

U.S. Report Provides Assessment of National, Regional Impacts of Global Climate Change

Climate change is already having visible impacts in the United States, and the choices made now will determine the severity of its impacts in the future, according to a new federal study assessing the current and anticipated domestic impacts of climate change.

The report, "Global Climate Change Impacts in the United States" (<http://www.globalchange.gov/usimpacts>), compiles several years of scientific research and takes into account new data not available during the preparation of previous large national and global assessments, including the last major report on global climate change released by the Intergovernmental Panel on Climate Change. The new report was produced by a consortium of experts from 13 U.S. government science agencies and from several major universities and research institutes.

"This new report integrates the most up-to-date scientific findings into a comprehensive picture of the ongoing as well as expected future impacts of heat-trapping pollution on the climate experienced by Americans, region by region and sector by sector," said John P. Holdren, Assistant to the President for Science and Technology and director of the White House Office of Science and Technology Policy. "It tells us why remedial action is needed sooner rather than later, as well as showing why that action must include both global emissions reductions to reduce the extent of climate change and local adaptation measures to reduce the damage from the changes that are no longer avoidable."

The report, which confirms previous evidence that global temperature increases in recent decades have been primarily human-induced, incorporates the latest information on rising temperatures and sea levels; increases in extreme weather events; and other climate-related phenomena. Adding to its practical value in the realm of policy and planning, the report breaks out those impacts in detail by U.S. region and by economic sector, including water resources, energy supply and use, and transportation.

The 190-page report, produced under leadership of the National Oceanic and Atmospheric Administration (NOAA), is a product of the interagency U.S. Global Change Research Program. The report was commissioned in 2007 and completed this spring.

The report is not intended to direct policymakers to take any one approach over another to mitigate climate change or adapt to it. But it emphasizes that the choices

made now will determine the severity of climate change impacts in the future. "Implementing sizable and sustained reductions in carbon dioxide emissions as soon as possible would significantly reduce the pace and the overall amount of climate change," the report states, "and would be more effective than reductions of the same size initiated later."

The report confirms that about 87% of U.S. greenhouse gas emissions come from energy production and use. "In turn," the report said, "climate change will eventually affect our production and use of energy," an area in which study has been somewhat limited, so far, to the effects on energy requirements for heating and cooling in buildings. According to the report, research finds that "the demand for cooling energy increases from 5 to 20 percent per 1.8°F of warming, and the demand for heating energy drops by 3 to 15 percent per 1.8°F of warming." Furthermore, climate change is expected to affect renewable energy sources including hydropower (due to changing patterns of precipitation or snowmelt), solar energy (due to changes in cloud coverage), wind power, and biomass production (particularly due to changes in water availability which is needed for biofuels). The report recommends further study in this area.

In order to make the study accessible to a broad range of decision-makers—federal to local policymakers, business owners, farmers, public health officials, water resource officials—examples of regional spotlights and adaptation scenarios are provided. For example, to reduce casualties during heat waves, Philadelphia implemented a "Cool Homes Program" which includes roof coatings and roof insulation that save energy and lower indoor temperatures. Among adaptation measures against damage from wildfire recommended by groups such as National Firewise Communities is the selection of ignition-resistant building materials and design features.

"By comparing impacts that are projected to result from higher versus lower emissions of heat-trapping gasses, our report underscores the importance and real economic value of reducing those emissions," said Tom Karl, director of NOAA's National Climatic Data Center in Asheville, N.C. and one of the co-chairs of the report. "It shows that the choices made now will have far-reaching consequences." The other co-chairs of the report are Jerry M. Melillo, director of The Ecosystems Center at the Marine Biological Laboratory in Woods Hole, Mass.; and Thomas C. Peterson, a physical scientist at NOAA's National Climatic Data Center.

The report draws from a large body of scientific information, including the set of 21 Synthesis and Assessment reports from the U.S. Global Change Research Program. The government agencies affiliated with the program include the Departments of Agriculture, Commerce, Defense, Energy, Health and Human Services, Interior, State, and Transportation; the Environmental Protection Agency; National Aeronautics and Space Administration; National Science Foundation; Smithsonian Institution; and the United States Agency for International Development.

South Africa Maps the Way Forward for Climate Change Atlas

Researchers and decision-makers from various government sectors in South Africa concerned with global and climate change met in Pretoria in June for a workshop aimed at bridging the gap between global change science and global change policy.

The South African Risk and Vulnerability Atlas (SARVA) workshop was aimed at stimulating engagement between the two groups to determine the information requirements of potential users of the Atlas in the government sector. The first version of the Atlas is due for release in January 2010, in electronic and hard-copy format. It will provide easily understood climate change sensitivity and vulnerability information at regional, national, provincial, and municipal levels. It will also support national initiatives such as the National Disaster Management Framework.

In his welcoming address, Bob Scholes, CSIR systems ecologist and principal investigator in the Southern African Millennium Assessment, said that risk and vulnerability represented a "common currency" between the research and application domains, and that the Atlas is set to improve access to global change information.

