department of Commerce/National Ocean Service
U.S. Resource	U.S. resource not identified
Cooperating Agency	Cooperating agency not identified
Sector	Oceanographic research
Technology	Sea level monitoring, cooperative research, instrumentation
U.S. Funding	Approximately \$100,000 in FY 1991; \$890,000 from FY 1990 to FY 1995
Description	This project installs and operates one or two advanced design sea level stations in each of the cooperating countries. Funding also supports scientific cooperation on sea level research in the cooperating countries and, in the case of China, a visiting scientist for training and cooperative research in the United States. Location of the station in Nigeria is subject to results from a reconnaissance survey.

Project Name	Cooperative Global Tropospheric Experiment
Purpose	Develop an understanding of global tropospheric chemistry and the susceptibility of the global atmosphere to chemical change.
Countries	Brazil
Contacts— U.S. Agency U.S. Resource Cooperating Agency	National Aeronautics and Space Administration Langley Research Center Comissao Brasileira de Atividades Espaciais
Sector	Atmospheric chemistry
Technology	Collaborative research
U.S. Funding	\$3 million in FY 1992; \$3 million in FY 1993
Description	This project will enhance understanding of the processes that control concentrations and distributions of various gases in the atmosphere. The project combines measurements of fluxes and meteorological mixing processes from aircraft, ground stations, and, where available, satellites. Extensive field measurements will be made in the tropical Atlantic, the Amazonian rain forest, and the Alaskan tundra. The resulting large-scale data will be used in models that demonstrate how changing atmospheric chemistry affects climate.

CLIMATE SCIENCE

Project Name	Collaborative Research with the People's Republic of China
Purpose	Support collaborative climate research
Countries	China
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Commerce/Office of Global Programs U.S. resource not identified Cooperating agency not identified
Sector	Atmospheric and oceanographic research
Technology	Collaborative research
U.S. Funding	U.S. funding not specified
Description	This is a collaborative research program with China to study air-sea interaction processes in the western tropical Pacific region. The collaboration supports participation by Chinese scientists in the Tropical Ocean-Global Atmosphere, Coupled Ocean-Atmosphere Response Experiment. It includes support for short- and medium-term visits by Chinese scientists to U.S. institutions and joint research cruises using Chinese research vessels. The program is carried out under two bilateral agreements that began in 1985 and remain in effect through April 1994.

CLIMATE SCIENCE

Project Name	Sea Level Monitoring
Purpose	Monitor global absolute sea level for climate studies and coastal zone management.
Countries	Brazil
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Commerce/National Ocean Service National Oceanic and Atmospheric Administration Consortium headed by the University of Sao Paulo
Sector	Oceanographic research
Technology	Sea level monitoring, cooperative research, instrumentation
U.S. Funding	\$2.55 million; project duration not specified.
Description	U.S. and Brazilian organizations are developing a Very Long Baseline Interferometry–Global Positioning System near Natal, Brazil. The National Oceanic and Atmospheric Administration is providing the instrumentation on long-term loan and will assist in the reduction and analysis of data from the observatory. Brazilian funding not listed above will support construction and operation of the observatory.

CLIMATE SCIENCE

Project Name	Technical Transfer in Global Change Technology Through Technical Training
Purpose	Provide technical training in order to enable developing countries to participate in bilateral and international programs.
Countries	Brazil, Indonesia, People's Republic of China
Contacts— U.S. Agency	National Oceanic and Atmospheric Administration/Global Programs
U.S. Resource Cooperating Agency	U.S. resource not identified National Institute for Space Research, Brazil; Badan Pengkajian dan Penerapan Teknologi, Lembaga Ilmu Pengetahuan Indonesia, Pusat Penelitian Dan Pengembangan Oseanologi (Puslitbang Oseanologi), and Badan Meteorologi Dan Geofisika, Indonesia; State Oceanic Administration, People's Republic of China
Sector	Oceanographic and meteorological instrumentation
Technology	Data collection, analysis technologies and methodologies
U.S. Funding	\$45,000 in FY 1991
Description	Technicians will be taught how to use and maintain oceanographic or meteorological instrumentation. This training will also involve education in data collection methodologies.

CLIMATE SCIENCE

Project Name	Technical Transfer in Global Change Through Scientific Workshops.
Purpose	Implement new collaborative programs and exchange the latest scientific results in global change studies and technologies.
Countries	Brazil, Indonesia
Contacts— U.S. Agency	National Oceanic and Atmospheric Administration/Global Programs
U.S. Resource Cooperating Agency	Several universities University of Sao Paulo and National Institute for Space Research, Brazil; Badan Pengkajian dan Penerapan Teknologi, Lembaga Ilmu Pengetahuan Indonesia, Pusat Penelitian Dan Pengembangan Oseanologi (Puslitbang Oseanologi), Badan Meteorologi Dan Geofisika, Institute of Aeronautics and Space, Badan Kordinasi Survey Dan Pemetaan Nasional (Bakosutanal), and Dinas Hidrografi-TNI-AL (Dishidros), Indonesia
Sector	Basic science, climate and global change
Technology	Scientific information
U.S. Funding	\$20,000 in FY 1991
Description	These scientific workshops address various aspects of regional and global climate change variability. For example, in October 1990, a U.S.-Brazil workshop was held in Fortaleza, Brazil, on the Relationship of the Atlantic Ocean to Regional and Global Climate Variation.

CLIMATE SCIENCE

Project Name	Numerical Weather Prediction
Purpose	Establish the Indian Long Range Weather Forecasting Center and enable it to produce numerical weather predictions.
Countries	India
Contacts— U.S. Agency	National Oceanic and Atmospheric Administration/Global Programs
U.S. Resource Cooperating Agency	University of Maryland Indian Meteorological Department
Sector	Climate modeling
Technology	Computer modeling methodologies
U.S. Funding	\$50,000 in FY 1991
Description	The National Oceanic and Atmospheric Administration (Global Programs) is supporting a U.S. scientist to assist with the establishment of the Indian Long Range Weather Forecasting Center at the Indian Meteorological Department. Education and training in the application of a computer model using the newly acquired supercomputer in numerical weather prediction efforts are part of this effort.

