

Defenders of Wildlife Wildlife Climate Change Adaptation Across the Landscape



A Survey of Federal and State Agencies, Conservation Organizations and Academic Institutions

About the Survey

The effects of climate change are already being felt by wildlife and natural systems, and even with immediate action to reduce greenhouse gas emissions, these effects will continue for decades to come. Natural resource managers are just coming to grips with what this means for the future of conservation strategies. Climate change adaptation is an approach to help species and ecosystems cope with climate change and ongoing ecological threats. The term *adaptation* is currently used to describe adjustments in natural or human systems in response to the impacts of climatic change.



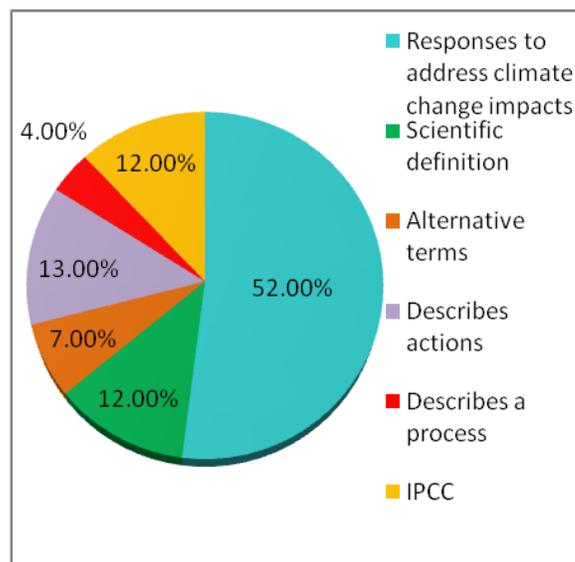
We surveyed conservation practitioners, academic scientists, and natural resource managers from a variety of sectors. Photo: United States Department of Agriculture Natural Resources Conservation Service

To better understand the current status of the field of natural resources adaptation, Defenders of Wildlife, The Association of Fish and Wildlife Agencies, The Nature Conservancy and the National Wildlife Federation conducted a survey with funding from the Doris Duke Charitable Foundation. From October 2008 through January 2009, we interviewed 68 participants from federal and state agencies, conservation organizations, and the academic community in order to develop a clear definition of climate change adaptation, and to understand how natural resource adaptation is taking place on the ground. We asked these experts to define climate change adaptation, to discuss ongoing adaptation

planning efforts, to provide examples of adaptation techniques and strategies, and to list costs associated with these techniques and projects when possible. We also asked participants to discuss the challenges and barriers to planning for and implementing adaptation strategies, and the metrics associated with adaptation project monitoring.

Climate Change Adaptation

Most participants defined climate change adaptation to encompass anticipating, preparing for, and responding to the expected impacts of climate change in order to promote ecological resilience in natural systems, and to allow these systems to respond to change. Some participants expressed concern about the use of the term, noting that it could be easily confused with the evolutionary definition, and some offered alternatives such as describing the process of adaptation or using alternative words such as “preparation” to describe adaptation.



Participants used a variety of ways to talk about climate change adaptation, but the majority said that climate change involved responses to manage or address the impacts of climate change.

Climate Change Adaptation Across the Landscape

Building Adaptive Institutions

Participants noted that climate change adaptation is a new field. There is uncertainty in the magnitude of climate change and its impacts, and the ecological responses to those impacts. Participants said that in order to respond to climate change, conservation institutions themselves must adapt to constant change at large scales. Representatives from the agencies, organizations and institutions we interviewed were involved in the following types of actions aimed at improving institutional adaptive capacity:

Programmatic Changes: Participants are making climate change a part of program priorities, securing increased funding to reflect that new focus, modifying management plans to address projected climate change impacts, forming internal and external working groups, and increasing internal capacity to address adaptation.

Planning: Many participants are planning, revising existing land management plans, reprioritizing restoration or conservation actions, identifying new management goals, and developing monitoring before implementing adaptation projects. Chief among planning activities mentioned by participants was the revision of existing management or conservation plans to incorporate climate change, or creating stand-alone adaptation plans.



Working at landscape scales will be an important component of building institutional adaptive capacity and flexibility. Photo: http://en.wikipedia.org/wiki/Pioneer_Valley released under the [GNU Free Documentation License](#).

Collaboration: Participants noted that climate change requires conservation partners to work together at landscape- scales, across jurisdictional boundaries to adequately understand and respond to the impacts of

climate change. Forming working groups, partnerships and collaborative structures and processes is an important component of building adaptive institutions.

Increasing science and technical capacity: Many agencies, organizations and institutions are developing tools, predictive science, models, guidance documents, and planning information as key components of adaptation to climate change. Developing and implementing active adaptive management programs within land management agencies is also a key part of climate change adaptation, as many adaptation strategies will be implemented under changing and uncertain conditions with incomplete information. Learning from doing and revising management strategies is an essential part of climate change adaptation.

Increasing flexibility: Because of the uncertainty, the rapid influx of new information, and potential for unexpected abrupt changes, participants noted that climate change adaptation calls for increased flexibility and nimbleness from federal and state land management agencies. Agencies will be forced to adjust timeframes, plan for alternative future scenarios, and revise resource management plans, actions, and objectives more actively than in the past.

