Center for Watersheds and Environmental Sustainability

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Mission and Vision

As aquatic environments and watersheds become increasingly stressed from anthropogenic impacts, including global climate change, their management for long-term sustainability will be fundamental to overall ecosystem health. Typical sustainability issues range from quantity and quality of water resources to enhanced management of forest health.

The mission of the Center for Watersheds Environmental Sustainability (CWES) is to facilitate development of interdisciplinary (and interdivisional) research teams that address a variety of science issues important to policy decisions at the watershed scale. Information gained from these research programs will be disseminated to land managers and policy and regulatory decision makers to provide scientific guidance for appropriate policy development.

The vision of CWES is to develop innovative research programs that integrate the hydrologic, geologic, and atmospheric processes with water quality, nutrient dynamics, ecology, resource sustainability, and environmental policy. New strategies and approaches developed from these interdisciplinary research efforts will address significant questions and solve problems pertaining to watershed processes and restoration effectiveness.

Approach

- Develop integrated watershed science based tools to facilitate informed decision making for sustainable management of watersheds.
- Facilitate the development of interdisciplinary research teams within DRI that address watershed science, planning, and restoration to provide the scientific information needed for understanding the behavior of watersheds in a planning and management policy context.
- Foster the development of partnerships with land management agencies to aid in developing research programs as an integral element of watershed management and restoration activities.
- Develop research and teaching partnerships with institutions external to DRI.

Highlighted CWES Research Areas

Lake Tahoe Watershed

Conducting more than 40 research projects in Lake Tahoe since its inception in 1999, CWES scientists are focused on algal growth and fine sediment entering the lake that have produced an average one-foot per year decline in lake clarity since the 1960s. For this reason, the majority of CWES projects have focused on identifying the sources and amounts of nutrients (nitrogen and phosphorus), which trigger algal growth, and fine (< 10 micron) sediment and the processes by which they enter the lake, and how best to remove them from runoff entering the lake. Erosion control and sediment and nutrient removal projects are known as best management practices (BMPs). BMPs in the Lake Tahoe basin range from constructed wetlands to highway sediment capture and nutrient removal structures. (1) Identifying atmospheric sources of dust and nutrients in the Tahoe basin ; (2) Determining atmospheric dust and nutrient deposition rates on the lake surface; (3) Measuring and modeling fugitive dust emissions from roads in the basin; (4) Characterizing storm water runoff fine sediment and nutrient loads; (5) Evaluating nutrient and fine sediment loading for different land uses; (6) Determining groundwater nutrient loading to the lake; (7) Conducting near-shore lake clarity surveys to identify areas of high nutrient and fine sediment loading from surface water, storm water, and groundwater inflows; (8) Determining shoreline erosion contributions of fine sediment and nutrients to the lake; (9) Identifying and quantifying microbiological communities in the lake; (10)

Evaluating restoration project effectiveness in removing fine sediment and nutrients from surface water runoff; (11) Evaluating BMP structures effectiveness in removing fine sediment and nutrients from surface water runoff; (12) Determining the amount of impervious cover, such as roads, parking lots, and roofs, that produced increased storm water runoff in the Lake Tahoe watershed; (13) Evaluating the effects of fire on atmospheric sources of nutrients entering the lake; (14) Identifying the sources of fine sediment that enter the lake; (15) Developing bio-engineer systems for removal for nutrients and fine sediment in storm water runoff (16) Evaluating the efficiency of highway runoff structures for removal of nutrient and fine sediment; (17) Evaluating the health of the American Martin population in the watershed; (18) Help structure adaptive management, so that as new information is gained in the basin management practices can include this information; and (19) Develop a storm water monitoring program for the Lake Tahoe watershed.

DRI is a charter member of the Tahoe Science Consortium (TSC: http://www.tahoescience.org). The TSC consists of five research institutions--DRI University of California Davis, University of Nevada Reno, U.S. Geological Survey, and the Pacific Southwest Research group of the U.S. Forest Service--and 10 land management and regulatory agencies. The TSC drafted the Lake Tahoe Science Plan; the foundation for future research directions and funding in the basin. CWES was instrumental in developing the working agreement that directed $37.5 million per year of SNPLMA monies to the Lake Tahoe Basin for restoration activities. Approximately $3.5 million per year (a total of $28 million over 8 years) of the Tahoe SNPLMA funding will be used to fund research activities in the Tahoe basin.

Walker Lake Watershed

Starting in 1999, CWES faculty continues to conduct research in the Walker Lake Basin. This research has ranged from cloud seeding to geomorphic to hydrologic studies in the basin. For example, an evaluation of additional surface-water flow from cloud seeding in the headwaters of the Walker Lake watershed provides information on the amount of runoff generated by cloud seeding. A recent DRI study in the Walker Lake basin provides a history of lake level fluctuations over the last several thousand years. CWES faculty also conducted an EIS study for the Bureau of Land Management (BLM) on potential water rights purchases for Walker Lake.

In 2007, DRI in collaboration with the University of Nevada, Reno (UNR), began a research program in the Walker Lake basin. This program includes 13 projects that range from developing a watershed model to evaluate water purchases, to evaluating potential alternative agricultural crops, to assessment of the health of the river and lake ecosystem.

In addition, CWES worked with the BLM in developing a project for watershed-scale planning studies of the Carson River basin above Lahontan Reservoir. This request is one of the first projects funded under the Western Water Initiative, Water 2025 project, to help avoid and mitigate conflicts over water use in the Western United States.

International and Other Watersheds

CWES is involved in international water projects in collaboration with World Vision, The Conrad F. Hilton Foundation, The Tahoe-Baikal Institute, and The International Arid Lands Consortium. Geographic focal areas of CWES research activities include Western Africa and Lake Baikal, a large lake that resides in Russia and Mongolia. Research projects are also in the planning stages for Egypt, United Arab Emirantes, and China.

In places where desertification is a threat, the need for water is generally a compounding issue. DRI researchers are addressing this need in three African countries through the West African Water Initiative (WAWI), a program that brings clean and safe water sources to villagers in northern Ghana, Mali, and Niger. The goal of WAWI is to bring a modern, sanitary well to rural villages, diminishing the risk of waterborne disease and eliminating the long treks to find water.

In August 2004, DRI and The Tahoe-Baikal Institute hosted a workshop, “Lessons in Regional Watershed Management,” for an international delegation of government and business representatives from Russia and Mongolia. The delegates, along with faculty from DRI and UNR, discussed current resource management challenges facing their region and at Lake Tahoe. The workshop made it clear that watersheds and lakes need protection and that collaboration between government agencies across political boundaries is essential if watershed resources are to be properly managed and preserved for the future.

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