



Chapter 9

Education, Training, and Outreach

Over the last three years, U.S. climate change outreach and education efforts have evolved significantly. Early outreach efforts, which focused primarily on the research and academic community, have helped to expand climate change research activity and have resulted in a robust research agenda that has resolved many scientific uncertainties about global warming. Scientists and decision makers worldwide have used the findings of U.S. research projects. More recent outreach efforts have moved beyond the research community, focusing on public constituencies who may be adversely affected by the impacts of climate change. These constituencies will have the ultimate responsibility to help solve the climate change problem by supporting innovative, cost-effective solutions at the grassroots level.

Federal efforts to increase public education and training on global climate change issues are designed to

increase understanding of the Earth's complex climate system. This improved understanding will enable decision makers and people potentially at risk from the impacts of climate change to more accurately interpret complex scientific information and make better decisions about how to reduce their risks.

Federal outreach and educational activities are performed under several U.S. mandates, including the Global Change Research Act of 1990, the National Climate Program Act, the Clean Air Act Amendments of 1990, and the Environmental and Education Act of 1990. Federal programs often rely on noneducational programs to simultaneously meet legislative mandates on climate education and U.S. science, policy, and outreach goals.

In addition to outreach conducted at the federal level, a growing movement of nongovernmental outreach efforts has proven to be very effective in engaging the U.S. public and industry on the climate change issue. Most outside groups work independently of government funding in their climate change research and outreach efforts, although some nongovernmental programs are funded in part by the federal government. Many nongovernmental organizations (NGOs) enjoy tax-exempt status, which permits them to receive private support and reduce costs to donors. An extensive list of NGOs conducting climate change outreach and education initiatives may be found at http://www.epa.gov/global-warming/links/org_links.html.

Industry is also playing an increasing role in climate change outreach and education. Many corporations have worked extensively with federal government partnership programs to resolve climate change issues. These companies spend millions of dollars to promote their climate change investments and viewpoints to consumers and other industries, and most disseminate information about climate change to their customers and the public.

More recent outreach and education efforts, both within government and by NGOs and industry, have encouraged many activities that adapt to a changing

climate or that reduce greenhouse gas emissions. Because of these efforts, more citizens understand the issue with a higher level of sophistication. And as people are becoming more familiar with the problem, they are also beginning to appreciate the impacts of society's actions on the climate system.

This chapter presents a sample of current U.S. education and outreach efforts that are building the foundation for broad action to reduce risks from climate change. Because a comprehensive treatment of NGO efforts is beyond the scope of this chapter, it focuses on new and updated governmental activities since the previous National Communi-

U.S. GLOBAL CLIMATE RESEARCH PROGRAM EDUCATION AND OUTREACH

Sponsored by the U.S. Global Change Research Program (USGCRP), the U.S. national assessment of the potential consequences of climate variability and change (NAST 2000 and 2001) has provided an important opportunity to reach out to the many interested parties, or stakeholders, about the potential significance for them of future changes in climate.

Regional Outreach

The National Assessment began in 1997 and 1998 with 20 regional workshops across the country. Each initiated a discussion among the stakeholders, scientific community, and other interested parties about the potential importance of climate change and the types of potential consequences and response options, all in the context of other stresses and trends influencing the region. On average, about 150 people participated in each workshop. There was extensive outreach to local media, drawn in part by the frequent participation of high-level government officials. Halfway through this effort, a National Forum convened in Washington, D.C., attracted about 400 participants, from Cabinet officials to some ranchers who had never traveled outside of the central U.S.

Moving from the workshop phase to an assessment phase, the USGCRP organized a range of activities that involved assessment teams drawn from the research and stakeholder communities. While sponsored by and working with government agencies, these teams were based largely in the academic community to broaden participation and enhance their independence and credibility. To focus analysis on the issues identified in the regional workshops, 16 of these assessment teams had a regional focus. Each team established an advisory and outreach framework that was used for the preparation of each assessment report. The reports are being distributed widely within each region, and outreach activities include workshops, presentations, and the media. USGCRP agencies are continuing to sponsor many of these regional activities as a way of strengthening the dialogue with the public about the potential consequences and significance of climate change, and the anticipatory actions that will be needed.

