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Overview of Vol.2, No.4 – Inland Wetlands

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The papers in this chapter pertain to inland wetlands, freshwater wetlands that are not located along a coastline, generally occurring along streams, rivers, lakes, and ponds. Fifteen plant communities fall under this broad heading, including shallow open water, deep and shallow marshes, sedge meadows, fresh meadows, low prairies, calcareous fens, open bogs, coniferous bogs, shrub carrs, alder thickets, lowland hardwood swamps, coniferous swamps, floodplain forest, and seasonally flooded basins (Eggers &Reed, 1987).

Three of the papers in this chapter address wetland restoration or creation. As our understanding and appreciation of wetlands has expanded, so have the number and scope of federal, state, and local laws to protect them. Regulatory agencies require mitigation in the form of the restoration or enhancement of existing wetlands, or the creation of new wetlands to offset wetland losses. Wetland mitigation appears to promise the best of both worlds by allowing development to occur in wetlands while ensuring that wetlands lost will be replaced. However, arguments arise because no strong consensus has materialized on exactly what constitutes a successful mitigation, and mitigation attempts in general have yielded mixed results. Whether or not it is possible to restore wetlands similar to those that existed historically is uncertain. The challenge of wetland restoration is to create wetlands comparable to those that existed over a century ago, but within today’s landscape. Also, "in-kind" replacement is preferred and some wetland communities are extremely difficult or take centuries to restore (Galatowitsch & van der Valk, 1994; Slavesen, 1991).

Much of what we know about wetlands derives from research and from the hundreds of wetland mitigation projects undertaken each year. Each mitigation project can contribute to the collective understanding of how wetlands function and how they can be more successfully restored. This strengthens the argument for the more consistent, long-term monitoring of mitigation projects. Over time, experience will continue to weed out the less successful mitigation methods and result in some proven techniques that more closely resemble natural wetlands (Galatowitsch & van der Valk, 1994; Slavesen, 1991).

The ecological, hydrological, and technical considerations in planning, constructing, managing, and evaluating wetland restorations needs to be examined and constantly evaluated as part of the wetland restoration process (Galatowitsch & van der Valk, 1994) . The first, and possibly most critical step, in the wetland restoration process the selection of a site with appropriate hydrology. Unfortunately, site characterization can fall prey to aggressive project schedules and budgetary constraints, leading to mitigation projects that fail, are less successful than they should be, or are more costly to construct in order to overcome hydrology problems. Doyle discusses how hydrology determines both the type of wetland restored and whether it is self-sustaining. Siting considerations, data requirements, and construction methods appropriate for the restoration of drained and filled wetlands, as well as created wetlands are addressed. Doyle also stresses the importance of identifying the characteristics of nearby natural wetlands for incorporation in the design of mitigation projects to produce similar processes and functions. This is consistent with the goals set by Galatowitsch & van der Valk (1994) for assessing the success of a wetland restoration by comparing characteristics of the restoration to those of similar natural wetlands. Eventually, this assessment may be based on comparisons of the functioning of restored and natural wetlands in terms of criteria such as primary and secondary production and rates of denitrification.

Biehn reviews the current technology of water control structures used in wetland restoration and creation. The maintenance of appropriate hydrology is affected by the selection and correct installation of the these structures. Earthen structures, trickle tubes, spillways, drop structures, and subsurface drainage manipulation are addressed. Biehn provides a helpful overview of site considerations, lessons learned from past projects, and information on the relative costs of various water control structures.

Robertson's paper addresses another critical component in the restoration process, wetland management. Robertson summarizes research associated with prescribed burning as a restoration and management tool in wetlands, reviews practical considerations of wetland burning techniques, and provides a commentary on the use of fire to achieve wetlands management goals. Although commonly used in upland environments, the application of prescribed burning in wetlands remains largely unresearched and the paucity of field data makes it difficult to evaluate its effectiveness. Goals and prescribed burning techniques for wetland sites differ from those for uplands, and the determination of appropriate prescriptions to meet wetland management goals is needed.

The next papers move from the topic of wetland mitigation and restoration to the arena of wetlands constructed to improve water quality and control flow. Although these wetlands are not "restorations", they provide many benefits associated with wetlands such as green space, habitat, water quality improvement, flood control, and improved plant diversity while providing stormwater or wastewater treatment. Mastey reviews design strategies for stormwater wetlands and describes how a multiple pond system, consisting of a deep forebay to remove suspended solids, a shallow emergent marsh to remove fine sediment and nutrients, and a micro-pool for final clearing and discharge can be an effective alternative to deep, steep-sided detention ponds. Although more space is needed for multi-pond system, benefits include improved water quality, improved groundwater recharge due to ponding, increased plant diversity, additional green space and wildlife habitat. Mastey also stresses the landscape scale solution. This is consistent with the Afelbaum *et al's* (1994) experience with projects designed to reduce runoff volume and pollutant loads through source control and the integration of large-scale restored landscapes into developments to serve as the stormwater management system consisting of upland prairie biofiltration, natural swale conveyance systems, wetlands, and lakes. Combined, these increase lag time and opportunities for pollutant removal though settling and biofiltration and reduce the rate and volume of runoff through enhanced infiltration opportunities.

Phillips reviews the use of constructed wetlands for wastewater treatment, especially when used in conjunction with conventional systems. Design elements can be incorporated in wastewater treatment wetlands so that they become fully functioning ecosystems and can contribute to the habitat needs of aquatic species. Phillips reviews the types of treatment wetlands, area requirements, design considerations, cleansing capabilities, and relative costs. BOD, suspended solids, nitrogen and phosphorous removal capabilities and methods to avert potential problems while maintaining low flow to the receiving water body are addressed. As with all wetlands, water level is the main consideration for plant survival and uptake.

References

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