

New Mexico Climate Change Ecology and Adaptation Workshop: Executive Summary

On October 22, 2007, The Nature Conservancy in New Mexico, in collaboration with the Climate Assessment for the Southwest (CLIMAS) and the Institute for the Study of Planet Earth (both associated with the University of Arizona) brought together key local, state, tribal and federal natural resource managers with agency and academic scientists to review climate change science, articulate management concerns, share management strategies and identify opportunities to address climate change adaptation challenges in a coordinated way. Invited speakers provided science and management perspectives to provide a foundation for problem-solving. Then participants devised and discussed a wide variety of options, ultimately identifying a suite of priority strategies for follow-up.

The workshop participants recommended **four key strategies** for buffering natural ecosystems from climate change:

1. Develop a small number (two to four) of intensive **landscape-scale climate change adaptation pilot projects**, including at least one in a forested landscape and another in a landscape dominated by grassland and/or shrubland.
2. Identify a suite of **practical adaptation options and best climate change management practices for natural resource managers**. Share, apply and test these ideas collaboratively across US southwest and northern Mexico.
3. Develop a **regional climate change adaptation network and training program** for information sharing, networking, professional development, and capacity building.
4. Develop a **regional monitoring and data management framework** that facilitates development and sharing of scientific information about climate change and its ecological effects.

The participants identified several other needs, including community outreach and education; policy and administrative reform (particularly with respect to environmental regulation), and addressing the root cause of climate change by reducing emissions of greenhouse gas both within and outside New Mexico.

Key Science Findings

Speakers, including Jonathan Overpeck (Institute for the Study of Planet Earth, University of Arizona), Craig Allen (US Geological Survey, Jemez Mountains Field Station), Manuel Molles (University of New Mexico, *in absentia*), presented information on climate change and its observed and potential impacts on New Mexico ecosystems.

- The evidence for global warming is *unequivocal*. Recent global warming is *very likely* caused by humans. Scientists are confident in projected warming for the West. Temperature increases will further decrease mid-elevation snowpack, accelerate spring snow melt, and enhance drought. Winter storm tracks are expected to continue moving northward, as they have since the late 1970s, which may decrease winter precipitation in the Southwest. In addition to long-term drying and warming, we can anticipate greater decadal and inter-annual *variability* in temperature and precipitation, which may have as much influence on ecosystems as the long-term average trend in these variables.

- Reducing GHG emissions now may keep impacts from becoming unmanageable; in 10 to 20 years it may be too late to avoid “dangerous climate change,” in the words of the Intergovernmental Panel on Climate Change.
- Gradual climate change may trigger large, abrupt ecological change, such as the piñon pine dieback in the Four Corners. Increased temperatures were a key factor in this and other large-scale tree mortality events, globally, in Australia, the Amazon, Canada, Spain and Switzerland and other places. The recent dieback, nevertheless, provides opportunities for managers to safely reintroduce fire to enhance resilience in densely forested areas, where crown-fire potential has decreased.
- In New Mexico streams and lakes, fish and non-flying invertebrates are predicted to be at greatest risk from climate change, especially at high-elevations. Moreover, warmer temperatures and drought conditions will result in more variable stream flows, due to New Mexico’s complex geography.

Key Strategies for Land Mangement Climate Change Adaptation

Allen Solomon (USDA Forest Service) and Brian Hurd (New Mexico State University), presented information on climate change management plans and adaptation strategies.

- By focusing on vulnerable systems where interventions can be effective, identifying ‘no regret’ and ‘win-win’ strategies, and taking advantage of existing and emerging opportunities, managers can help ecosystems adapt to climate change. Some examples of these strategies include: improving science and information development, integration, and dissemination; developing appropriate risk management institutions and policies; increasing the use of resource markets and incentive-based policies; adding flexibility and safety to infrastructure design and assessment; and considering climatic factors in land use planning and building codes.
- USDA-Forest Service climate change research strategy currently focuses on: (1) adaptation (*e.g.*, increase diversity, decrease density of forests); (2) mitigation (*e.g.*, increase CO₂ sequestration from atmosphere by decreasing emissions from wildfires and increasing forest growth); (3) bioproducts (*e.g.*, increased biomass removal from forests to long term carbon pools, biofuels); and (4) decision support tools (*e.g.*, for incorporating climate change into planning and land management).
- USDA-Forest Service recommendations for responding to climate change include: (1) develop formal training for USFS land managers; (2) establish action priorities under resource limits; (3) develop early detection and rapid response systems for post-disturbance management; (4) educate stakeholders on the role of climate change in management; (5) integrate climate change across planning levels within USFS; (6) increase collaboration across federal and private ownership; and (7) reframe the role of uncertainty by learning to manage for change.