National Outreach

The USGCRP also sponsored five national sectoral studies covering climate change's potential consequences for agriculture, forests, human health, water resources, and coastal areas and marine resources (NAAG 2001, NFAG 2001, NHAG 2000 and 2001, NWAG 2000, NCAG 2000). The five broadly based teams organized outreach activities ranging from presentations at scientific and special-interest meetings to full workshops and special issues of journals. Each team is now issuing its report, distributing information widely to the public.

The National Assessment Synthesis Team (NAST) was created as an independent federal advisory committee to integrate the findings and significance of the five sectoral studies. The NAST was composed of representatives from academia, government, industry, and NGOs. Through a series of open meetings, followed by a very extensive open review process, the NAST prepared both an overview report that summarizes the findings (NAST 2001a) and a foundation report that provides more complete

documentation (NAST 2001b). Both reports are being widely circulated. They are available on the Internet, and copies are being sent to every state and to major U.S. libraries.

The USGCRP is also using other outreach tools to increase public understanding of the potential consequences of climate change. USGCRP's Web site (<http://www.usgcrp.gov>) helps connect scientists, students and their teachers, government officials, and the general public to accurate and useful information on global change. Also, the newsletter *Acclimations* provides regular information to a broad audience about the national assessment (USGCRP 1998–2000).

The USGCRP is sponsoring the preparation of curriculum materials based on the national assessment. These materials will be made widely available to teachers over the Web, updating the various types of materials made available during the mid-1990s by a number of federal agencies. Through these mechanisms, the national assessment has directly involved several thousand individuals, while reaching out to many thousands more through the reports and the media.

FEDERAL AGENCY EDUCATION INITIATIVES

Climate change education at the primary and secondary (K–12) and university levels has grown considerably over the past three years. The growth of the Internet has allowed educators throughout the country to use on-line educational global change resources. Federal government programs have supported numerous initiatives, ranging from on-line educational programs to research support. This section and Table 9-1 present a sampling of these initiatives.

Department of Energy

The Department of Energy (DOE) sponsors several programs that support advanced global change research.

Global Change Education Program

DOE's Global Change Education Program continues to support three coordinated components aimed at pro-

viding research and educational support to postdoctoral scientists, graduate students, faculty, and undergraduates at minority colleges and universities: the Summer Undergraduate Research Experience, the Graduate Research Environmental Fellowships, and the Significant Opportunities in Atmospheric Research and Science program.

Oak Ridge Institute for Science and Education

The Science/Engineering Education Division at the Oak Ridge Institute for Science and Education continues to develop and administer collaborative research appointments, graduate and postgraduate fellowships, scholarships, and other programs that capitalize on the resources of federal facilities across the nation and the national academic community. The aim is to enhance the quality of scientific and technical education and literacy, thereby increasing the number of graduates in science and engineering fields, particularly those related to energy and the environment.

National Aeronautics and Space Administration

From helping design K–12 curricula to teacher training, NASA is heavily involved in education initiatives related to Earth science.

Earth System Science Education Program

Sponsored by NASA through the Universities Space Research Association, this program supports the development of curricula in Earth System Science and Global Change at 44 participating colleges and universities. The program's Web site provides educational resources for undergraduates.

Earth Science Enterprise

Every year tens of thousands of students and teachers participate in NASA's Earth Science Enterprise program. The program attempts to improve people's understanding of the natural processes that govern the global environment and to assess the effects of human activities on these processes. It is

expected to yield better weather forecasts, tools for managing agriculture and forests, and information for commercial fishers and coastal planners. Ultimately, the program will improve our ability to predict how climate will change.

While the program's ostensible goal is scientific understanding, its ultimate product is education in its broadest form. The Earth Science Enterprise has formulated education programs that focus on teacher preparation, curriculum and student support, support for informal education and public communication, and professional training. Its Earth System Science Fellowship program encourages student research, modeling, and analysis in support of the USGCRP. More than 500 Ph.D. and M.S. fellowships have been awarded since the program's inception in 1990.

Partnerships

Partnerships allow agencies with similar goals to combine resources and expertise to serve the interests of educators and students.

Climate Change Partnership Education Program

The Environmental Protection Agency (EPA), NASA, and NOAA initiated a partnership outreach program for broadcast meteorologists on climate change impacts and science. They formed the partnership in response to broadcasters' requests for educational materials that they could use in their community outreach and education activities, particularly during school visits. The resulting *Climate Change Presentation Kit* CD-ROM includes fact sheets that can be downloaded, printed, and distributed to audiences who have varying levels of scientific literacy, a complete PowerPoint slide presentation that can be shown from a computer or printed as overhead transparencies, science experiments and games for classroom use, contact names and phone numbers for additional scientific information, and links to informative Web sites (U.S. EPA, NASA, and NOAA 1999).

TABLE 9-1 U.S. Government On-line Climate Change Educational Resources

Resource	Description	Web Site
Department of Energy		
Energy Efficiency and Renewable Energy Kids' Site	A wealth of information on types of renewable energy.	http://www.eren.doe.gov/kids/
Energy Information Administration Kids' Page	Interactive Web page with energy information, activities, and resources.	http://www.eia.doe.gov/kids/
Fossil Energy—Education Main Page	An introduction to fossil fuels for students.	http://www.fe.doe.gov/education/main.html
Environmental Protection Agency		
Global Warming Site	Information for general audiences about the science of climate change, its impacts, greenhouse gas emissions, and mitigation actions.	http://www.epa.gov/globalwarming
Global Warming Kids' Site	Overview of global warming and climate science; includes interactive games.	http://www.epa.gov/globalwarming/kids/index.html
GLOBE Program		
GLOBE Program Home Page	Interactive science and education site for participants in the GLOBE program, grades K–12.	http://www.globe.gov
National Aeronautics and Space Administration		
Educational Links	List of Earth science educational links.	http://eosps0.gsfc.nasa.gov/eos_homepage/education.html
Teaching Earth Science Site	Resources and information for Earth science educators for elementary through university levels.	http://www.earth.nasa.gov/education/index.html
For Kids Only Site	From NASA's Earth science Enterprise, contains a wealth of Earth science information, teacher resources, and interactive games.	http://kids.earth.nasa.gov/
National Oceanic and Atmospheric Administration		
CLIMGRAPH	Educational graphics on global climate change and the greenhouse effect.	http://www.fsl.noaa.gov/~osborn/CLIMGRAPH2.html
Specially for Students—Climate Change and Our Planet	List of NOAA's climate change-related sites tailored for kids.	http://www.education.noaa.gov/sclimate.html
Specially for Teachers	List of NOAA's climate change-related sites tailored for educators.	http://www.education.noaa.gov/tclimate.html
A Paleo Perspective on Global Warming	For general audiences, a site to help teach the importance of paleoclimate research and its relation to global warming.	http://www.ngdc.noaa.gov/paleo/globalwarming/home.html
U.S. Global Change Research Information Office		
Global Change and Environmental Education Resources	List of global change and environmental education on-line resources.	http://gcric.org/edu/educ.html
GCRI Home Page	Data and information on climate change research, adaptation/mitigation strategies and technologies.	http://gcric.org
Common Questions About Climate Change	Intended for general audiences.	http://www.gcric.org/ipcc/qa/cover.html
Global Warming and Climate Change	Brochure explaining the issue for general audiences.	http://gcric.org/gwcc/toc.html
U.S. Global Change Research Program		
USGCRP Home Page	Global change information for students and educators.	http://www.usgcrp.gov/
U.S. Geological Survey		
Global Change Teacher Packet	An introduction and five activities for classroom use.	http://mac.usgs.gov/mac/isb/pubs/teachers-packets/globalchange/globalhtml/guide.html
Global Change Educational Activities	Information about global change for grades 4–6.	http://www.usgs.gov/education/learnweb/GC.html

GLOBE Program

Administered by NOAA, NASA, NSF, and EPA, the Global Learning and Observations to Benefit the Environment (GLOBE) program continues to bring together students, educators, and scientists throughout the world to monitor the global environment. The program aims to increase environmental awareness and to improve student achievement in science and mathematics. GLOBE's worldwide network has expanded to represent more than 10,000 K–12 schools in over 95 countries. These students make scientific observations at or near their schools in the areas of atmosphere, hydrology, biology, and soils, and report their findings to the network.

