

## Building a Network of Climate-Resilient Watersheds in Oregon

The impacts of climate change are already apparent in Oregon's water systems. Changing patterns of flooding and drought, precipitation, and temperature directly affect water quality and quantity, creating new challenges for watershed managers. Because of the complexities of climate change, new considerations and approaches to watershed management are needed. Managers can no longer assume a static range of climate variability, but instead must consider projections for future climate change when developing and implementing restoration projects and standards. Consideration for future conditions allows managers to build system resiliency and to respond more effectively when impairments occur. Building resilience now will increase the likelihood that Oregon watersheds can continue to provide the services on which both human and natural communities depend.

To support these efforts, the Climate Leadership Initiative (CLI)<sup>1</sup> has implemented a project on building resiliency across Oregon's watersheds using a five-systems approach (Figure 1). The audience for the Preparing Watersheds for Climate Change Project (hereafter, the Watershed Climate Project) is broadly defined as "watershed managers" to include the full range of participants in Oregon's community-based volunteer watershed management program<sup>2</sup>. This includes professional resource managers, informed community participants active in local watershed councils, and lay audiences concerned with watershed health. The principle learning objectives of the Watershed Climate Project are to (1) achieve a general understanding of climate change

among watershed managers, (2) promote an understanding of projected climate impacts to Oregon watersheds developed by the Oregon Climate Change Research Institute (OCCRI), (3) facilitate an understanding of how to develop and integrate climate adaptation strategies into existing watershed council processes, and (4) effectively communicate climate change issues to local watershed constituents.

The Watershed Climate Project has completed the following activities (1) a statewide needs assessment of watershed council staff in 2009 to assess knowledge of, and concerns about, climate impacts, as well as capacity and resource needs for the implementation of climate resiliency strategies; (2) workshops in 2009–2010 for watershed managers to identify local climate impacts and climate resiliency strategies; and (3) the *CLI Watershed Council Resilience Guide*, released in early 2011, which outlines step-by-step climate action planning for watersheds, including indicators for assessing and monitoring resiliency. Among its future

initiatives, the Watershed Climate Project will collaborate with state agencies, research institutions, and organizations to (1) develop protocols for climate change consideration in total maximum daily load programs, (2) define and evaluate indicators, and (3) develop case studies on climate action planning for watersheds. Funding for the project has been secured from foundation sources as well as the Oregon Watershed Enhancement Board, a state agency funded primarily through lottery dollars.

The insights provided by the 2009 statewide needs assessment indicate a broad understanding among watershed managers that climate change will probably have negative impacts on watershed health and a corresponding high degree of concern about the nature of those impacts. The assessment further found that watershed managers lack specific, localized projections for changing climatic conditions

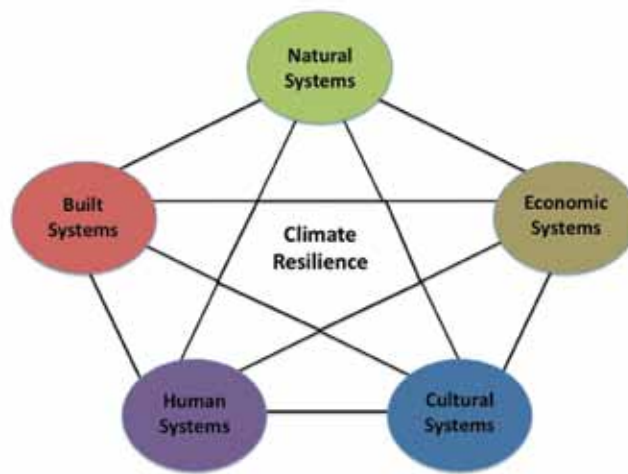


Figure 1. Five-systems approach to building climate resiliency in watersheds.

<sup>1</sup> The Climate Leadership Initiative is a social science-based global climate change research, education, and technical assistance program of The Resource Innovation Group, a 501 (c)3 organization based in Eugene, Oregon.

<sup>2</sup> The Oregon legislature established watershed councils in 1995 under House Bill 3441. Oregon's watershed councils are locally organized, voluntary, nonregulatory groups intended to improve the conditions of local watersheds.

within the watersheds they manage. The majority felt that they lacked the understanding, capacity, and resources needed to incorporate adaptive responses into existing watershed management activities.

To meet these needs, CLI developed and refined a training curriculum in 2009–2010 using a five-systems approach that provided an overview of principles and methods for climate resilience. The five-systems approach considers all aspects of the watershed by identifying climatic impacts to natural systems (e.g., landscapes, streams, and biodiversity), human systems (e.g., emergency response, health care, and education), built systems (e.g., transportation, irrigation, communications infrastructure, and buildings), cultural systems (e.g., species and places of cultural importance), and economic systems (e.g., forestry, agriculture, manufacturing, and tourism) as well as examples of resilience strategies that are beneficial across multiple systems. The training curriculum draws extensively from the literatures of adaptive resource management, natural systems resilience, human psychology, and climate change communications to build capacity among watershed managers for developing response strategies.

The training program included a series of presentations, facilitated participant discussion with question-and-answer periods for presenters, and a series of tabletop exercises in which participants worked through future climate projections developed by OCCRI. The modeling, which was provided by OCCRI and the USDA Forest Service Pacific Northwest Research Station, featured downscaled climate projections (i.e., at an 8-km<sup>2</sup> scale compared to global climate models that provide regional projects at a scale of 150 km<sup>2</sup>).

The resilience guide supplements training materials and provides step-by-step guidance for applying the tools described during the training sessions, including indicators for monitoring resiliency and a process for initiating climate action planning. The resilience guide identifies how watershed managers can use local climate data to develop a whole-systems approach to climate action planning and to develop strategies under conditions of uncertainty. For example, the resilience guide identifies approaches to integrating the flexibility and adaptability of projects and provides case studies. It also provides specific tools and exercises to facilitate the planning process—for example, mapping past events and responses and evaluating priority strategies for implementation. Finally, CLI has developed a professional networking website using “Yammer” networking technology as a means of facilitating ongoing conversation and sharing among watershed managers concerned with climate change adaptation issues within their local watersheds.

Although the Watershed Climate Project was initiated in Oregon, the methods, tools, and lessons learned are transferable to watersheds across the country where practitioners or decision makers are beginning to consider climate impacts and the need for resilience strategies. CLI continues to work with the watersheds and associated communities across Oregon to prioritize, fund, and initiate the implementation of strategies. The project released the resilience guide to watersheds in the Pacific Northwest in winter 2010–2011 and will make it available to other regions in summer 2011.

## For More Information

For more information, please contact Stacy Vynne (stacy@trig-cli.org). The survey results, reports, modeling data, and the resilience guide are available at [www.climateleadership.org](http://www.climateleadership.org).

## Contributors

This vignette was prepared by Stacy Vynne, project manager, and Steve Adams, managing director of the Climate Leadership Initiative, a program of The Resource Innovation Group.

### SPATTERDOCK SPONSOR



Have you thought about water quality today?

We have. Every day we are evaluating the events that impact our water quality and developing comprehensive solutions for a cleaner and safer environment. With a proven and sustainable total watershed approach, we deliver cost-effective environmental benefits to your community.

[www.arcadis-us.com](http://www.arcadis-us.com)



The Water Division of ARCADIS

Imagine the result