

Global Climate Change, DOI, and the NPS

Global warming and related climate changes due to the "greenhouse effect" are expected to have a major impact on the earth's life within the next century. This has prompted Congress to introduce legislation to study and ameliorate the situation and the Department of the Interior (DOI) to begin studying possible effects on its bureaus and the policy options. The National Park Service, which stands to be affected as greatly as any DOI agency, is beginning to engage the subject through the Departmental Working Group on Climate Change and through conferences.

Scientists studying the effects of greenhouse gases, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several chlorofluorocarbons (CFCs), have tried to predict how quickly and to what extent atmospheric temperatures may rise. In 1979, the National Academy of Sciences concluded that a doubling of CO_2 would lead to an increase of 1.5 to 4.5°C (3 to 8°F) in average annual global air temperatures. Since then, other researchers have concluded that an increase of all greenhouse gases equivalent to CO_2 doubling is likely to occur as early as the 2030s, with commensurate global warming lagging by several decades. Under such a scenario, temperatures would rise higher than the planet has experienced in the past 100,000 years, at a rate many times faster than occurred in the past. This would put unprecedented pressure on many species to migrate or be wiped out.

Though scientific consensus seems to have been reached on global warming, there is much more uncertainty about regional changes in temperature and associated changes in precipitation. The prevailing view is that warming will be relatively greater toward polar regions. Global climate models indicate that, on the average, precipitation should increase, though they disagree on magnitudes and regional variation.

In response to the Global Climate Protection Act of 1987, the EPA is preparing a report to Congress on the impacts of global warming in the United States. The report will analyze some issues on a nationwide basis, but the focus will be on regional effects, with case studies in California, the Great Lakes, the Southeast, and the southern Great Plains. The Southeast studies will include potential effects of water quantity changes and sea level rise on Lake Okechobee and the Everglades ecosystem. EPA cautions that the present reliability of regional climate models allows only qualitative statements about regional effects, under a range of climate scenarios. The report is expected to be completed early in 1989.

The Department of the Interior has established a Working Group on Climate Change to coordinate Interior's involvement in climate change research and policy. This will include reviewing EPA's report to Congress as it relates to DOI responsibilities and bureaus. Bill Gregg, MAB Coordinator, is the NPS representative in the Working Group, which is chaired by Martin Smith, Deputy Assistant Secretary/Director, Office of Policy Analysis. Possible effects of global warming on DOI bureaus are being discussed and studied to establish a basis for policy formulation.

Several aspects of the issue that will affect the Park Service have been identified. One is sea level rise. Global warming may cause thermal expansion of the oceans and melting of the polar ice caps. The resulting rise in sea level would cause soil saturation, inunda-

tion, and increased erosion at shoreline areas such as Cape Hatteras NS and Channel Islands NP. Habitats would be affected and structures could be destroyed.

Changes in temperature, precipitation, and water availability would affect environments in all NPS areas. These changes could be intolerable to some species, forcing them to migrate if surrounding environments were favorable. Otherwise, they could become locally extirpated. Such changes also could affect the preservation of historic structures and landscapes.

Global warming could cause a change in the aesthetics of national parks: e.g., less or more snow on the mountains; changes in river flow; changes in the appearance of forests and other vegetation because of different species composition.

Recreation on natural lakes or reservoirs in park areas might be affected by changes in water level and seasonal variation.

Climate change might lead to significant changes in visitation patterns and recreational use of parks.

A number of policy questions have been posed. In view of potential widespread habitat changes due to human effects on the atmosphere, how should the NPS policy of minimal intervention be applied? Should the NPS try to assist in ecosystem or species migration where land use patterns make migration difficult? Should the NPS modify its general management plans and philosophies to deal with climate change? Should land purchases be made on or near the seashore? Should more or less investment be made in erosion control? Could the NPS contribute to a policy of afforestation/reforestation to increase removal of CO_2 from the atmosphere, and if so, how?

While the Department and NPS wrestle with such questions, Congress is considering further legislation. Senator Wirth of Colorado has introduced a wide-ranging bill that calls for studies by many government entities, including DOI, to find ways to deal with and adapt to climate change, among them alternative energy use and protection of tropical forests. A bill by Senator Stafford of Vermont focuses on reduction of CO_2 emissions. And legislation introduced by Senator Hollings of South Carolina would amend the National Science and Technology Policy, Organization, and Priorities Act of 1976 to, among other things, develop a national plan to improve scientific understanding of the earth system and the effect of changes on climate and human well-being.

Global warming is suddenly a hot topic for conferences as well. The NPS is involved in at least two this fall. One is on Consequences of the Greenhouse Effect for Biological Diversity, convened by the World Wildlife Fund-U.S. in Washington, D.C. October 4-6. The seven sponsors include NPS. And at the George Wright Society-NPS research conference in November at Tucson, a minisymposium will address global change. Paul Risser and Francis Bretherton of the National Academy of Sciences Global Change Committee will describe the status of this issue, and two NPS speakers will comment on potential impacts of global warming on parks.

There is little doubt now that discussion and action on global climate change will be high on the Park Service, national, and international agendas for a long time to come.

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