FEDERAL AGENCY OUTREACH

Federal agencies provide the public, state and local governments, industry, and private groups with information about national and global climate change research and risk assessments, U.S. mitigation activities, and policy developments. Agencies work on outreach efforts independently and in partnership with other federal agencies, NGOs, and industry. Although outreach activities may vary from agency to agency, most of them share the common goal of increasing awareness about the potential risks climate change poses to the environment and society. Current outreach encourages constituencies to participate in existing federal voluntary programs that promote climate change mitigation and adaptation activities.

Department of Energy

DOE supports numerous initiatives focused on increasing energy efficiency and reducing greenhouse gas emissions.

Carbon Dioxide Information Analysis Center

The Carbon Dioxide Information Analysis Center (CDIAC), which includes the World Data Center for Atmospheric Trace Gases, is DOE's primary center for global change data

and information analysis. CDIAC responds to data and information requests from users from all over the world who are concerned about the greenhouse effect and global climate change. CDIAC's data holdings include historical records of the concentrations of carbon dioxide and other radiatively active gases in the atmosphere; the role of the terrestrial biosphere and the oceans in the biogeochemical cycles of greenhouse gases; emissions of carbon dioxide to the atmosphere; long-term climate trends; the effects of elevated carbon dioxide on vegetation; and the vulnerability of coastal areas to rising sea level.

National Institute for Global Environmental Change

The National Institute for Global Environmental Change conducts research on global climate change in six U.S. regions: Great Plains, Midwest, Northeast, South Central, Southeast, and West. The Institute integrates and synthesizes information to help decision makers and communities better respond to the effects of climate change.

Each region has a "host institution," a prominent university that appoints a Regional Director who acts in an administrative capacity. Regional centers develop their own research programs by soliciting proposals from scholars throughout the nation. These programs must focus on areas important to global environmental change and must meet DOE's research priorities and the following criteria:

- Improve scientific understanding of global environmental and climate change issues.
- Reduce uncertainties surrounding key environmental and climate change science.
- Create experimental or observation programs to enhance the understanding of regional- or ecosystem-scale processes contributing to global change.
- Improve decision-making tools for resolving global environmental and climate change issues.

- Build education and training opportunities and develop new curriculum materials to increase the flow of talented scholars into global environmental change research areas.
- Focus contributions to public education on the subject of global climate change and other energy-related environmental risks.

Regional Roundtables

DOE held roundtable meetings with various segments of the energy industry to discuss implementing its planned energy partnership programs for energy efficiency. Workshop participants were asked to advise DOE's Office of Energy Efficiency and Renewable Energy about how to improve the quality of the individual program implementation plans, as well as the overall package of initiatives. Attendees represented manufacturers, builders, utility executives, engineers, and others who offered a variety of perspectives on the programs. These meetings were instrumental in shaping the final energy partnership programs, and many of the participants' suggestions were incorporated into the revised implementation plans.

Environmental Protection Agency

Following are some examples of EPA's numerous climate change outreach and education initiatives.

Business/Industry Outreach

EPA has taken various steps to engage business and industry on climate change-related issues. For example, EPA, the Risk and Insurance Management Society, Inc., the Federal Emergency Management Agency, NOAA, DOE, and the National Renewable Energy Laboratory co-sponsored a climate change and insurance roundtable in March 2000 to share information and ideas about the risks that climate change poses to the insurance industry and society. The roundtable provided insurance and financial executives with information

about climate science and policy information. It also explored alternative risk management tools as a way to mitigate and adapt to the impacts of climate change. EPA also partnered with DOE to produce the publication *U.S. Insurance Industry Perspectives on Global Climate Change* (Mills et al. 2001).

