EPA scientists are conducting critical research to improve national, regional, and local response capabilities to global change.

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GLOBAL CHANGE RESEARCH PROGRAM

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Research to Assess the Impacts of GLOBAL CHANGE

U.S. Environmental Protection Agency
Office of Research and Development

The U.S. Environmental Protection Agency is an active partner of a larger federal effort to provide the best possible science to support public discussion and decision-making on climate-related issues. Researchers in EPA's Global Change Research Program in the Office of Research and Development are providing timely and useful information to respond to a changing climate.

Developing Decision Support Tools

Global change researchers worldwide are studying changes to the Earth that are impacting the environment and humans such as climate variation, land-use activities, and other stressors. EPA's Global Change Research Program is making contributions by assessing the impacts of global change (particularly climate variability and change) on air and water quality, ecosystems, and human health in the United States, and then investigating adaptation options.

The multidisciplinary program integrates information from the physical, biological, and social sciences to develop decision support tools for resource managers and decision makers. The tools are used to improve society's ability to effectively respond to the environmental and public health impacts of global change.

The program uses a place-based approach because the impacts of global change and their solutions are often unique to a location. Partnerships are established with locally based decision makers to ensure that the program is responsive to their unique scientific information needs and the socioeconomic realities at their locales.

Making a Difference

The Global Change Research Program is evaluated through extensive review by EPA's independent Board of Scientific Counselors (BOSC). A review in 2006 by the BOSC concluded that the program has conducted the "right work" and done it "well." The program's earlier emphases on regional assessment of the consequences of global change and involvement of stakeholders are deemed pioneering. The program has improved understanding of global change and ways to adapt to it.

The program closely coordinates with the U.S. Climate Change Science Program. EPA and the other 12 participating agencies address key scientific questions about the effects of global change, and develop and provide timely, useful, and scientifically sound information to decision makers.

"The program has provided substantial benefits to the nation and … is on course to make significant further contributions to societal outcomes."

Board of Scientific Counselors Review, March 27, 2006

U.S. Environmental Protection Agency
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Success Stories

EPA's Global Change Research Program has improved understanding of global change and delivered decision support tools to enable resource managers to consider the impacts of global change when making decisions to protect the environment and public health.

DEVELOPING TOOLS FOR WATER RESOURCE MANAGERS

The program developed a Climate Assessment Tool to help water resource managers address the high sensitivity of water resources and aquatic ecosystems to changes in climate. This tool is incorporated into EPA's watershed management program, BASINS (Better Assessment Science Integrating Point and Nonpoint Sources). The tool allows managers to meet future demands for water and water quality regulations by considering changes in the risk of floods and droughts, river channel stability, water quality, and wildlife habitats due to climate change.

PREVENTING COMBINED SEWER SYSTEM OVERFLOWS

Aging Combined Sewer Systems in the United States are being redesigned to comply with EPA's Combined Sewer Overflow Control Policy. These systems collect and co-treat storm water and municipal water, and are designed to overflow directly to surface waters when their design capacity is exceeded. Intense storms can cause combined sewer systems to exceed their capacity and result in the discharge of untreated storm and waste water into streams. Climate change is already leading to an increase in the number of intense rainfall events. The program has demonstrated that redesigned systems might not satisfy EPA's control policies if they are rebuilt without considering climate change. The program has shown that the risks are manageable. It is possible to anticipate the effects of climate change on these systems and to adapt their new designs to increase their effectiveness.

ASSESSING IMPACTS ON WATER QUALITY STANDARDS

EPA's Total Maximum Daily Loads (TMDL) program allocates pollutant loads to water bodies. The research program has shown that climate change could lead to more intense precipitation events that could increase runoff, alter stream flow, and lead to higher annual costs at publicly owned treatment works in the Great Lakes region.

PROTECTING DRINKING WATER SYSTEMS FROM SEA LEVEL RISE

Drinking water systems that derive their supplies from surface water and groundwater will be put at risk in varying degrees and in different ways from rising sea levels. Several million people are served by coastal surface water systems that are unprotected from sea level rise. However, the research program has shown that only five surface water systems serving over 100,000 people are at high risk of salt water intrusion. The greater risk from salt water is faced by coastal systems that derive their supplies from groundwater. For example, the program has identified the groundwater supplies in Florida that are vulnerable to sea level rise.

ASSESSING IMPACTS ON AIR QUALITY

The research program is assessing the effects of global change on air quality across the United States. The initial assessment of the effects of climate change on air quality will be completed by September 2007. The long-term goal is to provide air quality managers and decision makers with the scientific information and models they need to protect air quality from the impacts of global change. This assessment is unique among federal agencies.

PROTECTING CORAL REEFS

The health and survival of the world's coral reefs are at risk because of climate change, pollution, UV radiation, and overfishing. The Global Program partnered with the U.S. Coral Reef Task Force, the National Oceanic and Atmospheric Administration, and the Great Barrier Reef Marine Park Authority to publish *A Reef Manager's Guide to Coral Bleaching*. The guide is used by resource managers to protect these critical ecosystems.

The program assesses the potential consequences of global change, particularly climate variability and change on air and water quality, ecosystems, and human health.

PREVENTING HANTAVIRUS PULMONARY SYNDROME

The assessments done by EPA's Global Change Research Program have led to on-the-ground interventions to prevent disease and protect the public's health. In partnership with The Johns Hopkins School of Hygiene and Public Health, the program discovered that the 1993 outbreak of Hantavirus Pulmonary Syndrome (HPS) in the Southwestern United States was due to increased rodent populations caused by unusual weather associated with the El Niño Southern Oscillation event of 1991-92. The program found that high-risk areas for the disease can be predicted over six months in advance with the use of satellite-generated maps of climate-sensitive land cover. This led to the development of risk maps in partnership with the Centers for Disease Control and Prevention and the Indian Health Service. The maps are being used for disease prevention in the Southwest by the U.S. Department of Health and Human Services.

PARTNERING WITH THE WORLD HEALTH ORGANIZATION

The research program supports efforts by the World Health Organization (WHO) to develop strategies for responding to the health risks posed by climate change. In 2003, with support from EPA's Global Change Research Program, WHO published the book *Climate Change and Human Health: Risks and Responses*. EPA scientists co-authored three chapters and one scientist served as an editor. This collaboration also led to the research program's participation in the writing of the *Synthesis Report for the Health Sector*, which was prepared as part of the Millennium Ecosystem Assessment. The assessment involved more than 1,360 experts worldwide to provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide.