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Editorial

Wetland restoration at the Society for Ecological Restoration International Conference in Zaragoza, Spain

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“Ecological restoration—a global challenge” was the theme of the 17th Conference of the Society for Ecological Restoration International held from 12 to 18 September 2005 in Zaragoza, Spain. Wetland restoration and rehabilitation were among the hot topics during this conference. Wetlands fulfill a variety of ecological services including production of food and raw materials for direct human uses, as well as water quality improvement, flood protection, and climate regulation for non-direct uses (Millennium Ecosystem Assessment, 2005; Verhoeven et al., 2006a). Their large populations of endangered or rare species provide them with great value for biodiversity protection (Junk et al., 2006). Nevertheless, wetlands are still threatened by, e.g. water abstraction, alteration of natural flow pattern, deforestation, desertification, and land reclamation for civil construction, agriculture and peat mining (International Mire Conservation Group, 2006; Millennium Ecosystem Assessment, 2005).

Reducing the negative effects of wetland degradation on species diversity and ecosystem functioning is the main reason for the increased interest in wetland restoration and rehabilitation. During the Zaragoza conference, wetland restoration and rehabilitation were discussed in a wetland session chaired by Bill Mitsch and in a session about decision support systems chaired by Michael Trepel. This special issue of Ecological Engineering contains a selection of papers from both sessions. In the wetland session, experiences with wetland restoration on different scales and under different climatic conditions were reported (Fink and Mitsch, 2007; Gallego-Fernández and García-Novo, 2007; García-Novo et al., 2007; Hoffmann and Baattrup-Pedersen, 2007; Moreno et al., 2007; Pedersen et al., 2007a,b). In the decision support ses-

sion, the requirements for the development and application of DSS's to support wetland restoration planning were discussed between scientists and practitioners (Claassen, 2007; Goosen et al., 2007; Trepel, 2007). Recently, Verhoeven et al. (2006b) have emphasized that conversion of intensively used agricultural land into wetlands may have disadvantages due to increased N₂O emissions and losses of biodiversity caused by enhanced nutrient loading. Thus, they stated that restoration and rehabilitation projects require careful planning and monitoring. Wetland rehabilitation is an important strategy for the reduction of nutrients entering the sea both in North America and Europe (Mitsch and Day, 2006; Grant et al., 2006).

To guarantee success, management objectives for rehabilitating biodiversity and wetland functioning should be considered at the regional scale, rather than setting objectives for small areas (Turner and Verhoeven, 2004). Tools and methods for site selection on a regional scale are presented by Claassen (2007) for water body restoration in The Netherlands and by Trepel (2007) for peatland rehabilitation in Northwest Germany. Goosen et al. (2007) describe their experiences with applying GIS-based methodology for predicting the effects of land use and water-management changes on several functions of a large peatland complex in The Netherlands. Hoffmann and Baattrup-Pedersen (2007) and Trepel (2007) give examples of methods to predict nitrogen removal rates as a tool to rank potential restoration sites.

As wetland ecosystems are a critical component of the hydrological cycle, they need to be managed in the context of their catchment areas. Fink and Mitsch (2007) studied the effect of different flood pulses on nutrient retention and plant establishment in a created river diversion oxbow wetland and

– based on their finding that the oxbow design was successful in removing nutrients – they recommend the creation of similar diversion wetlands in other locations to examine their functioning under different climatic and hydrological conditions.

As thorough ecological understanding of wetlands dynamics is a key to preserving and restoring, restoration and rehabilitation projects should include a monitoring program to document developments after restoration and if necessary to enable adaptive management. Moreno et al. (2007) evaluated the effect of small wetland construction on nutrient removal in NE Spain and concluded that to remove most nitrogen from wastewater, between 3 and 5% of the total catchment has to be converted into wetland. Gallego-Fernández and García-Novo (2007) compare the effectiveness of different restoration intensities on species diversity in a 5-ha large tidal marsh in Spain. García-Novo et al. (2007) describe background, costs and implementation of the plan to enlarge Doñana National Park (SW Spain) by 1800 ha. Based on a vegetation survey a detailed, low cost revegetation plan was developed based on long-term self-organization processes. Pedersen et al. (2007a,b) describe the restoration of 19 km of the Skjern River and 22 km² of the cultivated river valley since 1999. A comprehensive monitoring program including hydrology, nutrients, fish, meadow vegetation, amphibians (Pedersen et al., 2007a), as well as river morphology, in-stream habitats, macrophytes and macroinvertebrates (Pedersen et al., 2007b) was initiated to assess the short-term ecological consequences of restoration.

These case studies show that successful wetland restoration can be achieved if sites are selected carefully on a regional scale, projects are planned and implemented properly, and an accompanying monitoring program allows for adaptive management. The examples and experiences collected in this issue show that wetland restoration and management is on a good path when scientists and wetland managers exchange their ideas and cooperate from the beginning at all stages of wetland restoration. This was intensively practiced not only during the well-organized Society for Ecological Restoration International Conference, for which Francisco Comín and his efficient team deserve special thanks, but also during evenings in the lively tapas bars of Zaragoza.

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