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GLOBAL CHANGE RESEARCH PROGRAM

ASSESSMENT PROVIDES STRATEGIES FOR MANAGING NATURAL RESOURCES IN A CHANGING CLIMATE

FINDINGS OF THE U.S. CLIMATE CHANGE SCIENCE PROGRAM SYNTHESIS AND ASSESSMENT PRODUCT 4.4

Overview

The U.S. EPA's Office of Research and Development (ORD) has completed a scientific assessment that summarizes knowledge of environmental management practices that will help managers reduce the impact of climate change on sensitive ecosystems and natural resources.

The assessment finds that the extent to which ecosystems and natural resources may be affected in the future will depend on the degree of sensitivity of the ecosystem to changes in climate and the ability of resource managers to adapt in anticipation of these changes.

For example, an intertidal marsh is an ecosystem sensitive to changes in temperature, precipitation, sea level rise, and storm surge. Marshes filter water and support species such as migratory waterfowl, shorebirds, threatened and endangered species, and fish. Adaptation solutions may include protecting land up-slope of marshes to allow them to move as the sea level rises and protecting seaward marsh edges from storm erosion by installing structures, such as sills and breakwaters, to reduce the impact of waves on the marsh.

The report, *Synthesis and Assessment Product 4.4: Preliminary Review of Adaptation Options for Climate-Sensitive Ecosystems and Resources*, is one of 21 products commissioned by the U.S. Climate Change Science Program (CCSP). The CCSP is responsible for coordinating and integrating the research of 13 federal agencies on climate and global change.

This report was planned and coordinated by the Global Change Research Program in ORD, which assesses the consequences of global change (particularly climate variability and change) on air quality, water quality, ecosystems, and human health in the United States, and evaluates alternative adaptation strategies to protect human health and the environment as changes occur.

Synthesis and Assessment Product 4.4 identifies strategies to address management challenges posed by climate change for a subset of federally protected lands and waters. These strategies can also be broadly applied to other lands and waters managed by governmental or nongovernmental entities.

Resource managers are in the early stages of considering the impacts of climate change on their management practices to protect and restore their lands and

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waters. This report provides information on how existing practices could be adjusted, or new strategies developed, to address the effects of climate change on natural resources.

Approach

Six federally managed systems – national forests, national parks, national wildlife refuges, wild and scenic rivers, national estuaries, and marine protected areas – were evaluated in the report. For each, the authors reviewed:

- Historical origins of the management system
- Current management goals
- Key ecosystem components and processes on which those goals depend
- Potential climate change impacts on managers' ability to attain goals
- Short- and long-term options for adjusting current management practices or implementing new practices to meet goals in the face of climate change

In addition, a variety of case studies explore in greater depth the current state of knowledge on management options that can be used to adapt to the impacts of climate variability and change.

Highlights

Climate change can exacerbate the impact of traditional stressors, such as pollution or habitat destruction, on ecosystems. Many existing best management practices to reduce these stressors can be applied to reduce the impact of climate change.

For example, current efforts are underway to restore vegetation along streams and shorelines. These actions serve to increase ecosystem resilience to climate change impacts such as higher temperatures, greater amounts of pollutants and sediments from more intense rainfall, and higher rates of erosion along the coasts from rising seas and storm surges.

The nation's ability to adapt will ultimately depend on recognition of barriers to strategy implementation, expanded collaborations among ecosystem managers, creative re-examination of program goals and authorities, and flexibility in setting priorities and managing for change.

Application and Impact

All natural resource managers are faced with the challenge of evaluating and responding to the impacts of climate change on our ecosystems. Adaptation responses are needed that are informed by the best-available science on the potential impacts of climate change.

This assessment will be useful to EPA, other federal organizations, nongovernmental organizations, states, and communities for developing adaptation responses to global change.

REFERENCES

CCSP Web site: http://www.climatescience.gov/Library/sap/sap4-4/

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