

The NPS Global Change Research Program

By Bill Gregg, MAB Coordinator for NPS

To understand and address global change effects on ecosystem processes, and related effects on species distributions and life cycles, will require unprecedented cooperation at many levels: interdisciplinary cooperation among global change researchers; among research, educational, and management specialists in participating NPS areas; between these NPS special-

ists and others in the same biogeographic area; and among specialists in different biogeographical areas, including a strong emphasis on building international linkages. To foster the required multi-level cooperation, the NPS adopted the biosphere reserve model for developing its long-term global change research program.

In this model, a biogeographic area, defined on the basis of physical and biological factors and human-environment interactions, provides the geographic framework for developing cooperative programs. Each biogeographic area contains from one to several NPS units as core research areas that will serve as the

Continued on page 8

Continued from page 2

Policy Implications

A reading of the possible consequences of GCC will suggest immediately to resource managers the drastically changing nature of their responsibilities and tasks in the decades ahead. Policy issues, both near- and long-term, raise some interesting questions. The NPS will be concerned in a near-term context with such questions as:

- (1) Under conditions of rapid habitat change, should NPS change its management philosophy of minimal intervention?
- (2) How should climate uncertainty be incorporated into NPS planning activities?
- (3) Should NPS become a more active cooperator in maintaining ecosystems outside park boundaries?
- (4) What should be the NPS role in generating scientific information for detecting, understanding, and predicting global change effects?
- (5) To what extent should NPS educate the public on the effects of global change?

Longer-term policy issues give rise to a different set of questions:

- (1) Should NPS adopt a policy of active vegetation management?
- (2) Under what conditions should NPS participate in national or international efforts to rehabilitate degraded ecosystems?
- (3) To what extent should NPS encourage *ex situ* maintenance as a means of perpetuating native species?
- (4) Under what conditions should the NPS intervene to prevent, mitigate, or lessen the effects of sea level rise?
- (5) To what extent should potential sea level rise and climate change be considered in NPS land purchases and boundary modifications?

How Does The U.S. Fit Into the World Research Picture?

The U.S. Global Change Research Program is coordinated by the Working Group on Global Change of the interagency Committee on Earth and Environmental Sciences (CEES). The overall goal of the U.S. Program is to "establish the scientific basis for national and international policymaking relating to natural and human-induced changes in the global Earth system."

In the executive summary of *Our Changing Planet: The FY 1991 Research Plan of the U.S. Global Change Research Program*, the CEES underscored the Administration's commitment to improving our understanding of the process and implications of global change:

"Recognizing the profound economic and social implications of responding to global environmental changes, the President has set in motion a comprehensive process designed to continue U.S. leadership on this issue. This includes an accelerated, focused research effort; active participation in international collaborative efforts intended to culminate in a Frame-

work Climate Convention; and a comprehensive review of potential policies and their implications.

"As the research component of this process, the U.S. Global Change Research Program is designed to reduce key scientific uncertainties and to develop more reliable scientific predictions, especially predictions of changes in regional climate, upon which sound policy strategies and responses can be based."

The CEES has structured the U.S. research program around seven interdisciplinary science elements:

- Climate and Hydrologic Systems
- Biogeochemical Dynamics
- Ecological Systems and Dynamics
- Earth System History
- Human Interactions
- Solid Earth Processes
- Solar Influences

The CEES has established technical Task Forces to coordinate interagency programs under each science element, and additional task forces to coordinate activities in the areas of modeling, data management, international coordination, industry and global change science, outreach and communications, and educa-

tion and training. NPS specialists are participating on 11 of the CEES Task Forces.

NPS Research Categories

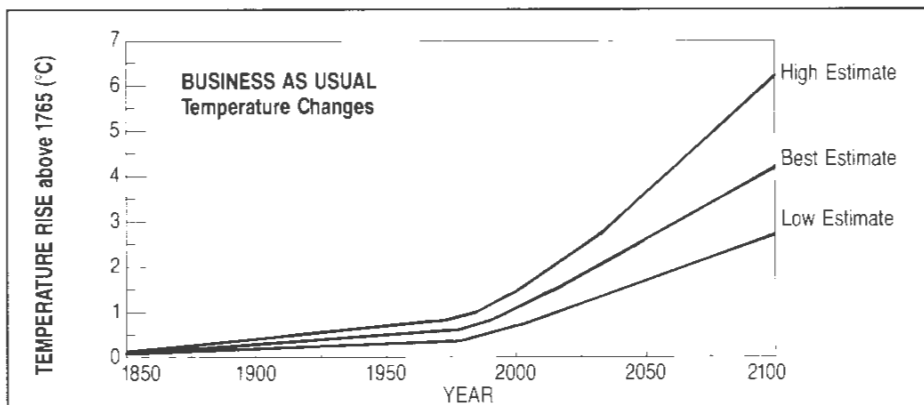
The National Park Service will be conducting global change research within four of the seven interdisciplinary science elements designated by the CEES.