CLIMATE SCIENCE

Project Name	Interannual Climate Variability
Purpose	Improve scientific understanding of meteorological processes occurring in tropical regions and shorten the time scale of predictions.
Countries	People's Republic of China, Indonesia
Contacts— U.S. Agency	National Oceanic and Atmospheric Administration/Global Programs
U.S. Resource Cooperating Agency	Universities; Aeronomy Laboratory, Boulder, Colorado State Oceanic Administration, Academia Sinica, State Meteorological Administration, and State Commission of Education, People's Republic of China; Badan Pengkajian dan Penerapan Teknologi, Lembaga Ilmu Pengetahuan Indonesia, Pusat Penelitian Dan Pengembangan Oseanologi (Puslitbang Oseanologi), Badan Meteorologi Dan Geofisika, Institute of Aeronautics and Space, Badan Kordinasi Survey Dan Pemetaan Nasional (Bakosutanal), and Dinas Hidrografi-TNI-AL (Dishidros), Indonesia
Sector	Climate Science
Technology	Data collection, analysis technologies and methodologies
U.S. Funding	\$750,000 from FY 1991 to FY 1992; \$1 million in FY 1993
Description	This project supports two major activities. In the first, the Aeronomy Laboratory has collaborated with the Indonesians in an effort to fix their wind profiler, located in Biak. It is an element of the planned trans-Pacific network of wind-profiling radars that will eventually span the entire tropical Pacific Ocean. The second supports participation by the People's Republic of China and Indonesia in the Tropical Oceans Global Atmosphere Coupled Ocean Atmosphere Research Experiment (TOGA COARE). The People's Republic of China will provide three research vessels to participate in joint cruises in the TOGA COARE region. The United States will complement the necessary oceanographic and meteorological instrumentation. The Indonesians are participating in the TOGA COARE meteorological program. They are collaborating with U.S. scientists to upgrade their sounding stations (Manado, Palu, Kupang, Biak, Ambon, Medan, Padang, Takarta, Surabaya, Ujung Pandang) for use during the Intensive Observing Period planned for November 1992 to February 1993.

CLIMATE SCIENCE

Project Name	Biogenic Carbon Sources and Sinks
Purpose	Determine the potential for using forest and agricultural management practices in Brazil to offset global carbon emissions to the atmosphere.
Countries	Brazil
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Environmental Protection Agency/Office of Research and Development U.S. resource not identified Cooperating agency not identified
Sector	Forestry, agriculture, climate science, carbon budget
Technology	Collaborative research
U.S. Funding	\$100,000 from FY 1990 to FY 1991
Description	Carbon budgets quantify pools and fluxes of carbon and are useful in determining the effectiveness of different options for managing the biosphere to offset carbon emissions to the atmosphere. The project will use existing data to develop a carbon budget for Brazil, evaluate the present trends in land-use patterns and practices, and assess potential terrestrial management practices to conserve and sequester carbon. Present activity will provide only a crude estimate of the potential for carbon sequestration, but a long-term collaborative research program is envisioned to demonstrate and evaluate potential management and conservation practices based on the results of this project.

CLIMATE SCIENCE

Project Name	International Symposium on Climate-Biosphere Interaction
Purpose	Exchange scientific information on interactions between climate and the biosphere.
Countries	China
Contacts— U.S. Agency	Environmental Protection Agency/Office of Research and Development
U.S. Resource Cooperating Agency	Environmental Research Laboratory—Athens National Environmental Protection Agency of China; participation by scientists from other countries
Sector	Climate science
Technology	Exchange of scientific information
U.S. Funding	\$95,000 in FY 1991
Description	Under the auspices of the United States–China protocol for scientific and technical cooperation in the field of environmental protection, the Environmental Protection Agency and the National Environmental Protection Agency of China organized a symposium to exchange information on current global climate research and to foster useful future interaction among the participants. The symposium was held in Beijing in May 1991 and included a diverse group of researchers. Topics included climatic trends; climatic forcing from increasing concentrations of CO ₂ and methane; current approaches to evaluating sources and sinks of carbon gases; tropical deforestation; biomass burning; afforestation; rice cultivation; atmospheric feedbacks; the hydrologic cycle; and environmental effects on agriculture, water resources, and forest ecosystems. Symposium proceedings will be published.

CLIMATE SCIENCE

Project Name	Regional Institutes for Global Change Research
Purpose	Promote the ability of developing countries to conduct interdisciplinary global change research.
Countries	Global
Contacts— U.S. Agency U.S. Resource Cooperating Agency	National Science Foundation U.S. resource not identified Cooperating agency not identified
Sector	Climate Science
Technology	Collaborative Research
U.S. Funding	Continuing program beginning with \$2 million budgeted in FY 1992
Description	This initiative will establish three regional institutes for global change research: one in the Americas, one in the Far East and Southwest Pacific, and one in Africa and Europe. The initiative recognizes the need for improved knowledge of physical and biogeochemical processes and their economic implications in different regions of the world and the contribution that scientists from these regions can make toward this understanding. The institutes are intended to bring together the critical mass of resources and abilities needed to undertake global change research in the three regions. A workshop to begin organizing the institute for the Americas was held in July 1991 and began a regional working group; another workshop will be held in the spring of 1992 to prepare documents and an agreement to formally establish the institute.

Project Name	Sea Level Monitoring
Purpose	Monitor global absolute sea level for climate studies and coastal zone management.
Countries	China
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Commerce/National Ocean Service National Oceanic and Atmospheric Administration Shanghai Observatory, Academia Sinica
Sector	Oceanographic research
Technology	Sea level monitoring, cooperative research, instrumentation
U.S. Funding	\$25,000 per year, project duration not specified
Description	The National Oceanic and Atmospheric Administration works cooperatively with the Shanghai Observatory on a Very Long Baseline Interferometry facility, providing technical assistance, lending instrumentation, and assisting with procurement of parts. Shanghai Observatory participates in international Very Long Baseline Interferometry observation campaigns that produce observational data useful for climate and global change studies.

