Perspectives on European Wetland Restoration

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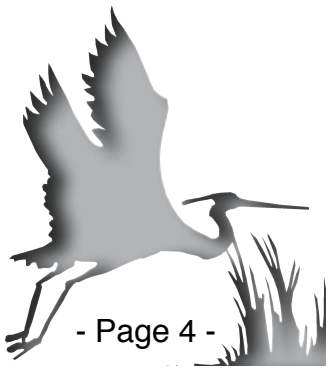
Restoring Europe's Wetlands

Estimates suggest that wetlands account for 7% of the European land area (excluding Russia and marine areas) (Nivet & Frazier, 2004). From the Scandinavian peatlands to the Mediterranean salt fields; from the Atlantic fringe raised bogs to the floodplain meadows of the great continental rivers, Europe's wetlands provide a vast and important biological and societal resource (Silva et al. 2007). However, as long ago as the 1970s, the Council of Europe recognised the importance of wetlands and raised concerns that they were in danger of becoming severely degraded and ultimately disappearing (Hoekstra, 1976). These fears were not misplaced and estimates suggest that wetland losses in the 21st century will continue at around 8% per annum (Nicholls, 2004).

Many European countries, both within and beyond the European Union (EU), are signatories to a variety of international conventions, such as the Ramsar Convention on the Wetlands, the Bonn Convention on Migratory Species and the Convention on Biological Diversity, all of which commit the signatories to protect and restore of wetland ecosystems. This commitment is further enforced within the EU through legislation, such as the Birds Directive (79/409/EEC) and the Habitats Directive (92/43/EEC), which seeks to rectify or reduce damage to European natural habitats and associated species. Through the Water Framework Directive (2000/60/EC) which aims to improve and protect surface and groundwater and to deliver good ecological status; and Directive (2007/60/EC) on the assessment and management of flood risks which provides opportunities to restore wetlands as essential components of water management infrastructure, especially as Europe struggles to adapt to a changing climate with a greater prevalence of meteorological extremes and rising sea levels.



In addition to legislative and political drivers, wetland science has a relatively long and high quality tradition in Europe (Cizkova et al. 2013). Therefore, the science base exists, even if the application and transferability of understanding sometimes needs to be approached with caution, especially when considering knowledge transfer across European climatic zones and cultural systems (Acreman et al. 2007). Increasingly, the social sciences and the economic importance of the ecosystem services provided by wetlands are being advocated to promote wetland restoration in Europe (Meyerhoff & Dehnhardt, 2007) and this situation will improve as the scientific community develops further information on the ecosystem services and socio-economic values of wetlands (Cizkova et al. 2013).

Protecting the existing wetlands in Europe should be the imperative (Gardner et al. 2012). However, the necessity to restore wetlands and mitigate centuries of wetland loss and degradation remains if the benefits wetlands provide to nature and, particularly, to human society are to be delivered (Alexander & McInnes, 2012). This is an urgent task as it has been argued that the recovery of wetlands following restoration can take considerable time and may ultimately be incomplete in terms of structure and function (Moreno-Mateos et al. 2012). However, wetland restoration should be based on sound scientific understanding and practices (Acreman, et al., 2007) and seek to deliver multiple benefits (Zak et al. 2011). To further this aim, the European Chapter of the Society of Wetland Scientists met at Aarhus University, Denmark, in June 2012, to discuss *Wetland restoration – challenges and opportunities*. Attended by over 80 wetland experts from 15 countries the meeting addressed a range of wetland restoration dimensions and included field visits to several restored wetlands including the iconic River Skjern (Pedersen et al. 2007) (Figure 1). The following examples are provided describing the drivers and approaches to wetland restoration in Europe from which lessons can be learned and more universally applied to other wetland restoration projects.