"The Atlas will not only contain continually updated maps—it will be an easy-to-navigate, interactive spatial product at many scales, and will include case studies and other narratives to inform global [climate] change adaptation responses and planning," he said. "The end product will be a widely encompassing storehouse of information about global [climate] change."

The Atlas will capture data related to aspects such as groundwater, surface water, forests, biodiversity, human health, crops, demographics, economics, and social dimensions.

The SARVA project is sponsored by the Department of Science and Technology (DST) and is project managed by the

CSIR, with key input from South African institutions and research groups. Emma Archer from CSIR is the principal climate change scientist on the Atlas project.

SARVA project manager Rebecca Maserumule told workshop participants that South Africa has learned a valuable lesson from one of its neighboring countries. "Despite the fact that the country produced a truly admirable risk and vulnerability atlas, they face a huge challenge in persuading decision-makers to use it. With our Atlas we want to create a platform for researchers and potential users to walk hand in hand from the outset to make doubly sure that the Atlas meets user requirements," she said.

As an introduction to the workshop, six case studies were presented by global climate change researchers to illustrate how the Atlas information could potentially be used in decision-making. The case studies highlighted issues such as environmental health—bridging the gap between traditional health concerns and a changing climate; potential impacts of climate change on the coastal zone; adapting to climate change in a diverse landscape, focusing on the case of the Kruger to Canyons Biosphere Reserve; building resilience to climate variability and change in the City of Joburg; climate change and water resources; and climate change implications for water and land use within the agricultural sector of the Garden Route.

In the debate that followed, some of the issues raised included the fact that there were gaps in existing climate change research, and that in many cases climate change research findings were still inaccessible.

Maserumule said that the Atlas was set to contribute to efforts to coordinate research and identify gaps. The Atlas should be seen as a living platform—as new information becomes available it will be added to the body of knowledge.

"The Atlas will become a one-stop shop for relevant climate change findings, which would inform projections of global change, land cover change, and biogeochemical change for the region," she said. "It will facilitate value-addition

to 'raw' research data to make the resulting information accessible to decision-makers in a practical application format," she said. The Atlas is being designed as a "distributed" system, linking to outlying databases, to build a community engaged in spatial data provision in global change and risk and vulnerability.

Discussion in the workshops focused on important features to include in the Atlas. These were identified as mapping of climate extremes; risk indices; links to other important databases; and base maps of population growth, economic activities, physical parameters which influence coastal sensitivity, coastal zones, land-use, and environmental resources. Participants also said that the Atlas should provide a platform where environment impact assessments can be shared to allow lesser resourced municipalities access to this information and drive down costs.

Stakeholders also requested that the Atlas should function as a decision support tool in aspects such as risk associated with specific developments, land reform vulnerability, highly sensitive areas which preclude development such as mining, and vulnerability of different sectors such as forestry and tourism.

At the end of the workshop, Maserumule challenged decision-makers to feed the findings of their own case studies into the Atlas system to enable researchers and decision-makers to come to a mutual and more comprehensive understanding of global climate change and its impacts.

Temporary Expert Committee on Materials Science and Engineering Established in Europe

Following thorough discussions with major stakeholders about the needs and future opportunities for Materials Science and Engineering research in Europe, the European Science Foundation (ESF) has announced in July the establishment of a new ESF Temporary Expert Committee in Materials Science and Engineering (to be known as MatSEEC) to provide the focus for discussion and the coordination of effort. MatSEEC is associated with the ESF

Standing Committee for Physical and Engineering Sciences (PESC) with a task related term of five years. MatSEEC will deliver foresight reports and scientific advice to PESC and ESF on issues related to materials science and engineering and matters of concern to the related scientific communities, as well as to European national agencies and ministries, institutions of the European Commission, and the European Strategic Forum on Research Infrastructures upon request.

Further information is available at Web site www.esf.org/matseec.

CAS Launches China's Science and Technology Roadmap 2050

The Chinese Academy of Sciences (CAS) has launched its series report, "Technological Revolution and China's Future-Innovation 2050," on June 10, 2009 in Beijing. The report produced a roadmap for China's science and technology development up to 2050.

According to the report, a new technological and industrial revolution featured by green energy, artificial intelligence, and sustainable development is most likely to take place in the next 10 to 20 years. China must prepare itself for the new revolution in order to build a well-off society and realize China's modernization, according to the report.

Eight social economic systems backed up by science and technology innovation are to be constructed: a sustainable energy and resources system, a new material and green manufacture system, an information networking system, an ecological higher value agriculture and bio-industry system, a health insurance system, an ecology and environment preservation and development system, a space and ocean system, and a national and public security system.

The report also identifies 22 strategic technology issues that are key to China's modernization, including green manufacture of high-quality elementary raw materials, a new nuclear energy system, and nanotechnology. CAS plans to amend the roadmap every four years. □

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