CLIMATE SCIENCE

Project Name	River Forecast Center
Purpose	Improve ability to forecast river flow.
Countries	Egypt
Contacts— U.S. Agency	Department of Commerce, National Ocean Service; Agency for International Development
U.S. Resource	U.S. resource not identified
Cooperating Agency	Cooperating agency not identified
Sector	Water resources
Technology	Forecasting, remote sensing, information management
U.S. Funding	\$2.4 million from FY 1991 to FY 1993
Description	This project is establishing a center in Cairo to forecast river flow in the Nile basin. Part of this effort will develop methods to measure rainfall from earth satellites for use in predicting floods. Specialists have been recruited, and computer equipment has been ordered; data links with the European METEOSAT are being developed.

CLIMATE SCIENCE

Project Name	Monsoons and Global Climate Change
Purpose	Improve understanding of how monsoons may be affected by climate change.
Countries	India
Contacts— U.S. Agency U.S. Resource	Department of Commerce/Office of Air and Radiation National Oceanic and Atmospheric Administration; University of Maryland; Pennsylvania State University; St. Louis University
Cooperating Agency	Indian Institute of Tropical Meteorology
Sector	Basic climate science
Technology	Collaborative research
U.S. Funding	\$250,000 from FY 1990 to FY 1995
Description	This project supports joint climate research by the Indian Institute of Tropical Meteorology and several institutions in the United States. The research focuses on the Indian Ocean/Asian monsoon and its coupling with global climate change.

CLIMATE SCIENCE

Project Name	Participation in Tropical Oceans and Global Atmosphere program
Purpose	Support participation by several developing countries in international climate science program.
Countries	Pakistan, Thailand
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Commerce/Office of Global Programs U.S. resource not identified Cooperating agency not identified
Sector	Climate science
Technology	Collaborative research, instrumentation
U.S. Funding	Project extends from FY 1987 to FY 1994; funding not specified
Description	This project supports participation by Thailand and Pakistan in the Tropical Oceans and Global Atmosphere Program, a major international research program to understand the role of the tropical Pacific in climate change. The project supplies expendable bathythermographs to be used by Pakistan to collect oceanographic subsurface thermal data, and it provides funding for participation by scientists from Thailand.

CLIMATE SCIENCE

Project Name	Installation of Climate Computing Systems
Purpose	Promote collection and sharing of meteorological and climatological information.
Countries	Brazil, Costa Rica, Mexico, Nigeria, Senegal, Venezuela
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Commerce National Weather Service Cooperating agency not identified
Sector	Climate science
Technology	Computing, data collection and management
U.S. Funding	\$98,500; project duration not specified
Description	CLICOM is a personal-computer-based system developed by the National Weather Service to help rescue and preserve historic meteorological, hydrologic, and climatological data in easily accessible forms for study. By providing funding to install this system in developing countries, this project encourages them to analyze their own data, collect data for their own use, and share data with other countries. The data collected will assist in establishing baseline information about the global climate. The system has been installed in other countries with funding from the United Nations Development Program, other donor countries, or the country itself.

CLIMATE SCIENCE

Project Name	Education of Scientists in Developing Countries
Purpose	Increase the number of scientists in developing countries who can assist in the global effort to analyze climate systems and climate change.
Countries	China, Costa Rica, Indonesia, Malaysia, Nigeria, Pakistan, Poland, Thailand, Venezuela
Contacts—	
U.S. Agency	Department of Commerce, National Weather Service
U.S. Resource	U.S. resource not identified
Cooperating Agency	Cooperating agency not identified
Sector	Climate science
Technology	Education and technical training
U.S. Funding	\$328,000 over an unspecified period
Description	This is a continuing project to support education and training in meteorology, hydrology, and climatology for students in developing countries. The funding identified above supported 18 students and in some cases was supplemented by funding from the participating countries.

Coastal Zones

COASTAL ZONES

Project Name	ASEAN Coastal Resources Management
Purpose	Develop improved ways to manage living coastal resource systems in the ASEAN countries.
Countries	Thailand, Indonesia, Malaysia, Singapore, Brunei, Philippines
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified International Center for Living Aquatic Resource Management, Philippines; institutions within the participating countries
Sector	Coastal resources, fisheries
Technology	Resource planning and management, collaborative research
U.S. Funding	Project runs from FY 1985 to FY 1991, with expected total expenditures of \$5 million from FY 1985 to FY 1991.
Description	The project develops improved technical and institutional approaches for managing living coastal resource systems in the six ASEAN countries. It supports coastal-zone resource assessments at pilot sites to identify conflicts in the use of common property resources and the biophysical, socioeconomic, and institutional dimensions of coastal resource management. Research is conducted to forecast future demands on coastal resources, analyze the economics of alternative resource uses, and identify problems inherent in resource management. The project provides support for mostly short-term training, for publication and dissemination of information within and outside the region, and for preparation of an atlas to present information on current resource use and trends.

COASTAL ZONES

Project Name	International Impacts of Climate Change on Sea-Level Rise
Purpose	Estimate how rising sea levels might affect several developing countries.
Countries	Brazil, Senegal, Nigeria, Egypt, China
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation
U.S. Resource Cooperating Agency	University of Maryland Universidade Federal do Rio de Janeiro, Brazil; Universite Cheikh Anta Diop, Senegal; Nigerian Institute for Oceanography and Marine Research, Nigeria; University of Alexandria, Egypt; Peking University, China
Sector	Coastal zones, sea-level rise
Technology	Collaborative research
U.S. Funding	\$240,000 in FY 1990
Description	Many developing countries have large and expanding populations in coastal areas and lack resources for responding if sea levels rise. This project is estimating the effect of sea-level rise on several developing countries. The research is being conducted almost exclusively by in-country researchers and includes national assessments based on existing data, case studies based on new data, and videomapping of the coastal contour and associated erosion. Later phases of the study will estimate the cost of protecting these countries from the effects of higher sea levels.