Tools for wetland restoration

Different protocols have been proposed for wetland restoration in relation to the unique characteristics of the target sites (Almendinger, 1999; Eades et al. 2003; Davies et al. 2004; Lesta et al. 2007). Conventionally the process starts with an evaluation of the hydrogeomorphic characteristics of the site, to ascertain whether the desired restoration outcomes are achievable, and an assessment of the degraded hydro-ecological characteristics that must be addressed as drivers of the wetland restoration. A further step is defining the

actions required to restore, or launch the recovery of, the biological community, with special emphasis on the vegetation as support for the rest of the ecosystem. Sometimes, as expanded below, livestock grazing is essential to control plant community development and invasive plant species (Reeves & Chiampon, 2004). Water quality improvement can be a major driver of wetland restoration, and this aspect should be integrated in any restoration plan. Specific tools must be used for understanding the appropriate wetland size and design according to selected objectives, for example restoring wetlands for water quality improvement (Kadlec &Wallace, 2008) or facilitating the recovery of aquatic bird populations (Huang & Isobe, 2012).

Figure 1: Restored floodplain and river channel, River Skjern, Denmark.

Restoration protocols can either comprise successive, incremental steps in selecting the characteristics of the wetland site, or sites, to be restored or multipurpose protocols where a simultaneous assessment of combinations of characteristics or sites is undertaken. The first approach is useful where a hierarchical order of objectives is established (e.g., firstly improving water quality; secondly recovering plant populations; thirdly delivering recreation objectives, etc.) (Newbold, 2005). The second approach is more appropriate to define the optimum combination of restoration actions to deliver multiple objectives while restoring a single wetland or to select the wetland restoration sites that contribute to one or several combined objectives (Zhou et al. 2008; Moreno-Mateos & Comin, 2010). In either case, integrating the social and economic aspects which are most relevant to the acceptance and participation of

local people and the availability of funding are key aspects that require specific tools for consideration in wetland restoration projects (Comin et al. 2005).

Restoring Abandoned Wetlands

The nature conservation value of many European wetlands is a result of historical human management. Certain wetlands have developed and subsequently been maintained for centuries by human intervention, and are used for agricultural production by livestock grazing and mowing for hay, or reed swamps cut for building material. This is particularly the case for wet grassland. Their regular management is perceived in Europe as being essential for nature conservation because it removes the aboveground biomass to allow a diversity of less robust plants to coexist, and to maintain an open landscape suitable for large numbers of wading birds and wildfowl (Joyce and Wade, 1998). Agricultural changes during the 20th century have resulted in enormous losses of wet grasslands, with a decline in the European resource of at least 80% and up to 99% in some regions (e.g., Luoto et al. 2003). The main driver has been agricultural intensification to increase productivity, usually in the form of drainage, inorganic fertilizers, and ultimately ploughing. The relatively few wet grasslands that have escaped intensification practices are now threatened by a less well-known but potentially critical phenomenon: abandonment, which is the cessation of farming practices often due to marginal economic viability or policy changes.

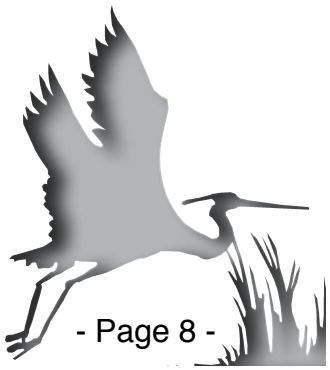
Wetland abandonment is widespread in Europe, especially in the central European and Baltic countries, and results in losses of characteristic and rare plant and animal species, and overall species diversity, as succession proceeds and the more robust plants eventually dominate the habitat. Abandonment can be seen as a positive opportunity to return to a more self-sustaining system or to steer management towards other, more utilitarian ecosystem services. However, managed European wet grasslands often represent biodiversity hotspots in wider, impoverished landscapes. Consequently, initiatives to restore abandoned wet grasslands in Europe by reinstating management have begun, although the success of these schemes appears to be variable. There is evidence that indicates abandoned wet grasslands can be rehabilitated by reinstating cutting or grazing, with beneficial changes being observed in two years in some cases (e.g., Straškrabová & Prach, 1998; Billeter et al. 2007), but that complete restoration to a previous condition is elusive. Long-abandoned grasslands, or those where shrubs or reeds have invaded, may need a more interventionist approach to initiate or accelerate vegetation recovery, such as additional disturbance to the vegetation or soil surface (Berg et al. 2012). Moreover, the viability of wet grassland restoration can be constrained by a lack of diaspores (e.g., in the seed bank) and dispersal vectors (e.g. flooding). However, even if the environmental constraints can be overcome, the restoration of abandoned wet grasslands needs to demonstrate a societal relevance and a benefit to stakeholders.