New Mexico Agency Priorities and Insights

New Mexico Department of Energy, Minerals and Natural Resources Secretary Joanna Prukop, New Mexico Department of Game and Fish Director Bruce Thompson, and Santa Fe National Forest Supervisor Daniel Jiron answered questions about their agency’s responses to climate change.

Current agency priorities:

- Secretary Prukop: (1) GHG reduction; (2) implementation of the Forest and Watershed Health Plan; and (3) implementation of the Lead by Example program.
- Director Thompson: (1) conserve fish and wildlife resources for the full spectrum of human uses; (2) provide opportunities for sustainable resource use; and (3) deliver effective outreach in support of the above priorities.

- Supervisor Jiron: (1) restoring fire-adapted ecosystems; (2) protecting open space adjacent to USFS lands from subdivision and development; (3) encouraging climate change research to understand its effects.

Barriers and opportunities to agency adoption of climate change adaptation strategies:

- Managing ecosystems across jurisdictional boundaries.
- Aligning the thinking of the legislature so that capital outlays are used strategically to address climate change problems.
- Interpreting science results and applying them to local areas.

Managing fire and water flows differently in a warmer, drier climate::

- Water conservation is the key issue to enable greater flexibility in allocating water; valuing water as an ecological service is critical to connecting human uses to ecosystem function.
- Integrate conservation assessments, plans and activities comprehensively, across organizations (*e.g.*, Comprehensive Wildlife Conservation Strategy, New Mexico Forest and Watershed Health and Restoration Plan).
- More thinning and other treatments to enable more *wildland fire use*.

Group Discussion

Full-group discussion of how the New Mexico natural resource management community can help preserve ecosystem services, land-based livelihoods, and biological diversity as the region's climate becomes warmer, drier and more variable, included the following key observations and suggestions:

- **We must address the root cause of climate change—greenhouse gas emissions—if dangerous regional warming and drying are to be avoided.** Whether or not emissions can be significantly reduced through our actions in New Mexico, **managers and leaders must begin taking action now to help natural ecosystems adapt** to the regional warming and drying that is in progress and will only become greater over the next several decades.
- Managers need to make a transition between **managing using the past as guide to managing for future conditions that have no past analog.** We are managing in a changing and uncertain world. This will require information sharing, adaptive management and triage.
- A continuum of private *and* public lands must be included when devising and testing adaptation strategies. The scope of the challenge requires **cross-institutional, landscape-scale thinking and management**, in order to have a long enough reach to make a difference ecologically. Similarly, working on a large scale, through **cross-boundary analysis and management** is necessary to successfully maintain local and regional biodiversity and other ecosystem values.
- **Sharing information about climate change and its effects seamlessly across natural resource management organizations** will enhance New Mexico efforts to build ecological resilience.. Inventory, monitoring, research and restoration—will be more effective if we form a network to bring communicate about climate change and its effects, and about new ecological resilience strategies.
- **Information management, including standardization of research and monitoring protocols, is extremely important to understanding climate change effects at large and small scales.** Programs, such as CIRMOUNT (www.fs.fed.us/psw/cirmount/), SAHRA (www.sahra.arizona.edu/) and EPSCoR (www.nmepscor.org/), have been established to meet the need for **large-scale, interdisciplinary regional science integration and application to management.** An important next step is to use global and regional climate change science to form hypotheses that we can test through on-the-ground experiments and case studies.

See nmconservation.org for additional information about the workshop.