COASTAL ZONES

Project Name	Vulnerability to Sea Level Rise
Purpose	Determine how sea level rise would affect the Marshall Islands and what would be necessary to respond to higher sea levels.
Countries	Marshall Islands
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Department of Commerce/National Ocean Service National Oceanic and Atmospheric Administration Cooperating agency not identified
Sector	Sea level rise
Technology	Assessment and planning
U.S. Funding	\$35,000, project duration not specified
Description	This is a cooperative project between the National Oceanic and Atmospheric Administration and the Marshall Islands to conduct a case study assessing the vulnerability of the islands to sea level rise. The study is part of the assessment by the Intergovernmental Panel on Climate Change on the vulnerability of coastal states to rising sea levels. The study will identify ways to respond and the requirements needed to undertake these responses.

Other

OTHER

Project Name	Monitoring Distribution of Malaria
Purpose	Demonstrate how remote-sensing technologies can be used to monitor changes in the distribution of malaria.
Countries	Mexico
Contacts— U.S. Agency U.S. Resource Cooperating Agency	National Aeronautics and Space Administration Ames Research Center, California Secretariat of Health
Sector	Health, biological systems
Technology	Remote sensing, biospheric modeling
U.S. Funding	Approximately \$750,000 per year from FY 1989 to FY 1993
Description	The joint scientific goal of this investigation is to demonstrate how National Aeronautics and Space Administration-derived technologies can be used to study and model the environmental factors that influence the prevalence and distribution of mosquitoes that carry malaria. If the climate changes, the geographical distribution of these factors also would change, as would the geographical distribution of the disease. The case study is being conducted in a portion of coastal Chiapas, Mexico.

OTHER

Project Name	Global Resource Information Data Base Facility
Purpose	Provide access to global environmental data.
Countries	Global
Contacts— U.S. Agency	National Aeronautics and Space Administration, United States Geological Survey
U.S. Resource	U.S. resource not identified
Cooperating Agency	United Nations Environment Program
Sector	Environmental data
Technology	Data management, geographic information systems, data analysis, satellite image processing
U.S. Funding	\$900,000 in FY 1991 from National Aeronautics and Space Administration; additional funding from United States Geological Survey not specified.
Description	This project is developing a center through which a variety of environmental data may be input, collated, stored, retrieved, analyzed, and distributed. The center will provide support to environmental projects requiring geographic-information-system and satellite-image-processing technologies. It will also provide support for training in these technologies, particularly for researchers and institutions in developing countries.

OTHER

Project Name	Geographic Information System Project
Purpose	Improve ability to collect and analyze data about the environment.
Countries	Chile
Contacts— U.S. Agency U.S. Resource Cooperating Agency	National Aeronautics and Space Administration John C. Stennis Space Center University of Chile
Sector	Environmental data
Technology	Geographic information systems, data management
U.S. Funding	\$10,000 to \$50,000 in both FY 1992 and FY 1993
Description	This project will establish a geographic information system in Chile to be used in analyzing remote-sensing data gathered from satellites and from field observations. The U.S. and Chilean partners will use the system to analyze how human activity affects various environmental processes and resources and how problems resulting from this activity might be solved.

OTHER

Project Name	Ranomafana National Park Conservation and Development
Purpose	Preserve biological diversity and conserve renewable energy resources.
Countries	Madagascar
Contacts— U.S. Agency	Agency for International Development
U.S. Resource	U.S. resource not identified
Cooperating Agency	Cooperating agency not identified
Sector	Natural ecosystems
Technology	Conservation, resource management
U.S. Funding	\$3.2 million from FY 1990 to FY 1995
Description	This project supports several measures to protect the Ranomafana National Park and research to identify and understand the park's resources. It also supports education in conservation and small development projects in villages surrounding the park to provide inhabitants with alternatives to the exploitation of park lands. The project also protects the headwaters of the Naramone River, which provides the electricity for southeastern Madagascar.

Project Name	Sustainable Approaches to Viable Environmental Management
Purpose	Identify and initiate systems to manage areas being protected to preserve biodiversity.
Countries	Madagascar
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Agency for International Development U.S. resource not identified Ministry of Livestock, Fisheries, Water, and Forests; National Office on the Environment
Sector	Natural resources
Technology	Methods for planning and managing the use of natural resources; geographic information systems; data collection and management
U.S. Funding	\$7 million in FY 1991
Description	This project will establish a National Association for the Management of Protected Areas to (1) help plan biodiversity policy in collaboration with the National Office of the Environment and (2) coordinate management of protected areas and development of their peripheral zones. The project will provide technical assistance to perform these functions and to establish the financial, administrative, educational, training, and communication systems necessary for effective functioning of the association. Assistance with establishing a Biodiversity Planning Service responsible for diagnostic studies, data collection, and monitoring of conservation and development activities will also be provided. The service will be housed within the association but initially will be managed by an international organization experienced with conservation data banks.

OTHER

Project Name	International River Basin Management and Climate Change
Purpose	Understand how climate change could affect water supply in major international river basins.
Countries	Numerous developing countries drained by major rivers
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation University of Colorado
U.S. Resource Cooperating Agency	Instituto do Pesquisas Hidraulicas, UFRGS, Brazil; Asian Institute of Technology, Thailand; Mekong Secretariat, Thailand; others not identified
Sector	Water resources
Technology	River basin management, collaborative research
U.S. Funding	\$315,000 in FY 1990
Description	The majority of research on how climate change might affect river basins and water resources has focused on developed countries. This project examines these effects on selected international rivers in developing countries, including the Mekong, Indus, La Plata, Nile, and Zambezi. Research will identify potential changes in water supply that might result if climate does change and will analyze the sensitivity and ability of water-resource management in these basins to adapt to climate change. A major goal of the project is to involve basin planners directly in the analysis, applying the simulation and analytical tools they currently use as guides to basin planning. This provides greater awareness of global change issues among river basin planners. Ultimately the project will link basin sensitivity development trends, potential impacts, and possible responses into an overall assessment of the risks posed by climate change.