Global Warming Site

Provided as a public service in support of EPA's mission to protect human health and the natural environment, the Global Warming Site strives to present accurate information on climate change and global warming in a way that is accessible and meaningful to all parts of society. The site is broken down into four main sections: climate (science), emissions, impacts, and actions. Updated daily to reflect the latest peer-reviewed science and policy information, the site contains over 2,000 content pages, as well as hundreds of official documents and publications. During 2001 the site averaged several hundred thousand page hits per month.

Outdoor/Wildlife Outreach

Since 1997 EPA has conducted climate change outreach activities for the outdoor recreation and wildlife enthusiast community. EPA staff have attended conferences and conventions of such diverse groups as Ducks Unlimited, the Izaak Walton League, the Wildlife Management Institute, the Federation of Fly Fishers, the National Association of Interpretation, and America Outdoors, distributing information about climate change science and impacts as they relate to the interests of each community. EPA has given presentations and conducted workshops at conventions and has contributed articles to the various groups' newsletters and magazines. To convey the vulnerabilities of specific recreational activities to the impacts of climate change, EPA has also developed targeted brochures and educational kits for use with the outdoor enthusiast audience. In 2002 EPA plans to release a toolkit for leaders of hunting and angling organizations to use with their constituencies.

Sea Level Rise Outreach

To meet U.S. obligations under the Framework Convention on Climate Change for taking measures to adapt to climate change, EPA supports a number of activities that encourage timely measures in anticipation of sea level rise. For example, EPA's continual recommendations to state and local governments to consider sea level rise within their ongoing initiatives has resulted in four states' passing regulations that ensure the inland migration of wetlands as sea level rises. A planning scenario mapping project is working with coastal planners to develop county-scale maps that illustrate where people are likely to hold back the sea and which areas are likely to flood. To stimulate dialogue within communities about how to prepare for sea level rise, EPA is developing brochures that explain the risks of sea level rise and also include the county-scale maps. Additionally, an outreach program to sand and gravel companies—who supply the fill material needed to elevate areas as the sea rises—is getting underway in one coastal state.

State and Local Climate Change Program

States and localities can play a significant role in promoting the reduction of greenhouse gases if they have the tools they need for assessing climate change issues in their daily decision making. By providing them with guidance and technical information about climate change, local air quality, and the health and economic benefits of reducing greenhouse gas emissions, EPA's State and Local Climate Change Program is enhancing the ability of state and local decision makers to comprehensively address their environmental and economic goals.

The program provides a variety of technical and outreach or education services and products related to clean air and climate change issues, including:

- assistance for states to analyze the co-benefits of mitigating greenhouse gases, developing and updating emission inventories, and assessing

the impacts of climate change policies on state economies;

- new tools and models that build understanding of the broader benefits of climate protection and better integrate multi-emission reductions, as well as multi-goal (e.g., energy efficiency and renewable energy) strategies in state implementation plans submitted to EPA;
- capacity-building outreach through EPA's Web site, an electronic "list-serve," and case studies;
- a best-practices clearinghouse to promote multi-emission reduction strategies, energy efficiency, sustainability, clean energy, and other greenhouse gas mitigation measures;
- information on state and local legislative activities related to greenhouse gases;
- state forest carbon data; and
- additional enhanced opportunities to promote state and local efforts, including creating success stories for wide dissemination and replication.

In 2000 the program distributed over 4,200 CD-ROM outreach kits to state and local leaders, providing information on voluntary strategies for reducing greenhouse gases. The kits are helping states and communities save money, improve air quality, lower risks to human health, and reduce traffic congestion, among other benefits. Their slide show on climate change is suitable for presentations to community groups, business organizations, and others. They also include more than 100 information sheets on climate change science, its potential impacts on each state, and technologies and policies that lower greenhouse gas emissions.

National Aeronautics and Space Administration

NASA's well-established outreach activities are designed to draw public and press attention to its work in the climate change arena.

Workshops for Journalists

NASA's co-sponsored workshops on global climate change provide science reporters with basic tutorials, information

on major scientific advances, access to international science leaders, and opportunities to visit major scientific facilities. In 1999 NASA hosted its first Global Change Workshop for journalists in concert with the American Geophysical Union.