Stakeholder Engagement in Wetland Restoration

The restoration of wetlands is often associated with potentially conflicting issues such as the demands of food production against the requirement to enhance biodiversity. Embedded in these issues is the limiting factor of how wetland restoration will be financed. In some EU member states the restoration of wetlands or actions for their conservation are considered agri-environmental measures which are eligible for financial support within rural development plans (DG AGRI, 2005). The criteria to access state financing for wetland restoration in the agricultural landscape are mainly based on the delivery of positive impacts on biodiversity or nutrient retention. However, in most cases agricultural landowners have to prioritise production to ensure economic viability, and often it is incumbent on the landowner to take the final decision regarding initiating a restoration project (Hansson et al. 2010). Consequently, there is a strong need to find new ways of engaging landowners and other key stakeholders in wetland restoration. In this respect, the promotion of multi-functional wetlands may be a promising way forward (Andersson, 2012). From a farming perspective, the appealing wetland services include the provision of irrigation water and hunting and fishing opportunities, offering recreational benefits with an economic return. From a societal perspective, the flood buffering capacity of wetlands may be valuable (Jenkins et al. 2010). To achieve flood risk protection, it is necessary to consider the implementation of a broad range of wetland systems such as wet grasslands and larger wetlands with permanent water, preferably developed at a catchment level (Mitsch & Gosselink, 2000). Applying a catchment approach supports more coordinated actions and facilitates large-scale impact modelling and monitoring. Schemes that deliver payments for ecosystem services (PES) represent potential instruments to create new financial arrangements to support wetland restoration and conservation (Wendland et al. 2010). For instance, landowners who convert drained cropland into wet grasslands facilitating seasonal flooding can be financially rewarded for providing a flood risk reduction service. Under such initiatives the role of farmers is rebalanced from primarily producing food to delivering a broader suite of ecosystem services. This has the potential for new actors to be engaged in wetland restoration.

Conclusions

Wetland science has a long history in Europe, which encompasses social sciences, economics and the understanding of local knowledge and culture. The embracing of stakeholders from multiple sectors to optimise the benefits delivered by wetlands is both increasingly necessary and apparent in Europe, and none more so than in the field of wetland restoration. Similarly, the use of tools and protocols that integrate environmental and socio-economic components within wetland restoration projects are increasingly relevant. From local projects seeking to restore small abandoned meadows to pan-European



initiatives seeking to disseminate information, the importance of demonstrating the benefits that flow from wetland restoration is now widely recognised. While much work still needs to be done, novel and exciting perspectives on wetland restoration continue to be exchanged through a range of fora, including meetings such as those hosted by the Society of Wetland Scientists, and the message that restoring wetlands delivers positive benefits to multiple stakeholders is slowly permeating a wider consciousness.

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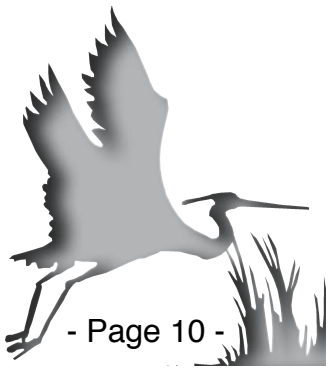

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