Land Letter
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9. WATER: Adaptive management key to coping with climate change, feds say

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Eryn Gable, special to *Land Letter*

ESTES PARK, Colo. -- Flexible water management and monitoring plans will be crucial in dealing with the uncertainties posed by climate change, federal officials said at a conference here this week focused on watersheds.

Water resources are constantly affected by factors such as climate, population and land-use changes, making the future status of life-supporting watersheds and aquifers uncertain. The unpredictable nature of the country's critical water resources makes adaptable management critical to managing these fundamental resources, according to water managers, scientists and stakeholders meeting at the Third Interagency Conference on Research in the Watersheds held Sept. 8-11 in Estes Park.

There is a new focus on managing for change, rather than for stability, said Ken Williams, chief of cooperative programs for the U.S. Geological Survey. Managers cannot depend on what has happened before to indicate what is going to happen in the future, particularly in the face of climate change, he said.

"We need to manage for uncertainty and climate effects ... in a way that accommodates surprise and unpredictability," Williams said.

Key to managing for climate change will be figuring out a way to apply what scientists have learned through global climate models on a regional and local scale, Williams added. "The climate information that we need is of a national or a regional or a local nature," Williams said. "The question here is, of course, how do we make these cross-scale inferences? How do we take data that we collect at one scale [and] make it useful to us at another scale?"

Brad Udall, director of the Western Water Assessment, a joint project by the University of Colorado and the National Oceanic and Atmospheric Administration, said the impacts of global climate change are already being felt in the West. For example, warmer and earlier springs have already resulted in declines in snowpack in places like Colorado.

But there are still many unknowns about the effects of global climate change, including effects on water quality, he said. Higher flows in the Northeast may dilute pollution in some areas, but lower late summer flows in other areas may exacerbate pollution.

Because of the unpredictability inherent in climate change, federal agencies must shift to adaptive management practices, several participants in the conference said.

"In the past, natural resource management agencies have primarily managed for stability -- stability of ecosystems and restoration of previous conditions," said Ron Huntsinger, national science coordinator for the Bureau of Land Management. "But now with the release of the IPCC [Intergovernmental Panel on Climate Change] report and other assessments, we're realizing that that's not the paradigm that we're facing today."

The buzz about adaptive management

Although adaptive management has become a buzzword lately, it has been used in resource management since at least the 1950s. Essentially, it entails learning through management and adapting based on what is learned.

How different agencies incorporate adaptive management into their work varies. For example, the Forest Service established "strategic program areas" in 2005 to create an organizational structure that is responsive to current and anticipated demands and provide a framework for directing investments. The new structure encourages more communication among researchers who are working in the same research areas, even if they are conducting the research in very different contexts, said Kelly Elder, a research hydrologist with the Forest Service.

For other agencies, adaptive management is most evident in the specific plans they put forward. The Fish and Wildlife Service has touted adaptive management in specific species conservation plans as well as broader plans that direct management of things like waterfowl harvests.

Andy Loranger, chief of the division of natural resources and conservation planning for the national wildlife refuge system, said the agency is really just getting started on managing the refuges in a way that allows for adaptation to climate change.

"The uncertainty associated with climate change ... makes, without question, addressing our water resource issues and understanding what we need to know and how we need to protect them one of the most important challenges that we're facing in the refuge system," Loranger said. "I think this is going to require a very dedicated effort, and frankly, we're behind the curve, I think. We've talked a lot about over the years in the refuge system, but we've got a lot of work to do."

Other agencies have changed their way of approaching management to look at things on a broader scale. For example, U.S. EPA has adopted a watershed approach to management since the early 1990s, rather than simply looking at individual permits. "The NPDES [National Pollutant Discharge Elimination System] permitting system really is targeting those entities within a watershed, so that you can come up with a watershed permit rather than individual utility permits or discharger permits, that would better deal with all the stressors within that watershed," said Chuck Noss, national program director of EPA's water quality research.

Crucial to successful management is cooperation among federal agencies and stakeholders, Williams added. "What needs to be done is on a broad enough scale and is costly enough that even though it needs to be done, nobody can afford to do it alone. The only way we're going to succeed is to work together."

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