OTHER

Project Name	International Impacts of Climate Change on Human Health
Purpose	Understand the implications for health of climate change.
Countries	China
Contacts— U.S. Agency	Environmental Protection Agency/Office of Policy, Planning, and Evaluation
U.S. Resource Cooperating Agency	National Institutes of Health Zhongshan University, China
Sector	Health
Technology	Collaborative research
U.S. Funding	\$35,000 in FY 1990
Description	There is growing concern in both the medical and climatological communities that significant global warming could exacerbate international health problems. The Environmental Protection Agency has initiated a study of the implications of climate change for health. A workshop was held in November 1990 with researchers working on tropical diseases to identify candidate diseases to be included in the study. As part of the study, the Environmental Protection Agency is working with the National Institutes of Health to develop models of the range and intensity of these diseases. A case study has been initiated with China to examine potential changes in mortality.

OTHER

Project Name	Global Emissions from Small Combustion Devices Used for Cooking
Purpose	Improve estimates of emissions of greenhouse gases from small cookstoves and woodstoves.
Countries	Philippines, India, China
Contacts— U.S. Agency	Environmental Protection Agency/Office of Research and Development
U.S. Resource Cooperating Agency	East-West Center, Hawaii International Development Research Center
Sector	Residential energy use
Technology	Collaborative research
U.S. Funding	\$80,000 in FY 1991
Description	The Environmental Protection Agency is cosponsoring a program to develop a more reliable estimate of global emissions from small cookstoves and woodstoves that most of the world's households use for cooking. These devices burn a broad range of fuels and, in aggregate, may be important sources of radiatively active trace gases that contribute to global climate change. The program will characterize the types of devices, fuels, and emissions and identify ways to reduce or control these emissions. The International Development Research Center, which is cosponsoring the program, is a network of five Asian and two U.S. institutions. A pilot study is in progress in Manila, and field testing will be done in India, with reports of results and discussion of control technologies to be issued in FY 1991 to FY 1993.

OTHER

Project Name	Ozone Depletion Case Studies
Purpose	Determine the costs of phasing out ozone-depleting substances.
Countries	Brazil, Egypt, Mexico
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Environmental Protection Agency/Global Change Division Environmental Protection Agency/Global Change Division Government agencies in Brazil, Egypt, and Mexico
Sector	Ozone depletion
Technology	Technical advice
U.S. Funding	\$260,000 in 1990, which may include some funds from cooperating countries
Description	Staff of the Global Change Division served as technical advisors to the governments of Brazil, Egypt, and Mexico in preparing three case studies on the costs to these countries of phasing out the use of ozone-depleting substances. Egypt and Mexico presented their case studies at the Second Meeting of the Parties to the Montreal Protocol. Some of the projects outlined in the case studies are being developed for funding from the Montreal Protocol Interim Multilateral Fund established by the Parties to the Montreal Protocol, and the Environmental Protection Agency anticipates providing technical assistance to these projects if they are funded. In addition, the Environmental Protection Agency is providing technical assistance to other countries to help them develop strategies and options for implementing the Montreal Protocol.

OTHER

Project Name	Carbon Dioxide Information Analysis Center
Purpose	Collect, maintain, and distribute information related to CO ₂ research.
Countries	Global
Contacts— U.S. Agency	Department of Energy / Office of Health and Environmental Research, Carbon Dioxide Research Program
U.S. Resource Cooperating Agency	Oak Ridge National Laboratory Scientists and numerous institutions
Sector	Climate science, information
Technology	Information, numerical data, computer modeling software
U.S. Funding	Continuing program since 1982, with funding of \$1.3 million in FY 1990.
Description	The center provides information support to the international research, policy, and educational communities for evaluating environmental issues associated with elevated levels of atmospheric CO ₂ , including climate change. The center obtains and evaluates data, articles, and reports; produces and distributes digital numeric data and computer model packages; distributes CO ₂ -related reports; and publishes a newsletter, <i>CDIAC Communications</i> , which has a worldwide distribution of over 5500 subscribers in 151 countries. Since 1985, the center has distributed nearly 2800 copies of data sets and models and responded to more than 18,000 requests for information from users in 80 countries.

Resources

The inventory format was designed to report examples of technological cooperation rather than the institutions and other resources which the U.S. agencies use to participate in cooperation. Several broad classes of institutional cooperation that are under represented or not represented in the inventory are listed as follows.

Bilateral or other cooperative agreements in which a U.S. agency makes available its staff, equipment, office space, or similar support (including those of its contractors) as a contribution to countries or international agencies that conduct research, administer treaties, or cooperate in solving common problems. The Department of Energy, Department of Agriculture, and Environmental Protection Agency all mentioned that they have such agreements with a number of developing countries and that these agreements involve cooperation in activities related to climate change. The Agency for International Development has similar agreements with multilateral organizations, including the World Bank, regional development banks, and United Nations organizations. Much of this type of activity involves in-kind cooperation of staff and appears to be very difficult to track. The Environmental Protection Agency anticipates that this type of cooperation by its staff will constitute part of the U.S. contribution to the Interim Multilateral Fund established by the Parties to the Montreal Protocol.

Several U.S. agencies work to promote exports of U.S. technologies, many of which would improve energy efficiency and reduce greenhouse gas emissions. The Department of Commerce and Department of Energy sponsor trade fairs in developing countries, the Department of Energy promotes the export of more efficient coal technologies, and the Department of Energy leads a multi-agency program, the Committee on Renewable Energy Commerce and Trade (CORECT), to promote transfer of renewable energy technologies. Related resources include funding programs within several agencies to underwrite part of the costs of conducting feasibility studies, applying for project financing, obtaining approvals, or providing insurance to participants in export investments. These efforts support exports to developed as well as developing countries and involve exports unrelated as well as related to global climate change, thus making it difficult to track in detail the specific activities of interest to this inventory. Although the focus of this inventory is on activities by federal agencies, several states have active export promotion programs, and California has one that targets technologies for renewable energy and energy efficiency.

