Session B4: Watershed Protection: Diverse Perspectives

Room A107-109
1:30 – 3:00 pm

0036
B4-1

Assessing Traditional Ecological Knowledge and Cultural Needs in Developing Tribal Water Quality Standards and Developing Data and Collaborative Solutions to Protect and Restore Water Resources

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I propose to write a paper and make a presentation on the nature of articulating a cultural water assessment in the process of establishing water quality standards involving American Indian Tribes. This has been a long standing issue for Tribes in their quest to assure a type and quality of water necessary to their religious and cultural practices and the ecosystem services that support their subsistence and basic natural resource needs. Achieving a better understanding of how these water quality needs are expressed and how they can be supported in the process of establishing water quality standards both on and off tribal lands can improve intergovernmental cooperation, improve intercultural understanding and offer traditional ecological knowledge to create a collaborative environment for implementing the Clean Water Act.

0099
B4-2

Monitoring the Effectiveness of a New Rain Garden Filtering Medium for Pollutant Removal and Urban Hydromodification Mitigation

Ken MacKenzie

Urban Drainage and Flood Control District, Denver, Colo., USA

The Urban Drainage and Flood Control District (based in Denver, Colorado) has, since 1992, promulgated stormwater quality criteria in the form of the *Urban Storm Drainage Criteria Manual, Volume 3: Best Management Practices*. One such stormwater quality best management practice (BMP) strategy is a process known as *bioretention*, and this process is often implemented in the form of a *rain garden*.

A rain garden is intended to support healthy ornamental plant growth and also collect stormwater runoff from urban paved areas and infiltrate that runoff back into the soil (where soil conditions permit), or filter the runoff through a sandy soil medium and slowly release it to the storm sewer system. Traditionally, peat has been incorporated into the rain garden filter medium in order to provide the nutrients and carbon source necessary for plant health. Peat has excellent properties as a soil amendment, but is expensive and also comes with a large carbon cost.

In 2006, UDFCD collaborated with the University of Colorado to develop an alternative filtering medium for rain gardens. Through extensive laboratory experimentation, a new raingarden filtering medium was developed. This medium consists of sand, shredded recycled paper and select compost in specific proportions.

In 2010, a demonstration project was constructed in a Denver metropolitan area residential neighborhood. This test site was fitted with rain gages, flow measurement devices, and automatic samplers. The rain garden was monitored throughout the 2010 rain season for pollutant reduction and to measure the effective mitigation of the hydromodification effects of urbanization.

This paper will outline the experimental setup, the data collection and analyses, and those conclusions made after this rain garden's first year in service.

0316
B4-3

Drainage Districts as Nitrate-Nitrogen Sources to Headwater Streams

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Many extensive subsurface tile drainage networks in the Corn Belt region of the United States are organized into drainage districts. Approximately 3000 of these entities exist in the state of Iowa, where tile-drained landscapes are common in the north-central area of the state. Tile discharge is the source of many headwater streams and contributes to loss of nitrate-nitrogen (NO_3-N) from cultivated fields. The objectives of this study were to evaluate NO_3 N concentrations and loads discharged from three typical drainage districts in north-central Iowa, explore the relation of drainage district NO_3-N concentrations to the downstream drainage network, and establish a baseline condition from which future determinations can be made that assess farmer efforts to reduce NO_3-N loss. NO_3-N concentrations averaged approximately 13 mg/l over a two- year period and exceeded 10 mg/L (the standard for safe drinking water in the U.S.) nearly 90% of the time. NO_3-N yields from the studied drainage districts ranged from 44 to 77 kg/ha per year. NO_3-N concentrations and episodes > 10 mg/L were observed to decrease downstream in a linear manner with log drainage area. A load reduction of 55% would be needed at the tile discharge to meet water quality objectives related to downstream municipal water supply. In-stream NO_3-N processing was observed immediately downstream of the tile outlet, but would appear to offer little potential for meaningful downstream reductions because the time period for NO_3-N processing was poorly timed with seasonal loading patterns. Study results suggest that focusing on NO_3-N reductions at the drainage district scale using well understood BMPs would achieve significant downstream reductions.

0339
B4-4

Use of Ecosystem Service Markets to Protect Drinking Water in the McKenzie Watershed

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The McKenzie River is the sole source of drinking water for over 200,000 people in Eugene, Oregon. The Eugene Water & Electric Board (EWEB) has developed a comprehensive source water protection program to protect the excellent water quality of the McKenzie as a valuable drinking water resource for current and future generations. Trends in development in the McKenzie Watershed over the last 15-20 years has led to creation of smaller lot sizes (currently 37% of lots outside urban growth boundaries are less than 1 acre) and structures being built in riparian areas, floodways and the 100-year floodplain. Development in these sensitive areas causes a loss of riparian vegetation, increased use of revetment to protect vulnerable structures, loss of floodplain function, and higher density of septic systems adjacent to water bodies. Healthy riparian forests and functioning floodplains provide natural filtration processes that removes pollutants, which is critical to maintaining the excellent water quality in the McKenzie River.

Mitigating for development in sensitive areas can be addressed through both regulatory and non-regulatory measures. EWEB was involved in a county initiative to protect drinking water through a proposed land use ordinance to limit development in riparian areas, floodways and the 100-year floodplain in community drinking water sources. Strong local opposition to both the content and ordinance development process essentially caused this to fail. Consequently, EWEB has re-focused its efforts into non-regulatory approaches including the development of ecosystem service markets to protect these sensitive areas and encourage restoration of degraded areas.

Payments for ecosystems services is a tool that EWEB is currently exploring with a number of other partner's, including Oregon State University and University of Oregon, to engage landowners in a non-regulatory approach to reward stewardship and encourage restoration to help protect this valuable resource for the next 100 years. EWEB views this potential market concept as needing to be simple, flexible, easy to enforce, rewards good stewardship practices and focuses on areas that provide the greatest benefits from a water quality perspective. EWEB feels they have a concept that meets these objectives, which will be shared as part of this discussion.