Under Ecological Systems and Dynamics, the NPS will conduct studies to understand the global change interactions at the population, community, watershed and landscape levels.

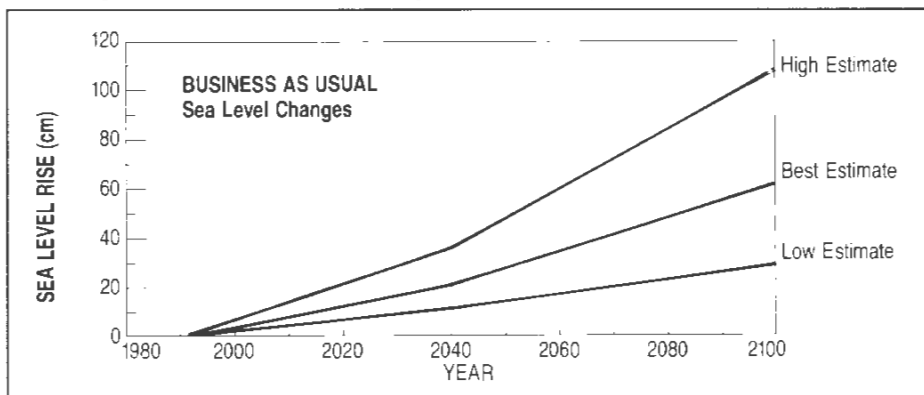
Under Earth System History, NPS will be conducting a variety of paleostudies to provide evidence of past climate change and its effects.

Under Human Interactions, our resource ethnography program will look at the effects of climate change on subsistence and other ecosystem uses of native and other small-scale societies.

And finally, under Solid Earth Processes, we will study the dynamics of coastal systems as affected by sea level rise and changes in the frequency, intensity, and tracks of coastal storms, with emphasis on NPS coastal barriers.



Projected temperature rises (above) and sea level rises (below) shown here represent best estimates according to the Intergovernmental Panel on Climate Change science and policy workgroups (May 2, 1990 draft report).



Research Program (Continued from page 7)

primary NPS sites for developing coordinated long-term interdisciplinary research programs. The core research areas are either designated units of the UNESCO's International Network of Biosphere Reserves, currently under study, or are considered potentially suitable for designation.

Contributing Areas

In addition to the core research areas, other NPS units in the biogeographic area will serve as contributing areas. The contributing areas will provide study opportunities by virtue of additional data sets through cooperative monitoring and research, and from natural or cultural resources not present in the core research areas. The participating NPS units in each biogeographic area will develop their research programs to address the scientific priorities identified by the CEES in the U.S. Global Change Research Program, while also providing the basic understanding needed to develop adaptive management policies and programs.

Each program will encourage interdisciplinary and interagency cooperation within the biogeographic area, as well as cooperation on particular research themes with other biogeographical areas and internationally. These interregional and international thematic initiatives, which will be identified as the long-term program matures, will provide the basis for NPS scientific leadership in the global change program.

The Review Process

The NPS Global Change Program is based on a process of concept development, program formulation, development of research proposals, and progressive strengthening of operational capabilities in participating field units. The NPS process relies strongly on review of the program and individual research pro-

The Invisible Present

"All of us can sense change – the reddening sky with dawn's new light, the rising strength of lake waves during a thunderstorm, and the changing seasons of plant flowering as temperature and rain affect our landscapes. Some of us see longer-term events and remember that there was less snow last winter or that fishing was better a couple of years ago. But it is the unusual person who senses with any precision changes occurring over decades. At this time scale, we are inclined to think of the world as static, and we typically underestimate the degree of change that does occur. Because we are unable directly to sense slow changes and because we are even more limited in our abilities to interpret their cause- and-effect relations, processes acting over decades are hidden and reside in what I call 'the invisible present.'"

John J. Magnuson, in *BioScience*
July/August 1990, p. 495

posals by NPS and outside specialists using key CEES criteria (relevance to global change program objectives, scientific merit, readiness, linkages, enhancement of existing program research). Higher level reviews of the NPS program by the Department of the Interior and the CEES Working Group on Global Change will also use these criteria and will facilitate

The Invisible Place

"...lack of historical perspective can place short-term studies in the 'invisible present,' where a lack of temporal perspective can produce misleading conclusions. Similarly, the broad significance of research results from a particular site is difficult to interpret if the site's context in space (e.g. location within region-scale variation in disturbance regime and temperature-moisture conditions) is not understood. In this sense, an isolated research site may reside in an 'invisible place' where the significance of results is unclear."

