

Preface

I would like to begin with a quote from Keddy (2002, p. xi), “A number of recent symposium volumes on wetlands appear to be little more than expensive books with a haphazard collection of papers with no unifying theme whatsoever except for the fact that all work in wet areas”. How often have I have heard this opinion iterated? The science of wetlands may indeed be best described as a loosely bound group of scientists and practitioners from diverse backgrounds that are all striving towards a common goal to preserve, maintain, and improve the world’s wetlands. However, more often than not these scientists are generally working independently of one another. As such, the discipline suffers from a lack of cohesiveness and the fragmentation amongst these groups is due largely to the lack of communication and understanding between one another. This fragmentation is perhaps most apparent in the applied wetland sciences where project participants rarely work as a team on wetland projects. The result is many wetland projects end in failure. With this in mind, this volume brings together experts from diverse backgrounds in a forum where the importance of each discipline is communicated in a manner that is neither presumptive, nor so laden with jargon that the meaning of the narrative is lost to most readers. The central theme of the volume is that if we as wetland scientists want to promote and advance the science of wetlands, we need to listen to and understand what each group has to offer and begin to work as a group. Although this volume is by no means comprehensive in the disciplines that have a stake in wetland research, it does provide broad coverage across the discipline, sets the stage for collaborative work, and fills a gap in the discipline that has been identified.

The topics and scope of this book should be of interest to a wide audience including wetland scientists, geologists, ecologists, paleoecologists, policy makers, landscape architects, sociologists, engineers, lawyers, and not the least, naturalists. A brief summary of the contributions follows.

The book has been organized into three broad sections. Section 1 introduces the reader to a basic overview of the wetland sciences and some of the issues that wetland scientists face or are likely to encounter when working on wetland restoration, creation, and enhancement projects. The contributions are certainly not inclusive of all of the disciplines that would be involved in wetland projects and are intended to add new dimensions to a project at the planning stage.

Through the ages wetlands have suffered irreparable damage at the hand of man. Since European occupation we have become proficient at filling in or draining wetlands in the United States. However, over the last few decades this trend is changing, and we have made great strides towards protecting these resources. Ben A. LePage examines this transition from the old paradigm that promoted wetland eradication to the emerging paradigm that attempts to incorporate wetlands into our social fabric. In this approach science and society are working collectively to develop a multidisciplinary ecosystem-based approach for wetland restoration, enhancement and creation. One of the key elements in this approach that he identifies is the greater need for communication between project participants and the public. LePage discusses the importance of developing well defined the goals and objectives during the planning stage of wetland projects. He closes with a proposal to adopt an adaptive management strategy for wetland projects.

Marjorie L. Zeff discusses the importance of channelized flow for providing and maintaining wetland hydrology. She examines the channel morphology in a variety of wetland types to illustrate the inter-related contributions of geology, engineering, and biology to the understanding of wetlands.

Andrew deWet et al. investigate the dynamic nature of sedimentology, stream geomorphology, and the ecological integrity of fluvial ecosystems over the last several thousand years and the impacts of human activity on these processes. In their study they examined the stratigraphic record of floodplain sediment deposition and erosion surfaces of a small second order stream located in the Susquehanna River Watershed in southeastern Pennsylvania that dates back approximately 10,000 years. They document how changes in land cover and landuse since European occupation influenced the erosion and deposition of sediment in this small watershed. Their study illustrates a number of problems associated with stream restoration activities in developed and developing landscapes. They discuss how sedimentological data can be used to better understand stream responses to natural and anthropogenic changes and how to adopt and implement restoration practices that will restore ecosystem functions to small fluvial systems that are consistent with how streams functioned in the past.

Christopher J. Williams reviews the paleoecological information that is relevant to wetland restoration science. As a practitioner of paleoecology he discusses some of the applied aspects of paleoecology that could be useful in a restoration sense. His focus on the use of plant remains such as leaves, seeds, fruits, wood, and pollen provides insight into the benefits and limitations of these data for reconstructing the composition and structure of ancient vegetation communities, as well as the temporal and spatial resolution of past environmental conditions. His discussion is motivated by a desire to improve the baseline conditions for restoration efforts, which in turn should improve the quality and quantity of ecosystem functions and services provided by wetland restoration.

Section 2 focuses on systems of wetland classification and the relationships between the ecological services provided by wetlands and the benefits they confer, both directly and indirectly to society. The impacts of global climate change are significant as they relate to the world's wetlands and how the manner in which the

scientific community examines potential and on-going change is of considerable importance. The contributions in this section provide the reader with the information necessary to understand these issues and leave them with questions to ponder.

Wetland classification is the focus of Mark M. Brinson's contribution. He outlines the importance of how wetlands are classified from non-wetland communities and the variety of classification systems that have been developed over time to meet specific needs. The various classification systems are divided into three broad groups that are based on structural, functional, and utility criteria. The histories, benefits, and limitations of the three types of classification systems are discussed. Finally, the relationship between the utility-based classification systems and ecosystem services as well as why this type of classification system is best suited for wetland management are discussed.

John A. Nyman looks at the ecosystem services provided by wetlands, but focuses his discussion on the ecosystem services that are important to people. He expands on the utility system of classification and further refines this approach to segregate the ecosystem services that provide services that are captured by the landowner and those that are external to the landowner. His point here is that most of the economic value afforded by wetlands is not captured or external to the landowner. His presentation is centered on the importance of understanding and quantifying the ecosystem services provided by wetlands so that wetland managers and regulators can properly evaluate the effectiveness of wetland management strategies and wetland valuation methods.

Beth A. Middleton provides a thought-provoking discussion on the importance of understanding complex environmental and social relationships from a multidisciplinary point of view and in light of continued global climate change. She correctly points out that our current reductionist educational paradigm is poorly equipped to address multidisciplinary questions and in order to adapt to rapidly changing climatic and environmental conditions we as a society will need to work, think, and solve problems using multidisciplinary approaches. The discussion focuses on a few emerging programs that are truly founded on multidisciplinary platforms that are centered on global change ecology. Her discussion then shifts to examples of multidisciplinary research questions that are related to global climate change including the assisted migration of slow-moving plants to prevent extinction, long-term seed storage, and planetary scale geoengineering projects that are designed to ameliorate climate change.

Charles A. Cole and Mary E. Kentula address the sometimes problematic issues of wetland monitoring, especially the dimension of time. Most monitoring programs assume that the three wetland parameters (i.e., vegetation, soil, and hydrology) are static through time. They demonstrate that this is generally not the case and that in order to properly measure the stability of a particular parameter, the objectives of the monitoring program need to be carefully selected. They discuss the benefits and limitations of single- versus multiple-visit monitoring programs and the importance of understanding and clearly defining the objectives of the monitoring program that is to be implemented and the type and quality of the data that will be generated using a particular approach.

Human interactions play a vital role in all aspects of science, especially those like the wetland sciences that touch our lives. The loss of our wetland resources over the last few hundred years is due largely to human activities compounded by the negative perceptions associated with these ecosystems. Society dictates how we treat and manage our resources and the contributions provided in Section 3 bring to light the importance that society plays in the decision making process and the need to keep people informed and engaged in wetland projects.

Although Rachel Kaplan's contribution may at first seem far removed from the science of wetlands, her insight into the importance of communication and human behavior makes this chapter important for illustrating the need for more effective communication between the science side of the business and society. Her discussion is centered on two broad themes: information sharing and the role of nature in human well being. Information sharing is built around a framework that is called the Reasonable Person Model and it illustrates what leads people to act more reasonably when presented with information that they do not understand. Nature and human well being address the issue of perception and the importance of acknowledging and recognizing commonalities and differences in perspectives.

Morgan Robertson and Palmer Hough provide an historical overview of the practice of wetland mitigation as it relates to Section 404 of the Clean Water Act in the United States and the impacts of compensatory mitigation on wetland loss. They point out that the regulations that govern wetland loss are complicated and the notion of mitigation for temporary and permanent impacts to wetlands was not a priority for the United States Army Corps of Engineers or the United States Environmental Protection Agency until the early 1990s. More importantly, the establishment of the interim goal for the Corps of "no net loss" of wetlands in 1990 signaled a major shift in the accounting and manner that the goal of no wetland loss was to be achieved.

Royal C. Gardner and Nick Davidson look beyond our boundaries and consider wetland policy at the global level. The Ramsar convention on wetlands is an inter-governmental treaty that promotes wetland conservation worldwide. The basic tenets and duties of the signatories to this treaty are presented. In addition, they provide a detailed discussion of the obligations that parties to the convention are required to uphold. Namely, employing the "wise use" approach to wetlands; designating and conserving at least one site as a Wetland of International Importance; and international co-operation. They conclude with the benefits that have been realized in wetland conservation by Ramsar parties and the priorities that Ramsar has adopted to address emergent and future global wetland issues.

Paleontological data indicate early man has been exploiting wetlands for food or some other economic benefit for at least 8,000 years. Little has changed since then. Robert J. McInnis provides an overview on the history of wetland management with specific examples through time. His discussion highlights the close relationships between the manner in which wetlands are managed, societal values, and economic drivers. More importantly, he illustrates these values and drivers have changed through time and the resulting shifts in wetland management strategies. His discussion shifts to the twentieth century where society began to realize the importance

of wetlands and the beginnings of wetland conservation strategies and programs. Today the “ecosystem approach” for wetland conservation is being adopted and promoted by various agencies worldwide. However, McInnis points out that the success of such an approach, moving forward, can only be successful through interdisciplinary collaborations.

Nancy Minich provides a landscape architect’s perspective on the qualifications, contributions, and role of landscape architects in multidisciplinary wetland projects. Landscape architects fulfill a relatively unique role in a team setting because they are trained to understand and synthesize the technical information derived from the professionals on the team (e.g., engineers, geologists, wetland sciences) and convert this information into words and concepts that are easily understood and appreciated by the public. From a public perspective, wetland projects must be aesthetically pleasing regardless of the technical and scientific merits of the project. In many cases, the landscape architect’s ability to effectively interface and communicate with the public and project team has a significant impact on the success of wetland projects. Minich provides examples of a number of multidisciplinary stream restoration projects that have benefited from her work as a landscape architect.

Urban streams and wetlands have probably suffered the most over the last century. Limited space to re-establish the streams floodplain, the inability to stop or limit upstream pollution, as well as exorbitant cleanup costs have challenged wetland scientists in the restoration and/or enhancement of impacted urban ecosystems. Lanshing Hwang and Ben A. LePage present an innovative project located along a significantly impacted tidal portion of the Anacostia River in Washington, DC where floating islands were built to create wildlife habitat and improve the aesthetics of the waterfront and water quality along this portion of the river. This project highlights what is possible using a multidisciplinary approach to address wetland issues and serves as an excellent model that can be adopted for other stream restoration projects.

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