

# 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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**MISSION:** The mission of the *Watershed Science Bulletin* (the *Bulletin*) is to synthesize research and experience from the numerous disciplines that inform watershed management and transmit this valuable information to researchers, regulators, practitioners, managers, and others working to protect and restore watersheds everywhere.

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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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## From the Editor's Desk

**In the *Watershed Science Bulletin***, the Association of Watershed and Stormwater Professionals aims to provide readers with topics that advance practical, science-based solutions to watershed and stormwater management issues. Our inaugural issue in October 2010 reached more than 2,000 professionals and focused on total maximum daily loads (TMDLs)—an increasingly prevalent regulatory requirement for many jurisdictions throughout the United States. I hope that our second issue will reach even more readers given the timeliness and importance of this issue's topic—climate change and watershed management. Although it does not have the regulatory thrust of TMDLs, we believe that this topic will become as prevalent for watershed professionals as TMDLs in the years ahead.

This issue's articles and vignettes illustrate, in many ways, how climate change science is being integrated into watershed management. In *Ask the Experts*, watershed scientists, administrators, and practitioners provide their perspectives on key elements needed to take effective action to address climate change and further enhance watershed management. I am also very pleased to include in this issue our first Watershed Superstar, whose work to effect change in local watersheds is an inspiration, along with the stunning image captured by the winner of the photo contest.

### Why Climate Change?

The hydrologic cycle and associated water resources are intimately related to the science and management of climate change. Numerous land-atmosphere feedback mechanisms regulate and drive variations in climate in the long- and short-term. However, translating global-scale climate change scenarios to local-level management actions is a challenge. From the perspective of practical applications, what can be taken from global climate change model outputs at a 100-km<sup>2</sup> scale to improve our understanding of watershed protection and restoration at smaller, regional scales? If we delve further into the implications of changes in temperature and precipitation patterns and think about how sea level rise may affect property and wetlands loss along the coast, or how drought conditions may affect water supplies, then climate change becomes a more real issue.

Although climate change is becoming an increasingly pervasive theme in natural resource management, it largely remains an intangible topic for local watershed and stormwater management. The practical application of climate change science continues to be challenged by the difficulty of finding information or new resources to dedicate to this problem. As we at the Center for Watershed Protection strive to digest and more fully understand climate change as it relates to watershed and stormwater

management, we find that we learn a lot more by asking watershed professionals, such as yourself, about ongoing work and the current thinking in this area.

As a watershed practitioner working at the local level, understanding climate change and what you need to do about it is a daunting task, given the amount of information available through federal and state agencies and organizations. A web-based search on the topic produces more than 42 million hits, and adding the term "watersheds" narrows the search to a mere 1.4 million hits. This information overload for our primary audience of watershed and stormwater practitioners inspired us to tackle this topic in our second issue. The Spring 2011 issue of the *Bulletin* is not a forum to discuss whether climate change is occurring or its causes. Rather, given the regulations and initiatives that already tax resources in local jurisdictions, we wanted to find out what is being done to address how climate change can "fit in" with existing watershed and stormwater management programs and practices.

### In This Issue

We aimed for content that focused on two central questions:

- How can a watershed-based management approach effectively address the potential impacts of climate change?
- What can or should communities do now to move forward to address climate change, given the uncertainty surrounding likely climate outcomes in 10 years, 50 years, and beyond?

Clearly, communities, states, and organizations are taking action to address the omnipresent issue of climate change. However, despite widely varied motivations and actions portrayed in both articles and vignettes, many authors and contributors converge on a common theme of integrating climate change into existing programs to gain support and momentum for action.

### How can a watershed-based management approach effectively address the potential impacts of climate change?

For this issue, we invited Christopher Pyke, President of the US Green Building Council, to provide us with his perspective on what must be done to make climate change relevant to decision makers and to discuss some meaningful first steps that federal and local agencies may take. Pyke also argues that we should not see climate change as another silo for decision making.

