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# A Primer on Watershed Management

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As the title indicates, the contents of this issue of the Journal of Contemporary Water Research & Education provide a "Primer on Watershed Management." Introductory material on any subject is rarely available in journals so we have deviated from typical journal approach and format in this issue. Our intent is to address individuals who are interested in water resources and watershed management, but who may not have the strong scientific background in these subjects held by professional practitioners and researchers in watershed sciences. Primer information typically is presented in short 'fact sheets' or web pages created by state or federal governments, such as the U.S. Environmental Protection Agency. These materials are useful, but the coverage is limited due to their brevity. Furthermore, the focus of most of these resources are hydrologic or aquatic responses or behaviors that result from human activities in the watershed, but there tends to be little information explaining the underlying processes that lead to those responses. Without that knowledge, it is difficult to take information from one situation and understand how it applies to others.

Several of the co-authors of papers in this issue have discussed the need for journal-quality papers focused on water resources that introduce concepts to teachers, students, and citizens in watershed coalitions who are hungry for such information, but are often frustrated by the technical aspects of typical journal papers. However, individuals, communities, and watershed coalition groups have tremendous influence on management and policy decisions that affect watershed conditions, so a well-informed citizenry is critical to the integrity of water resources and aquatic health. This issue is the culmination of efforts to achieve this outcome, so it is special to many of us.

The topics of the papers in this issue were selected to provide a breadth of information that could serve as a foundational understanding of watershed management and water resources. However, the papers should not be considered to be a comprehensive review nor do they cover all topics applicable to watershed management. Instead, we hope that the information presented here will pique readers' interests about watershed management, the specific concepts presented, or subjects alluded to but not covered in these papers, and challenge them to delve deeper into these topics.

The paper "Fundamentals of Watershed Hydrology" introduces the hydrologic cycle. The term 'watershed' is defined and discussed from the perspective of the inextricable connection between watershed boundaries and the hydrologic cycle. Components of streamflow are illustrated using hydrographs, and ephemeral, intermittent, and perennial streams are defined based upon their water sources. The water budget equation is introduced and its utility for predicting how different components of the hydrologic cycle, especially streamflow, will respond to different management actions in a watershed is demonstrated.

"An Introduction to Soil Concepts and the Role of Soils in Watershed Management" describes the importance of the watershed's surface from the perspective of its role in partitioning water into many components in the hydrologic cycle, its effects on water quality, and the importance of managing lands for ensuring soil sustainability. The various layers of soil and the processes involved in their development are described. Soil classification is summarized to provide an understanding of major groupings of soils. Additionally, descriptions of the physical, chemical, and biological characteristics of soils explain how and why water moves through

the soil, and the factors that influence its chemistry. Watershed management activities can influence many soil properties, so some agriculture, forestry, and urbanization effects are presented, including a discussion on erosion and soil conservation. Finally, readers are instructed on how to evaluate soil on their own land and provided with additional resources to obtain management assistance.

Because of its importance and ubiquity as a water pollutant from virtually all types of land uses, soil, as sediment, is revisited more extensively in "Soil Erosion in Humid Regions: A Review." The three processes of erosion, particle detachment, transport, and deposition are differentiated, and interrill and rill erosion are defined and described. Soil, precipitation, landscape, and biological characteristics that can contribute to erosion and sedimentation processes are detailed. Because unpaved roads can be a chronic source of sediment to water bodies, an introduction to forest roads also is provided.

Application of the technical concepts in these aforementioned papers is the subject of "Guiding Principles for Watershed Management Forested, Agricultural, and Urban Watersheds." Managed forests, agricultural lands, and urban landscapes are covered in this paper, as these are some of the most common land uses in U.S. watersheds. The influences of land management actions on hydrologic components, especially streamflow, stream morphology, and water quality are described. Special attention is given to best management practices (BMPs), which are tools and techniques that can help control nonpoint source pollutant levels in receiving waters. Nonpoint source pollutants include sediment, chemical, biological, and thermal pollutants whose sources cannot be specifically pinpointed (versus pollutant emissions from a pipe). As indicated by their mention in multiple papers in this issue, BMPs are an important topic. This is because BMPs can be implemented by individual citizens on their own lands and can contribute meaningfully to water resource protection.

We would be remiss not to include a discussion of the influences of human behavior and societal needs on watershed management. After all, human actions dictate the land management (or mismanagement) actions that occur within all watersheds on the Earth, and we have a profound effect on water use, water conservation, the hydrologic cycle, water quality, and aquatic health. The paper "The Role of Social Science in Successfully Implementing Watershed Management Strategies" describes how community and individual attitudes, norms, and behaviors influence our decisions and actions, how to more effectively target information to different stakeholders, and the role that group interactions play in implementing conservation actions and BMPs. The latter half of the paper provides information that can empower watershed stakeholders and watershed groups to move watersheds toward improved sustainability and resilience rather than focus on traditional short-term objectives.

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