Although the inventory notes a few information resources, many agencies either maintain or are developing clearinghouses and data bases related to climate change. We did not include these resources in the inventory because the agencies provided too little information about their contents and about what was being done to make the contents accessible to potential users in developing countries. These include

- A computerized information system describing environmental protection and energy efficiency technologies, which the Environmental Protection Agency, Department of Energy, and Agency for International Development are developing and expect to demonstrate at the 1992 United Nations Conference on Environment and Development in Brazil.

- The National Climatic Data Center, National Oceanographic Data Center's Environmental Data Referral Service, the National Environmental Satellite Data and Information Service, and the National Weather Service Climate Analysis Center, all operated within the Department of Commerce.
- The Center for Environmental Research Information, the Pollution Prevention Information Clearinghouse, the Innovative/Alternative Projects Clearinghouse, and the Pathfinder to International Databases, all supported by the Environmental Protection Agency. None was developed specifically for climate change but all have substantial information about technologies related to the issue.
- The Trade and Investment Monitoring System, Energy Efficiency Equipment Cost Directory, Energy Efficiency Technology Menu, and Private Power Database, all supported by the Agency for International Development. Some of these are targeted at U.S. companies that might supply technology or investment capital for projects in developing countries, while others may be directed more toward users in developing countries.
- Several data bases or clearinghouses created by industrial organizations or international agencies with substantial support from U.S. agencies. These include the Center for the Analysis and Dissemination of Demonstrated Energy Technologies (CADDET) of the International Energy Agency and the International Cleaner Production Information Clearinghouse sponsored by the United Nations Environment Program.

Finally, the technical expertise that the U.S. government brings to cooperative efforts resides in a diverse combination of agency laboratories and research centers, laboratories operated under long-term government contract, and universities, non-profit organizations, and private firms that provide information services to the sponsoring agency under grants or contracts of shorter duration. The following is a selected list of organizations that are either staffed by federal agencies or operated under long-term contract and are major resources for cooperation in science and technology related to global climate change. The inventory includes some but not all of these organizations.

Department of Agriculture

Animal Disease Laboratory, Kenya
 Asian Parasite Laboratory, Korea
 Biological Control of Weeds Laboratory, Argentina
 International Forestry Staff
 Institute of Pacific Islands Forestry
 Institute of Tropical Forestry, Puerto Rico
 Tropical Agriculture Research Station

Department of Commerce

Air Resources Laboratory Climate Monitoring and Diagnostics Laboratory
 Office of Oceanic and Atmospheric Research
 Environmental Research Laboratories
 National Meteorological Center

Department of Energy

Argonne National Laboratory
Brookhaven National Laboratory
Lawrence Berkeley Laboratory
Los Alamos National Laboratory
National Renewable Energy Laboratory
Oak Ridge National Laboratory
Pacific Northwest Laboratory
Sandia National Laboratories
Morgantown Energy Technology Center
Pittsburgh Energy Technology Center
National Appropriate Technology Assistance Service
Bonneville Power Authority

Environmental Protection Agency

Air and Energy Engineering Research Laboratory
Athens Environmental Research Laboratory
Corvallis Environmental Research Laboratory

National Aeronautics and Space Administration

Technology Application Center
Goddard Institute for Space Studies
Goddard Space Flight Center
Space Science Data Center

U.S. Geological Survey

Earth Resources Observation System Data Center
Water and Energy Research Institute of the Western Pacific
Virgin Islands Water Resources Research Center

Other Agencies

National Center for Atmospheric Research
Smithsonian Tropical Research Institute
Tennessee Valley Authority

The universities, non-profit organizations, and private firms that provide information services to the sponsoring agency under grants or contracts of shorter duration are far more numerous. Some of these have been identified in the inventory for specific activities. Many others were not identified in the information provided by the agencies and should be if the inventory is revised in the future.

OTHER

Project Name	Global Emissions from Small Combustion Devices Used for Cooking
Purpose	Improve estimates of emissions of greenhouse gases from small cookstoves and woodstoves.
Countries	Philippines, India, China
Contacts— U.S. Agency	Environmental Protection Agency/Office of Research and Development
U.S. Resource Cooperating Agency	East-West Center, Hawaii International Development Research Center
Sector	Residential energy use
Technology	Collaborative research
U.S. Funding	\$80,000 in FY 1991
Description	The Environmental Protection Agency is cosponsoring a program to develop a more reliable estimate of global emissions from small cookstoves and woodstoves that most of the world's households use for cooking. These devices burn a broad range of fuels and, in aggregate, may be important sources of radiatively active trace gases that contribute to global climate change. The program will characterize the types of devices, fuels, and emissions and identify ways to reduce or control these emissions. The International Development Research Center, which is cosponsoring the program, is a network of five Asian and two U.S. institutions. A pilot study is in progress in Manila, and field testing will be done in India, with reports of results and discussion of control technologies to be issued in FY 1991 to FY 1993.

OTHER

Project Name	Ozone Depletion Case Studies
Purpose	Determine the costs of phasing out ozone-depleting substances.
Countries	Brazil, Egypt, Mexico
Contacts— U.S. Agency U.S. Resource Cooperating Agency	Environmental Protection Agency/Global Change Division Environmental Protection Agency/Global Change Division Government agencies in Brazil, Egypt, and Mexico
Sector	Ozone depletion
Technology	Technical advice
U.S. Funding	\$260,000 in 1990, which may include some funds from cooperating countries
Description	Staff of the Global Change Division served as technical advisors to the governments of Brazil, Egypt, and Mexico in preparing three case studies on the costs to these countries of phasing out the use of ozone-depleting substances. Egypt and Mexico presented their case studies at the Second Meeting of the Parties to the Montreal Protocol. Some of the projects outlined in the case studies are being developed for funding from the Montreal Protocol Interim Multilateral Fund established by the Parties to the Montreal Protocol, and the Environmental Protection Agency anticipates providing technical assistance to these projects if they are funded. In addition, the Environmental Protection Agency is providing technical assistance to other countries to help them develop strategies and options for implementing the Montreal Protocol.