The theme of integrating climate change into existing programs is picked up in our first article, in which **Hirschman et al.** provide specific adaptation strategies to link existing stormwater management efforts to climate change initiatives. The authors advocate refining low-impact development practices and site design standards to accommodate changes in precipitation and runoff conditions, but they acknowledge that more work needs to be done to refine these ideas and to address the specific characteristics of a region. **Summerset and Stack et al.** use case studies to share with us how the framework presented by Hirschman et al. may be applied. **Summerset** describes the development of a best management practice selection tool that may be used to enhance decision making with regard to location in the watershed, given the expected warmer and drier conditions in the Southwest. **Stack et al.** explain the need to determine the adequacy of drainage systems, specifically the volumetric capacity of culverts, and the type of analysis for the job. This analysis reinforces the need to evaluate the data sets used in hydrologic and hydraulic analyses as part of local stormwater management programs. A third vignette by **Okay and Culbreth** identifies specific management actions to address the restoration and protection of forested riparian buffers given the added stress of climate change in the Mid-Atlantic region.

A central limitation that keeps many communities from moving forward is the ability to decipher information and data needs. This problem inspired the development of CAKE, the online Climate Adaptation Knowledge Exchange. **Hoffman and Gregg** describe the key attributes and functionality of CAKE, which uses case studies to connect users to applicable climate change adaptation resources that fit their unique situations and needs. To assist communities in Oregon and beyond, **Vynne and Adams** describe the Preparing Watersheds for Climate

Change Project, an effort to build resilience in Oregon's watersheds and enable adaptation to the impacts of climate change. Translating the global scale of climate change to local watershed management required the development of a training curriculum to meet the local needs of watershed organizations—from understanding climate change science to providing tools to evaluate impacts.

### What can or should communities do now to move forward to address climate change, given the uncertainty surrounding likely climate outcomes in 10 years, 50 years, and beyond?

The integration of climate change science into the practical management of watersheds and stormwater is not solely about water quality, but also the sustainability of water supply. **Davis and Dodson** provide insight into efforts to manage the Great Lakes for sustainable water supplies, focusing on New York State. The authors highlight the limitations of current data collection and monitoring efforts, as well as the water pricing system, and examine the potential effects on the region's adaptation to impending climate change. Vignettes by **Betz et al.** and **Score** further exemplify the specific actions that state agencies may adopt through science-oriented, broad-based, multiagency approaches. **Betz et al.** share the water resources climate change adaptation strategy that is part of the Wisconsin Initiative on Climate Change Impacts. A critical aspect of this strategy was the peer-review process used for the data collection and analysis, which ensured that the recommendations are scientifically defensible and technically sound and that they respond to the needs of Wisconsin water management issues. On to the warmer temperatures of the southeastern United States: **Score** highlights the *Climate Change Action Plan for the Florida Reef System 2010–2015*. Whether you live along the coast or not, you are probably aware of the impacts to the coral reef system, such as coral bleaching, habitat degradation, and overfishing. This vignette emphasizes that the restoration and protection of the reef system is within our grasp given the coordination of resources and expertise.

**Lenhart et al.** examine a missing link in water and land management in the Midwest. Their analysis of long-term hydrologic patterns in the Mississippi River basin attributes increases in low and mean flow to the interactions

among changes in land use, drainage, and precipitation patterns. By providing readers with a critical evaluation of how to interpret changing patterns in hydrology and examine the interaction between land use and climate, this analysis illustrates a pathway to better management decisions. A vignette by **Bason and Homsey** reinforces this need for science to inform policy as it pertains to the inland migration of wetlands on the Atlantic coastal plain for the Delaware Inland Bays.

But what does all of this mean if watershed practitioners don't engage the public in the decision-making process? In the article by **Stiles**, the experience of Wetlands Watch is described along with its revised approach to engage local decision makers and the public in the protection of the first line of defense against the rising coastal waters of the Atlantic Coast—wetlands. Stiles provides insight into a social marketing approach

that integrates shoreline ecosystem adaptation needs into current local planning processes. **Eckl** reinforces the findings by Stiles and demonstrates that the words chosen to engage the public and decision makers really do make a difference.

In closing, I hope you'll find that the information and ideas presented in this issue help put climate change in a context that enhances watershed and stormwater management programs such that they protect and sustain the quality and quantity of our valuable water resources. The content of this issue is not meant to feed the debate about climate change; instead, it is meant to help us do what we do best as watershed practitioners: apply our knowledge to manage impacts based on our understanding of watershed dynamics.

—*Neely L. Law, PhD, Editor-in-Chief*

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