



Flexible Planning in a Era of Uncertainty

Background

The National Park Service is instructed to “incorporate climate change considerations and responses in all levels of NPS planning” (NPS Climate Change Response Strategy, 2010). However, how does the NPS identify what future, or potential futures to plan for? What are the best response options when faced with a range of potential climate futures? These are not easy questions.

Statement of Need

Managers need conceptual as well as quantitative tools for climate change adaptation planning.

Challenges

Our planet is warming. Rising temperatures will influence many aspects of Earth’s hydrological systems, such as precipitation, snow, ice and permafrost, which will in turn affect plant and animal life and processes such as fire. These cascading effects are already impacting the natural and cultural resources the NPS is charged to protect, along with impacts to park infrastructure and changes in visitor use.

Potential climate futures are described based on a variety of models and assumptions. The models include a range of emission scenarios based on different economic conditions, technological advancements, and population growth. From these different assumptions, the modeled climate future can take many paths, producing a range of possible futures as illustrated in Figure 1. One of the biggest planning challenges with climate change is the “uncertainty” associated with which climate future we are headed towards.

Flexible Planning

Most plans set goals and a series of actions to achieve them, resulting in a fixed plan. The complexities and uncertainties that characterize climate change require a different approach. One that employs enough specificity to act in the short term but allows for an interactive, learning process. This flexible planning approach is being institutionalized in the new NPS planning framework (Figure 2).

Available Resources and Processes

A variety of information and data resources, including planning processes, continue to be developed to help NPS managers plan for and react to a changing climate. These include:

- Climate Change Planning Intranet Site
- Climate Change Observations and Projections
- Climate Change Scenario Planning

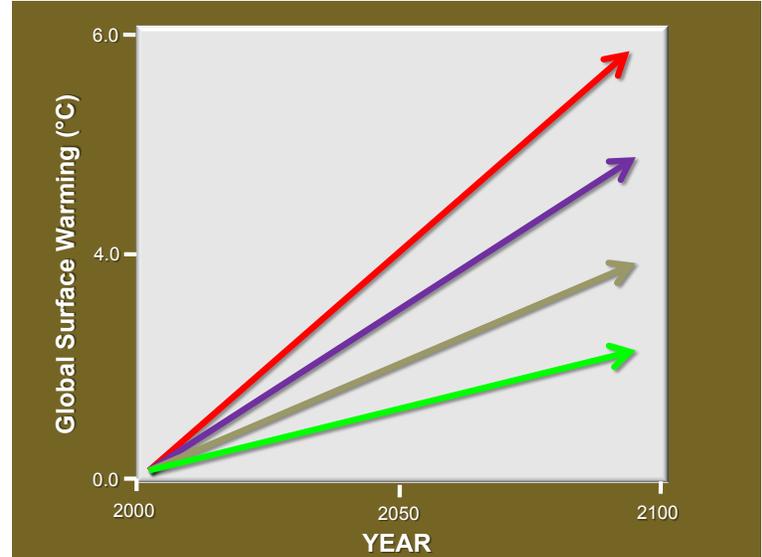


Figure 1. Uncertain climate futures.

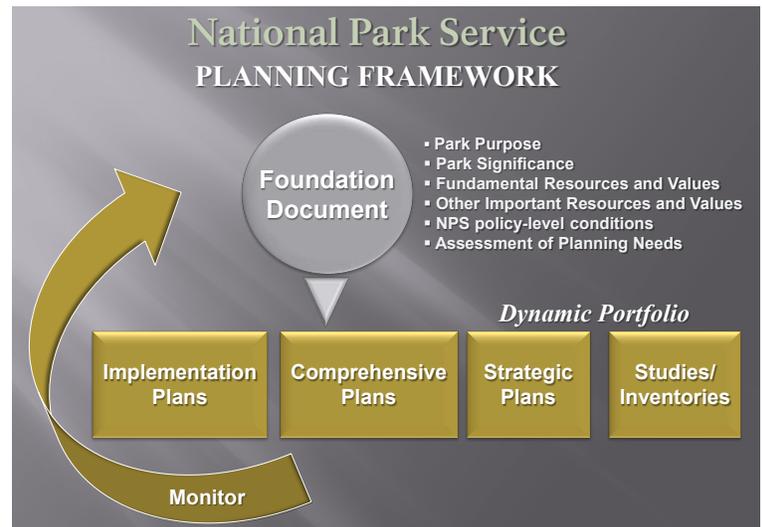


Figure 2. The National Park Service Planning Framework includes a new component in the Foundation Document, “Assessment of Planning Needs” that provides a planning and management roadmap unique to the park for navigating through the portfolio of options. There is emphasis in monitoring, that revisits the “Assessment of Planning Needs”, producing a more flexible and adaptive planning process.