OTHER

Project Name	Carbon Dioxide Information Analysis Center
Purpose	Collect, maintain, and distribute information related to CO ₂ research.
Countries	Global
Contacts— U.S. Agency	Department of Energy /Office of Health and Environmental Research, Carbon Dioxide Research Program
U.S. Resource Cooperating Agency	Oak Ridge National Laboratory Scientists and numerous institutions
Sector	Climate science, information
Technology	Information, numerical data, computer modeling software
U.S. Funding	Continuing program since 1982, with funding of \$1.3 million in FY 1990.
Description	The center provides information support to the international research, policy, and educational communities for evaluating environmental issues associated with elevated levels of atmospheric CO ₂ , including climate change. The center obtains and evaluates data, articles, and reports; produces and distributes digital numeric data and computer model packages; distributes CO ₂ -related reports; and publishes a newsletter, <i>CDIAC Communications</i> , which has a worldwide distribution of over 5500 subscribers in 151 countries. Since 1985, the center has distributed nearly 2800 copies of data sets and models and responded to more than 18,000 requests for information from users in 80 countries.

Resources

The inventory format was designed to report examples of technological cooperation rather than the institutions and other resources which the U.S. agencies use to participate in cooperation. Several broad classes of institutional cooperation that are under represented or not represented in the inventory are listed as follows.

Bilateral or other cooperative agreements in which a U.S. agency makes available its staff, equipment, office space, or similar support (including those of its contractors) as a contribution to countries or international agencies that conduct research, administer treaties, or cooperate in solving common problems. The Department of Energy, Department of Agriculture, and Environmental Protection Agency all mentioned that they have such agreements with a number of developing countries and that these agreements involve cooperation in activities related to climate change. The Agency for International Development has similar agreements with multilateral organizations, including the World Bank, regional development banks, and United Nations organizations. Much of this type of activity involves in-kind cooperation of staff and appears to be very difficult to track. The Environmental Protection Agency anticipates that this type of cooperation by its staff will constitute part of the U.S. contribution to the Interim Multilateral Fund established by the Parties to the Montreal Protocol.

Several U.S. agencies work to promote exports of U.S. technologies, many of which would improve energy efficiency and reduce greenhouse gas emissions. The Department of Commerce and Department of Energy sponsor trade fairs in developing countries, the Department of Energy promotes the export of more efficient coal technologies, and the Department of Energy leads a multi-agency program, the Committee on Renewable Energy Commerce and Trade (CORECT), to promote transfer of renewable energy technologies. Related resources include funding programs within several agencies to underwrite part of the costs of conducting feasibility studies, applying for project financing, obtaining approvals, or providing insurance to participants in export investments. These efforts support exports to developed as well as developing countries and involve exports unrelated as well as related to global climate change, thus making it difficult to track in detail the specific activities of interest to this inventory. Although the focus of this inventory is on activities by federal agencies, several states have active export promotion programs, and California has one that targets technologies for renewable energy and energy efficiency.

Although the inventory notes a few information resources, many agencies either maintain or are developing clearinghouses and data bases related to climate change. We did not include these resources in the inventory because the agencies provided too little information about their contents and about what was being done to make the contents accessible to potential users in developing countries. These include

- A computerized information system describing environmental protection and energy efficiency technologies, which the Environmental Protection Agency, Department of Energy, and Agency for International Development are developing and expect to demonstrate at the 1992 United Nations Conference on Environment and Development in Brazil.

- The National Climatic Data Center, National Oceanographic Data Center's Environmental Data Referral Service, the National Environmental Satellite Data and Information Service, and the National Weather Service Climate Analysis Center, all operated within the Department of Commerce.
- The Center for Environmental Research Information, the Pollution Prevention Information Clearinghouse, the Innovative/Alternative Projects Clearinghouse, and the Pathfinder to International Databases, all supported by the Environmental Protection Agency. None was developed specifically for climate change but all have substantial information about technologies related to the issue.
- The Trade and Investment Monitoring System, Energy Efficiency Equipment Cost Directory, Energy Efficiency Technology Menu, and Private Power Database, all supported by the Agency for International Development. Some of these are targeted at U.S. companies that might supply technology or investment capital for projects in developing countries, while others may be directed more toward users in developing countries.
- Several data bases or clearinghouses created by industrial organizations or international agencies with substantial support from U.S. agencies. These include the Center for the Analysis and Dissemination of Demonstrated Energy Technologies (CADDET) of the International Energy Agency and the International Cleaner Production Information Clearinghouse sponsored by the United Nations Environment Program.

Finally, the technical expertise that the U.S. government brings to cooperative efforts resides in a diverse combination of agency laboratories and research centers, laboratories operated under long-term government contract, and universities, non-profit organizations, and private firms that provide information services to the sponsoring agency under grants or contracts of shorter duration. The following is a selected list of organizations that are either staffed by federal agencies or operated under long-term contract and are major resources for cooperation in science and technology related to global climate change. The inventory includes some but not all of these organizations.

Department of Agriculture

Animal Disease Laboratory, Kenya
 Asian Parasite Laboratory, Korea
 Biological Control of Weeds Laboratory, Argentina
 International Forestry Staff
 Institute of Pacific Islands Forestry
 Institute of Tropical Forestry, Puerto Rico
 Tropical Agriculture Research Station

Department of Commerce

Air Resources Laboratory Climate Monitoring and Diagnostics Laboratory
 Office of Oceanic and Atmospheric Research
 Environmental Research Laboratories
 National Meteorological Center

Department of Energy

Argonne National Laboratory
Brookhaven National Laboratory
Lawrence Berkeley Laboratory
Los Alamos National Laboratory
National Renewable Energy Laboratory
Oak Ridge National Laboratory
Pacific Northwest Laboratory
Sandia National Laboratories
Morgantown Energy Technology Center
Pittsburgh Energy Technology Center
National Appropriate Technology Assistance Service
Bonneville Power Authority

Environmental Protection Agency

Air and Energy Engineering Research Laboratory
Athens Environmental Research Laboratory
Corvallis Environmental Research Laboratory

National Aeronautics and Space Administration

Technology Application Center
Goddard Institute for Space Studies
Goddard Space Flight Center
Space Science Data Center

U.S. Geological Survey

Earth Resources Observation System Data Center
Water and Energy Research Institute of the Western Pacific
Virgin Islands Water Resources Research Center

Other Agencies

National Center for Atmospheric Research
Smithsonian Tropical Research Institute
Tennessee Valley Authority

The universities, non-profit organizations, and private firms that provide information services to the sponsoring agency under grants or contracts of shorter duration are far more numerous. Some of these have been identified in the inventory for specific activities. Many others were not identified in the information provided by the agencies and should be if the inventory is revised in the future.