On the Ground Strategies

While adaptation planning efforts are ongoing across the agencies interviewed, there are very few ongoing adaptation projects currently in place. Participants noted that many of their current management and restoration projects address aspects of climate change adaptation, but were not implemented with adaptation in mind. These include removing invasive species, restoring riparian ecosystems, and forest thinning. Many participants also were able to suggest adaptation strategies that they have been thinking about or learning about. These strategies fit into the following categories:

- 1. Prevent undesired effects of climate change –** These strategies include efforts to manage species and ecosystems so that they are better able to resist the impacts of climate change. For example, building oyster reefs to prevent coastal erosion due to sea level rise is an example of a resistance strategy.
- 2. Reduce non-climate threats –** The most widely cited strategy by survey participants was the need to reduce ongoing threats to natural resources. In general, systems and species that are already stressed

Climate Change Adaptation Across the Landscape

will be less resilient to climate change and reducing non-climate threats will give wildlife species maximum flexibility to respond to climate change. Strategies in this category include reducing invasive species or limiting pollution.

3. Expand the network of protected lands and waters – Participants noted that maintaining resilient ecosystems and allowing species to move in response to climate change will require the expansion of a connected network of conservation areas. Building this network requires the following actions:

- **Increase the pace of strategic land protection** – Large conservation areas tend to contain more species than small areas and will provide opportunities for species to move between suitable habitats as the climate changes. Similarly, protecting the full range of habitat types and the conditions under which they occur will help species survive. Conservation funding is limited and so investments in land protection must be made in a coordinated, strategic manner that ensures that the most critical landscapes are given priority.
- **Identify and protect climate refugia** – Some areas may be less likely to change in response to climate change due to their topography, geographic location, or other physical factors. These areas are called refugia, and identifying and protecting them may be an important adaptation strategy. For example, gorges may provide shelter from hot, dry winds and may therefore be less affected by increasing temperatures and drought. These areas may stay moist and cool enough to enable temperature sensitive species to retreat and survive as the climate changes.
- **Promote landscape connectivity to facilitate species movements and gene flow** – To facilitate species movement and exchange of genetic material we will need to protect areas critical for climate-induced wildlife movement such as corridors for terrestrial species and stepping-stone habitats for species that need stopover locations between protected areas. Connecting streams and rivers through dam removals and stream and floodplain restoration projects is also important.

4. Implement proactive management and restoration strategies – Strategies in this category include all *active* interventions in habitats, ecosystems and species populations to enhance the ability of these targets to accommodate climate change impacts. Examples include the translocation of species to new locations, facilitating marsh migration in response to sea level rise, and using plant species in restoration projects that are thought to be more resilient to anticipated climate changes in a particular location.



Promoting landscape connectivity will be an important strategy to help species move in response to climate change. Photo: Defenders of Wildlife

Challenges

Climate change poses an unprecedented threat to natural resources, ecosystems and wildlife. The challenges described by resource managers and conservationists in terms of helping wildlife and ecosystems adapt to climate change are similarly daunting.

Participants ranked a **lack of resources – including funding, staff and institutional capacity** – as the number one challenge to planning for and implementing climate change adaptation activities. A number of participants noted that they require increased resources and capacity, while one academic participant said that greater support is required for long-term scientific studies.

Participants also expressed a tremendous need for **place-based adaptation techniques** and strategies and examples of ongoing adaptation projects. The conservation organizations and federal agency groups in particular highlighted the lack of tested approaches and case studies for managers who want guidance that is more

Climate Change Adaptation Across the Landscape

detailed than instructions to simply “increase connectivity,” or “manage other stressors.”

The need for further **development, revision and access to tools and models** was also identified as a challenge. Downscaled models – or models that show locally relevant data about climate change projections – better predictive tools, linked ecological process and climate models, standardized monitoring methodology, Geographic Information System (GIS) compatible data, and vulnerability assessment tools – which assess vulnerability of an ecosystem or species to climate change were all identified as critical to the adaptation planning and the implementation process.



Dealing with climate change will be challenging, but participants are moving forward to plan, build partnerships, develop tools and models, and implement adaptation strategies for managing natural resources as the climate changes. Photo: © Karen Murphy, King County Creek Fire 2005, Kenai National Wildlife Refuge, Fish and Wildlife Service.

Other challenges that were mentioned included:

- a difficulty in setting goals or defining targets for management;
- lack of robust monitoring programs;
- lack of an agency-wide commitment to work on the issue, or a political environment that does not allow or promote open and candid discussion;
- the lack of opportunities for collaboration between scientists and managers;
- the need for consistent definition for adaptation; using a better/different term;

- the lack of a centralized climate adaptation clearinghouse or other outlets for information sharing; and
- on-going, monumental non-climate challenges, such as invasive species and habitat fragmentation.

Conclusion

While the challenges presented are real, the responses from survey participants suggest that progress is being made to plan and implement adaptation strategies, develop tools and models for adaptation planning, and to help build the capacity of state and federal agencies that do not currently have the resources to take on the challenge alone. In particular, promising partnerships are developing within and among the federal, state, conservation organizations and academic sectors and these partnerships will go a long way towards developing innovative solutions and implementing strong adaptation strategies. However, without increased funding and other resources to support adaptation efforts, these partnerships alone will not be enough to prevent the collapse of natural systems and the loss of biodiversity. The agencies responsible for managing the lands and waters of the United States and the organizations and institutions that support their work are in desperate need of new funding to fully understand, plan for, and address the challenges ahead.

For the full results of the survey, “Climate Change Adaptation Across the Landscape: A survey of Federal and State Agencies, Conservation Organizations and Academic Institutions in the United States” please visit Defenders of Wildlife’s Website: www.defenders.org

We would like to express our sincere thanks to the Doris Duke Charitable Foundation for funding this survey and to all of the federal, state, academic and non-governmental organization employees who provided their time and expertise.