

WATERSHED SCIENCE BULLETIN



Journal of the Association of Watershed & Stormwater Professionals
A program of the Center for Watershed Protection, Inc.

SPRING 2011



**Integrating Climate Change Science into
Watershed and Stormwater Management**

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This photo was taken along Young's Bay estuary in Astoria, OR. The Young's Bay estuary is a component of the Columbia River estuary, a nationally significant estuary in the northwest corner of Oregon that supports some of the largest anadromous fish runs in the world and provides unique habitat for sensitive and endangered species.



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Arizona NEMO Preparing Watershed Communities for Climate Variability with Best Management Practices

The scientific community continues to compile evidence that the climate is changing and that observed and projected future changes will have significant impacts on the ecosystems and natural resources of our communities. The Arizona Nonpoint Education for Municipal Officials (NEMO) program recognizes that the arid Southwest will continue to become warmer and drier; these climate changes will increase the vulnerability of the state's most precious natural resource—water. The Arizona NEMO program has risen to meet this challenge by integrating watershed management and community planning. The NEMO program emphasizes the linkages between water supply and water quality with research-based professional education and encourages community stakeholders to engage in better land use decisions and best management practices (BMPs) tooled from bioengineering techniques that will protect and restore water resources from nonpoint source (NPS) pollution. For the arid Southwest, this community-based resource management technique is adaptive and resilient to environmental changes.

To enable policymakers and shareholders to address the adverse impacts of climate change (e.g., extreme droughts), NEMO provides education on the characterization and modeling of watershed responses to precipitation and NPS transport. This modeling identifies physical, biological, and social characteristics of a watershed from publicly available mapped information. NEMO then uses ArcGIS (Environmental Systems Research Institute, Inc.) software to construct a spatial database that includes topography, land cover, soil type, geology, vegetation, hydrologic features, and population characteristics.

After developing the GIS database, NEMO staff performs watershed classifications to identify important resources and rank ten-digit hydrologic unit code subwatershed areas based on the likelihood of NPS contribution to stream water quality degradation. NEMO then designs BMPs, including structural, vegetative, and managerial conservation practices. When implemented, the BMPs reduce and prevent the detachment, transport, and delivery of NPS pollution to

surface water and groundwater. The choice of BMP design will depend on the pollutant(s), the impaired area, and the level of engineering required to protect and/or restore the water body. However, the nature of the climate change may dictate the category of BMP that needs to be implemented. In the case of the arid Southwest, where predictions of a warmer and drier climate will increase water demands (on an already stressed supply) while adversely impacting land cover (creating erosion opportunities), these changes will call for the implementation of BMPs that are designed for the upland zone, such as low-impact development for site detention of runoff in urban areas as well as grazing management and grade stabilization structures for erosion control

and the sustainability of native vegetation in rural and ranchland locations. These categories of BMPs will provide a frontline phase of protection, while BMPs designed for the transition, overbank, bank, and toe zones can provide

additional protection against NPS pollutants reaching and impairing the water supply.

This type of analysis and selection tool will help to prioritize the types of BMPs that can protect water quality and supply while also enabling communities to adapt to climate change.

List of Sources

Hughes, T. P., A. H. Baird, D. R. Bellwood, M. Card, S. R. Connolly, C. Folke, R. Grosberg, et al. 2003. Climate change, human impacts, and the resilience of coral reefs. *Science* 301:929–933.

For More Information

More information about the arid region-specific BMP manual, as well as the NEMO watershed-based plans, can be found at: <http://www.ArizonaNEMO.org>.

Contributor

This vignette was prepared by James C. Summerset, Jr., Arizona NEMO, jcsummer@email.arizona.edu.

...the arid southwest will continue to become warmer and dryer; these climate changes will increase the vulnerability of the state's most precious natural resource—water.