Frederick J. Swanson and Richard E. Sparks
in *BioScience*, July/August 1990, p. 502

coordination among Departmental bureaus and with other agencies. These reviews will maintain a high degree of accountability within the Global Research Program.

The NPS global change program began with the Secretary's establishment of the Departmental Working Group on Global Climate Change (DWGCC) in November 1988, to provide a framework for interagency cooperation in response to CEES priorities. In early 1989, the DWGCC asked each bureau to identify ongoing research programs relevant to the U.S. Global Change Research Program. Bureaus were asked to provide information on "focused" programs targeted and justified to address global change research issues, and "contributing" programs relevant to global change research but justified on other grounds. (Focused programs are funded as components of the interagency U.S. Global Change Research Program; contributing programs are funded through other sources).

Through the Department's initiative, the CEES recognized 17 NPS programs under 5 science elements as contributing programs in the FY 1990 U.S. Global Change Research Plan, published in July 1990. The initiative established the relevance of NPS and other bureau research programs to the global change issues, and provided the opportunity to develop a focused program.

Coordinator Appointed

The NPS Director appointed Eugene Hester, the Associate Director, Natural Resources (ADNR), as the responsible NPS official for developing the NPS program. Dr. Hester designated Dr. William Gregg, the Service's Man and the Biosphere Program Coordinator, to coordinate technical aspects of the NPS program within the Service and with the Department and various CEES scientific Task Forces. Dr. Gregg served in this capacity until the appointment of Peter Comanor as full-time NPS Global Change Coordinator in August (see p. 6).

Through an informal network of WASO and field scientists, the NPS developed proposals for a cooperative integrated program of ecological research in selected biogeographic areas, to serve as the major NPS program emphasis, and a small thematic program to study global change effects on coastal systems. The "integrated studies" proposal called for initiating research in 12 biogeographic areas in FY 1991 and the addition of two biogeographic area programs annually until achievement of the full performance level of 20 biogeographic area programs in FY 1995.

As a result of the coordination between the Department, the CEES, and the OMB, the programs were

included, albeit at a somewhat reduced funding level (\$3 million and 26 FTEs), in the President's FY 1991 budget request to the Congress.

In February 1990, following release of the Administration's budget request, the Director announced the NPS Global Change Research Program: authorized an NPS program committee to plan, coordinate, and oversee the program; and invited parks interested in being considered as core research areas to prepare statements on their research capabilities and interests in global change research.

The Selection Process

NPS units representing 27 biogeographic areas prepared written statements, which were presented orally to the program committee and a group of outside reviewers at a workshop in New Orleans in May. Based on the review group's comments and the program development considerations, the NPS Global Change Program Committee (GCPC) recommended, and the ADNR approved the recommendation, that NPS units in 11 of the biogeographic areas be invited to prepare Global Change Operations and Conceptual Research Plans (GCPs) for participation in the NPS Integrated Studies program, and that planning also be initiated for thematic research initiatives on the effects of global change on coastal barriers and glaciers. Each park that submitted a proposal received feedback from the peer reviewers and the program committee for consideration in preparing their plans or, for the areas not

Contributions of Long-Term Research

"Research with an extended time perspective is crucial if one accepts the premise that long-term phenomena have a central role in ecological science. Such studies are uncommon despite this obvious need and repeated evidence of the misleading nature of short-term research. Factors contributing to the rarity of long-term studies include difficulties in obtaining sustained financial support and in providing continuing leadership."

Jerry Franklin, Caroline Bledsoe, and
James Callahan
in *BioScience*, July/August 1990, p. 509

selected, in deciding whether to revise their concept statements for consideration in the planning and review process for the FY 1992 program cycle.

Plans for the FY 1991 programs are due to the ADNR by October 1, 1990. The plans will be reviewed by outside scientists. In late October, the program committee meets in Seattle to review the plans and the peer review comments, and to recommend personnel and funding allocations for program operation and which research concepts will be developed as full research proposals.

Following the ADNR's approval of the Plans, the core research areas with approved Plans will develop the detailed research proposals and secure outside peer review. Final proposals and accompanying peer review comments must be submitted to the ADNR not later than March 1, 1991. The GCPC will then be asked to review the research proposals and make recommendations to the ADNR by late March. The ADNR will select proposals and complete the allocation of GCP funds by early April 1991.