Compiler's Notes

Our primary source of information was the descriptions provided by U.S. agencies of their activities involving technological cooperation with developing countries related to climate change. Many of these descriptions were prepared originally for other purposes and required substantial abstracting and editing. We have drawn upon our familiarity with climate change issues, our network of professional contacts, and, in some cases, our personal experience with the activities to determine whether to include the activity and how to describe it; we also used these sources to identify some activities the agencies omitted. Where necessary we supplemented a description to make it clear why the activity is related to climate change; otherwise, the description is based entirely on the material provided by the U.S. agency. When this material was insufficient for us to describe to others what the project is actually doing, how it contributes to preventing, mitigating, or responding to climate change, or how technology cooperation is involved, we omitted the activity from the inventory. We have not attempted to judge the effectiveness of the cooperation, only whether it was relevant to climate change and is a reasonably current activity (occurring in 1990 or 1991, or highly likely to occur in 1992).

Conventions used in compiling the inventory

We combined a few small projects that sounded similar to each other and differed only in the countries or agencies cooperating in them; we kept them separate if they differed greatly in funding or type of activity, even when they support a common purpose such as sea level monitoring.

Several descriptions included diverse activities, all related to climate change, with insufficient information to report them separately, and we have listed them under what we believe to be the main activity. Several descriptions reported activities clearly related to climate change in conjunction with activities for which the connection was much weaker. When the information was sufficient to allow us to describe the climate change activity separately, or to indicate clearly that the climate change activity was the predominant activity, we have included it. However, in most of these cases we were unable to separate the funding. When we could not prepare a separate description from the available information, we omitted the combined activity. This under reports the amount of technical cooperation related to climate change.

For each activity we have listed only those countries that the U.S. agency identified as cooperating. Some activities were identified as regional or global, and we have not identified specific countries unless we had personal experience with the project or agency, or other solid identifications. The number of countries participating in some of the projects is probably greater than we have listed. For example, a few involve river basins that drain more countries than the agency identified, and a few others involve participation in international observation programs that probably include more participants than the descriptions we were given indicated.

Some U.S. agencies identified cooperating agencies using the language of the cooperating country, while others used English. Except for a few obvious typographical errors and a few instances in which the institution is clearly better known in a language other than

the one reported by the U.S. agency, we have reported the names exactly as given to us. We have spelled out acronyms where possible, except for a few cases where we believe the activity or institution is better known to the international community by the acronym (e.g., CIMMYT). In many cases the U.S. agency did not identify cooperating agencies or the resources or organizations in the United States who are actually conducting the activity with the developing country.

Some activities are funded jointly by several agencies but were identified by only one, and this may understate total U.S. funding. In a few cases we received information about a single activity from several agencies, and we have reported combined funding only when we could determine that it was correct to do so; otherwise, we have reported only the largest of the individual agency contributions. Again, this probably under reports some U.S. expenditures. On the other hand, although we believe every activity listed here benefits the cooperating country, in most cases we did not have information to determine how much of the expenditures support scientists, consultants, or facilities in the United States. As a result, the expenditures probably overstate the resources going to the cooperating country. Many descriptions of long-term activities reported funding for only a single year, usually FY 1991. Thus, summing the expenditures reported here for any year will underestimate total funding.

We have included collaborative research as a form of technology cooperation because collaboration improves the knowledge and technical base of both collaborators, even in cases where the research is undertaken at the request of a U.S. agency to support its needs for information. We received descriptions of research that analyzes or takes place in developing countries. However, unless it was clear that scientists from the host country were collaborating or receiving support from the activities, we have not included them in the inventory. Finally, we have some information that identifies major international collaborative scientific projects but that does not identify participants or levels of funding. The inventory probably should include some of these, but in the absence of information describing the collaboration, we have omitted them.

Incompleteness of the inventory

The agency staff who gathered descriptions of their activities used their own criteria to determine which projects were related to climate change. Based on the material submitted, we believe that these criteria excluded some technology cooperation activities that are being undertaken for reasons unrelated to climate change but that help developing countries build the technical or social resources needed to cope with climate change. We believe the inventory includes significant gaps in the following areas:

- We did not receive material describing the Agency for International Development's famine warning system or its efforts to assist developing countries in building the institutional capacity to manage natural disasters; these social technologies would be useful in responding to climate change.
- Similarly, we believe that there may be additional cooperation between Department of Commerce agencies and developing countries to improve monitoring, analysis, and long-term prediction of weather that would strengthen the ability of cooperating countries to adapt to changes in climate.

- We believe we are missing some activities in which the National Science Foundation and the National Aeronautics and Space Administration cooperate with developing countries to monitor and analyze biological resources using earth satellites or other remote sensing technologies; such cooperation helps both in mitigating and adapting to change.
- Most activities reported in forestry and natural resources involve efforts to preserve these resources and to prevent their contributing further emissions of greenhouse gases. We received very little material describing collaborative research to understand how these systems might react to climate change, or activities that would help countries to manage such responses. On the other hand, most of the descriptions of agricultural activities involved response rather than mitigation; this emphasis may reflect the actual state-of-technology cooperation rather than a lack of material describing it.
- Only the Agency for International Development described cooperation in soil conservation and management, which develops a body of skills, knowledge, and organizational capacity useful for both responding to climate change and reducing the contribution of human activity to the buildup of greenhouse gases in the atmosphere.
- Finally, we received no material describing technology cooperation in family planning, which reduces the rate at which demand for energy, land, and forest products causes emissions of greenhouse gases.

Any future updating of the inventory should give special attention to including those areas of activity mentioned above for which we received no information.