
Challenges in Adapting to Climate Change: Are Federal Resource Management Agencies Prepared?

**Pinchot Institute for Conservation
Forum on Climate Change Effects**

**Presentation by Anne Johnson
U.S. Government Accountability Office
February 29, 2008**

Background

- *Climate Change: Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources (GAO-07-863)*
- Requested by Senators McCain and Kerry of the Senate Committee on Commerce, Science and Transportation
- September 2007 issuance

Background (Cont.)

Review covered five natural resource management agencies:

- Interior
 - Bureau of Land Management (BLM)
 - U.S. Fish and Wildlife Service (FWS)
 - National Park Service (NPS)
- Agriculture
 - Forest Service (FS)
- Commerce
 - National Oceanic and Atmospheric Administration (NOAA)

Background (cont.)

Review was in two parts:

1. A workshop in collaboration with the National Academies
 - *Objective:* To solicit experts' views on the effects of climate change on four ecosystem types and associated management challenges

 2. Four case studies
 - *Objective:* To illustrate the climate change vulnerabilities and management challenges highlighted at the workshop
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Workshop Findings

Key climate change effects:

- **Physical**—drought, floods, glacial melting, sea level rise, ocean acidification
- **Biological**—increases in insect infestations, shifts in species distribution, coral bleaching, change in timing of natural events
- **Economic and social**—adverse impacts on recreation and tourism, infrastructure, water supplies, fishing, ranching

Case Studies

Heinz Center ecosystem classification system used to determine ecosystem types

- Coasts and oceans—Florida Keys National Marine Sanctuary (NOAA)
- Forests—Chugach National Forest (Forest Service)
- Fresh waters—Glacier National Park (National Park Service)
- Grasslands and shrublands—Kingman, Arizona (BLM)

Case Study 1: Coasts and Oceans Florida Keys National Marine Sanctuary

Key climate change effects:

- Increases in sea water temperature
- Degradation of coral reefs (bleaching, disease)
- Sea level rise and saltwater intrusion on land
- Ocean acidification
- Damage to economic and cultural resources

Bleached Brain Coral, Florida Keys



Source: NOAA

Case Study 2: Forests Chugach National Forest, Alaska

Key climate change effects:

- Warmer, drier climate is already apparent
- Bark beetle infestation has affected 400,000 acres of the Forest
- Wetland decreases: ponds have been replaced by grassy areas and hardwood trees
- Treeline in the Kenai Mountains has risen about 1 M/year during the past 5 decades
- Pace of glacial retreat has accelerated
- Future climate changes could result in more invasive species, loss of spawning habitat, and reduced tourism

Bark Beetle Infestation, Kenai Peninsula



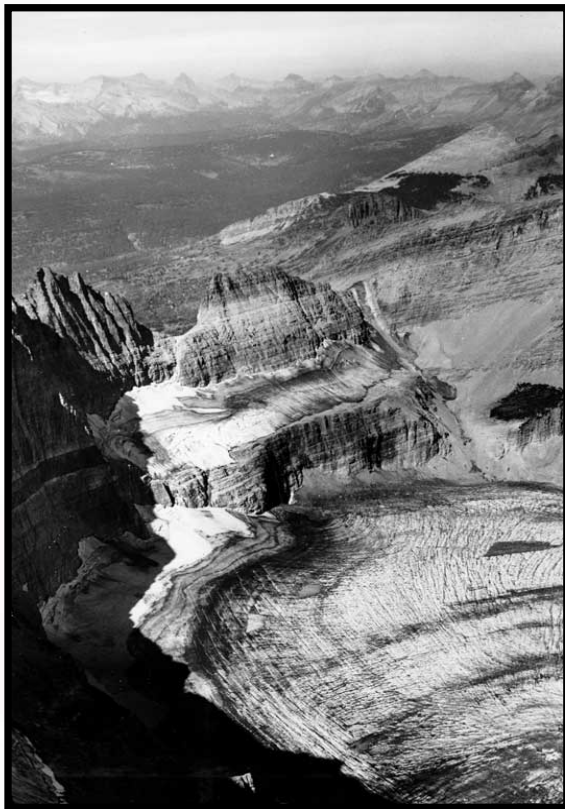
Source: Forest Service

Case Study 3: Fresh Waters Glacier National Park

Key Climate Change Effects:

- Average temperature in W. Montana has increased 1.6° C over the past century
 - Forests are more vulnerable to fire, due to warmer and drier conditions
 - Number of glaciers has declined from 150 to 26 since 1850
 - Spring comes 3 weeks earlier now compared to historical average
 - Snowpack has decreased by more than 30 percent, reducing runoff that downstream human and animal communities depend on
 - Forests are invading alpine meadows, affecting numerous animal species
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Melting Glacier, Glacier National Park



1938

Source: USGS



2005

Case Study 4: Grasslands & Shrublands BLM, Kingman, AZ

Key Climate Change Effects:

- Prolonged drought has
 - destroyed many old growth pinyon pine trees
 - caused desert scrub plant communities to convert to annual grassland communities, which are more vulnerable to fire
- Continued dry conditions may
 - lead to soil erosion, decreased plant productivity, decreased wildlife diversity, abundance, and habitat, and reduced groundwater recharge

Wildfire Damage, Mojave Desert



Source: GAO

Common Management Challenges

- The 5 agencies do not consider addressing climate change a priority
- Resource managers do not have climate-related guidance from agency headquarters
- Resource managers do not have site-specific information about local effects of climate change (need more localized models)
- Since climate change is a global issue, it is difficult to address the problem in a single park, forest, wildlife or marine sanctuary.

GAO Recommendation to Department Secretaries

Develop clear, written communication to resource managers that

- Explains how to address the effects of climate change
- Identifies how managers are to obtain necessary site-specific information
- Reflects best practices shared among the relevant agencies, while also recognizing the unique missions, shared objectives, and responsibilities of each agency.

Agency Response

Department of Agriculture (FS):

- Developing a regulation for land management that emphasizes adaptive management (early 2008)
 - Climate change and mitigation to be considered as part of the revision to land management plans
 - Preparing a white paper on how to integrate climate change into forest plans
 - Creating environmental simulation modeling for air, water, forests, and ranges
 - Preparing a 10-year climate change research strategy
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Agency Response

Department of the Interior (BLM, FWS, NPS):

- Established a Climate Change Task Force in April 2007 to examine how possible climate changes would affect disaster, water resource, and habitat management and evaluate responses to changing landscapes and appropriate modeling

Agency Response

Department of Commerce (NOAA):

- Will conduct consultations across its line of offices and programs to engage coastal and marine resource managers in identifying their needs for climate information
- By December 2008, will develop written communication to help resource managers address the effects of climate change, obtain site-specific information, and reflect best practices across agencies

Next Steps

The Senate Select Committee on Climate Change has requested a follow-on report that addresses climate change adaptation at the following agencies:

- Department of Agriculture
 - Department of Commerce
 - Department of Energy
 - Department of Homeland Security
 - Department of the Interior
 - Environmental Protection Agency
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