Media Directory for Global Change Experts

Published biennially, NASA's *Earth Observing System Global Change Media Directory* provides journalists with a ready source of international expertise on global climate change science and policy (NASA 2001). The directory contains contact information for more than 300 science experts available to the media in climate change, natural hazards, ozone, water resources, global warming, and many other areas. It is available on-line and is searchable by topic, name, affiliation, or location.

Earth Observatory On-Line Newsroom

NASA's on-line newsroom for journalists features the latest news on Earth science research released from all NASA centers and more than 80 universities participating in NASA's Earth programs through sponsored research. Resources updated weekly include media announcements, summaries of headline news, listings of newly published research, a searchable directory of experts, and selected writers' guides.

National Park Service

As the guardian of the world's finest system of national parks, the National Park Service applies innovative techniques to reach out to and actively involve diverse audiences in preserving and restoring our nation's parks. Following are some examples of the Park Service's increased support of education on global warming and environmental stewardship.

Environmental Leadership Program

As part of its Environmental Leadership Program, the Park Service has turned Utah's Zion National Park visitor center into a model environmentally sus-

tainable facility. The new center incorporates passive solar design to reduce overall energy consumption and uses only 80 percent of the energy required for other national park visitor centers. The center also receives 30 percent of its total electricity needs from solar power. Through an innovative transportation agreement with the nearby town of Bonnevillle, visitors can reduce fuel consumption by parking in town and riding alternative-fueled buses to the park.

Green Energy Parks

Green Energy Parks focuses on conserving energy and incorporating renewable-energy resources into the national park system to save money in park operations, as well as to promote more environmentally friendly facilities. The Park Service educates its visitors about its sustainable environment efforts through a combination of sign- age, brochures, and fact sheets. For example, at Lake Meade, Nevada, the Park Service has turned the park entrance tollbooth into a state-of-the-art, renewable-energy facility that is powered solely by the building's photovoltaic roof panels. Road signs describe the facility to drivers and explain the technology's environmental benefits.

National Oceanic and Atmospheric Administration

Several NOAA offices are significantly contributing to climate change and weather-related research education and public outreach efforts.

National Climatic Data Center

NOAA's National Climatic Data Center maintains a vast database of weather-related information used by specialists in meteorology, insurance, and agriculture and by various business sectors. The center provides information through special reports and its Web site.

The National Climatic Prediction Center

NOAA's National Climatic Prediction Center recently developed climate outlook products to help farmers, businesses, and the public better plan for extreme weather events related

to variations in climate. The new products are available on the center's Expert Assessment Web page at http://www.cpc.ncep.noaa.gov/products/expert_assessment/. They include drought, hurricane, and winter outlooks, along with an El Niño–Southern Oscillation advisories and threat assessments. The center also maintains a climate educational Web site.

National Geophysical Data Center

NOAA's National Geophysical Data Center's primary mission is data management. The center plays a leading role in the nation's research into the environment, while providing public domain data to a wide group of users. It features a Web site on paleoclimate at http://www.ngdc.noaa.gov/paleo/global_warming/home.html, which was developed both to help educate, inform, and highlight the importance of paleoclimate research and to illustrate how paleoclimate research relates to global warming and other important issues of climate variability and change.

Office of Global Programs

NOAA's Office of Global Programs (OGP) released the fourth of its *Reports to the Nation* series in 1997. The reports offer educators and the public a clear understanding of complex atmospheric phenomena, such as El Niño, the ozone layer, and climate change. Through a grant to the Lamont–Doherty Earth Observatory, OGP produced a public fact sheet on the North Atlantic Oscillation. OGP also created a special climate Web page to make NOAA's climate information more accessible to the general public.

During the 1997–98 El Niño and 1998–99 La Niña, OGP and the National Climatic Prediction Center worked closely with the Federal Emergency Management Agency, state agencies, and the press to educate the public about seasonal climate variability, the importance of advisories of El Niño–Southern Oscillations and other seasonal and decadal oscillations to our daily lives, and the need to prepare for related extreme weather events.

Smithsonian Institution

Every year the Smithsonian Institution's exhibits educate millions of U.S. and foreign visitors about many areas of science, including global warming.