More Information

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Climate Change Observations and Projections

Through a partnership with the University of Wisconsin, the NPS will deliver spatially-explicit climate information to all NPS units. This effort will analyze historical and projected climate trends including temperature, precipitation, and where appropriate, sea level rise. The range of projected climate futures are based on the Intergovernmental Panel on Climate Change (IPCC) emissions scenarios projected for the 21st century. The three IPCC greenhouse gas emissions scenarios are B1 (lower emissions), A1B (medium emissions), and A2 (higher emissions).

Climate Change and Scenario Planning

Scenario planning is a process for developing a science-based decision making framework in the face of futures with high uncertainty and lack of control (Figure 3).

The NPS started exploring the use of scenario planning in 2007 and now is using this process as a long-range planning tool for incorporating the uncertainties associated with climate change into a variety of park management process and documents, including General Management Plans and Resource Stewardship Strategies.

The goal of scenario planning in the NPS is to inform development of climate change adaptation strategies that best serve the park purpose, resources and visitors in a rapidly changing environment. Outcomes from a scenario planning effort include:

- Robust Strategies - development of “no regrets” strategies that make sense for all the plausible climate futures (scenarios).
- Windtunnel Testing - When considering existing, or developing new management strategies, managers can use the climate change scenarios to ask, “Do these strategies make sense under the scenarios?” Scenarios enable park managers to make better informed decisions regarding what level of risk they are willing to take with future park investments.
- Monitoring - identification of climate variables, as well as effects, to monitor that form the climate change scenarios, for tracking how the future unfolds relative to the scenario projections.

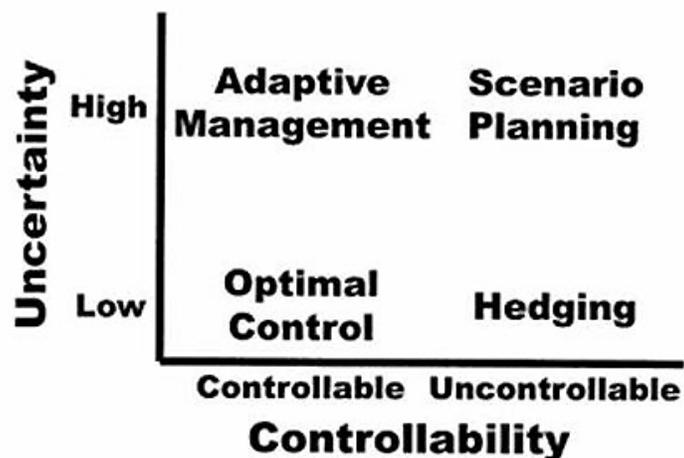


Figure 3. Appropriate management responses based on uncertainty and controllability (Peterson et al., 2003).



Top: Climate change scenario planning workshop in the NPS Alaska Regional office. Bottom: Sustainable park infrastructure at Assateague Island National Seashore is designed for a barrier island, where sea level rise and increase storm frequency are projected. Vault toilet mounted on a wooden deck to allow easy relocation during storm events.

Climate Change Planning Intranet Site

A climate change planning intranet site was developed for NPS planners and managers, providing a variety of resources that support climate change considerations in park planning. Information made available on the site include:

- Policy and Guidance - National guidance that provides the justifications for incorporating climate change considerations and responses in park planning. NPS guidance that puts the federal directives into practice.
- Science Resources - Select climate science information, data, and reference materials.
- Foundation Documents - Climate change science developed for specific NPS units to support Foundation projects.
- Scenario Planning - Overview of this process that is designed for managing into futures with high uncertainty and used by the NPS to plan and manage for climate change.
- Planning Examples - NPS examples where climate change has been considered in planning products.

NPS Climate Change Planning Intranet Site
<http://www1.nrintra.nps.gov/climatechange/planning>