Understanding the Forecast: Global Warming

Originally shown at New York's American Museum of Natural History, this exhibit was updated by the Smithsonian in the summer of 1997 at the National Museum of Natural History in Washington, D.C. Nearly 443,000 visitors passed through the exhibit that summer, and many more viewed it on its nationwide tour. The exhibit's interactive displays provided information on climate change science and explained the connections between our daily use of electricity, gasoline, and consumer products and greenhouse gas emissions. The displays also demonstrated how we can reduce our individual contributions to greenhouse gas emissions.

Under the Sun: An Outdoor Exhibition of Light

Tens of thousands of visitors viewed the Cooper Hewitt's outdoor solar energy exhibit in the gardens of the museum's Andrew Carnegie mansion in New York City. The Smithsonian later sent the exhibit on tour to other cities, including a summer stay in the gardens behind the Smithsonian's castle on the Mall in Washington, D.C. The exhibit demonstrated how solar energy systems can meet architectural and design preferences, while providing energy that reduces pollution and greenhouse gas emissions. The exhibit script paid special attention to helping visitors understand how energy consumption is linked to global warming. Both federal agencies and private industry partners helped fund the exhibit.

Forces of Change

The Smithsonian is working on an exhibit that examines the geological, environmental, and cultural processes that have shaped and continue to change our world. It consists of a per-

manent exhibit hall at the Smithsonian's National Museum of Natural History, traveling exhibitions, publications, interactive computer products, and public programs, including a lecture series and electronic classroom courses. Opened in the summer of 2001, the exhibit is expected to be seen by six million museum visitors annually. Its outreach programs and materials will reach additional millions throughout the nation. The exhibit's supporters include NASA, the W.K. Kellogg Foundation, USDA, the Mobil Foundation, Inc., the American Farmland Trust, EPA, and the U.S. Global Change Research Program.

Global Links

As part of its Forces of Change program, the Smithsonian is developing the Global Links exhibit, designed to tell a series of global climate change stories. The first story will explore El Niño and its possible links to global warming. The second story will examine greenhouse gases and the ozone hole. An EPA grant has supported preliminary planning of the Global Links exhibit.

Antarctica Exhibit

The National Museum of Natural History is seeking funding for an exhibit that explores how research in Antarctica allows us to learn more about global climate change in the past and to improve predictions for future change. The exhibit is scheduled to open in June 2003.

Partnerships

Government organizations with joint interests in climate change have formed partnerships to educate the public about climate change and to offer suggestions for how individuals and communities can help reduce its risks. Following are some examples.

It All Adds Up to Cleaner Air

This collaborative effort of the U.S. Department of Transportation and EPA is informing the public about the con-

nections between their transportation choices, traffic congestion, and air pollution. The program emphasizes simple, convenient actions people can take that can improve air quality when practiced on a wide scale.

Outdoor Interpreter's Tool Kit

EPA led a partnership effort with the National Park Service, the U.S. Fish and Wildlife Service, and NOAA to develop a climate change educational toolkit CD-ROM for park wildlife interpreters (U.S. EPA and NPS 2001). The kit provides interpreters with fact sheets and presentation materials that investigate the links between climate change and changes to habitat, ecosystems, wildlife, and our national parks. The partnership also produced a climate change video that will inform park visitors about climate change and its impacts on national parks. Released early in 2002, the kit includes other outreach materials, such as Park Service climate change bookmarks.

Reporter's Guide on Climate Change

Supported by NOAA and DOE, the nonprofit National Safety Council's Environmental Health Center produced a second-edition guide for journalists on climate change in 2000 (NSC 2000). *Reporting on Climate Change: Understanding the Science* is part of a series of reporters' guides designed to enhance public understanding of the significant environmental health risks and challenges facing modern society. Based on the findings of the 1995 Intergovernmental Panel on Climate Change assessment report, the guide explains major global warming issues in detail, as well as broader strategies for successful science reporting, interaction with the scientific community, and understanding scientific reporting methods. The guide also contains a glossary and list of public and private information sources and Web links.