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Book review

***European Wet Grasslands: Biodiversity, Management and Restoration*, Edited by Chris B. Joyce and P. Max Wade, Wiley, New York, 1998. ISBN 0-471-97619-9; 340 pp., US$195.00 (hardcover)**

This book emerged from two international workshops that dealt with various aspects of European wet grassland management and restoration for the conservation of biodiversity. Wet grasslands are located on riverine floodplains, lake margins and coastal zones behind sea defences, that are characterized by abundance of grasses and periodic flooding or high water table. Few of these occur naturally, the overwhelming majority having been created by draining or forest clearance over the past century, some dating back to at least the sixteenth century. They have been maintained by regular cutting (for hay making) or livestock grazing. In addition to being important to the agricultural economy of the region, these grasslands maintained beneficial conditions for a remarkably diverse and sometimes rare assemblage of flora and fauna that include internationally and nationally important wading birds, wildfowl, globally threatened plants and valuable invertebrate prey and fish for birds. Unfortunately, the past 50 years have witnessed a dramatic loss of biodiversity in these grasslands. The cause of this loss has been attributed to altered hydrologic regimes, increased use of inorganic fertilizers and other agrochemicals, and increased cutting frequency and stocking density, that are all associated with agricultural intensification. In some cases, wet grasslands have been eliminated or severely degraded by pollution, mineral extraction, as well as industrial and urban development.

Part One, which contains five chapters, is entitled 'status' and is led by a chapter that documents the historical development of European legislation and strategies for conservation of wet grasslands. Remainder of these are case studies from UK, Estonia and Spain that illustrate the diversity of wet grassland communities in these regions. Part Two contains five chapters that explain how different environmental factors (geomorphology, human intervention, hydrology) contribute to their maintenance and promote high biodiversity, especially in plants, birds and invertebrates. Part Three has five chapters concerned with management of these inundated grasslands. One chapter compares the plant community dynamics of floodplain grasslands; one receives constant flooding and grazing/trampling by livestock whereas the other receives traditional hay-meadow management that excludes intense grazing and inundation. Grazing, trampling and episodic inundation kept some areas bare and promoted a dynamic community of short-lived small ruderal species that responded rapidly to perturbations. On the other hand, the low-intensity management led to a community composed mostly of perennial competitive stress-tolerant species that were resistant to the cessation of management. When both fields were subsequently abandoned, they each encouraged the expansion of robust competitive species. Based on these results, the authors recommend that different responses of specific plant communities be considered prior to management alterations for conservation and rehabilitation purposes. Another chapter discusses the effectiveness and feasibility of restoring water levels in agricultural

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ditches where irrigation requirements keep the water table artificially low. The other chapters contain case studies that describe how management of grassland hydrology has affected the ecology of plants and wildfowl in English grasslands. Part Four focuses on restoration efforts, with documented cases from the UK, the Netherlands, and the Czech Republic. Grasslands that have been degraded due to fertilizer addition appear to require decades to recover its original floristic diversity following cessation of farming because of residual soil phosphorus content. Abandoned arable land may also require a long time to recover floristically, especially if the soil seed bank is inadequate. By comparison, alluvial meadows in the Czech floodplain that have lost its biodiversity due to lack of disturbance (no mowing for two decades) appeared to have responded in 5 short years when cutting resumed.

This is a handsome volume, which packs a lot into its 340 pages. There is an introductory chapter that gives a very accurate description of the 19 chapters to follow, and in many ways is the 'abstract' of the book, with sufficient detail to satisfy those with just a peripheral interest in wetland ecosystems. But wetland ecologists and managers would have no difficulty thumbing through and locating several chapters that will become an essential reference in their library. A very good organizational feature of the book is the 'Conclusion' section in almost every chapter and a 'Summary' that can be quickly scanned. There is also a useful glossary, complete with acronyms for those newly initiated, and a handy table of vascular plant nomenclature (along with common English names) at the back of the book.

As with other books that result from scientific workshops, there is some unevenness in how the assembled topics are covered. There are several chapters that give a thorough and satisfactory treatment, while others seem wanting, appearing to be only the skeleton of a better documented paper elsewhere. But these do not detract from the overall feel of the book, which is one of quality. The chapter introducing the European legislation and strategies for conservation shows how protection of individual species is likely ineffective, and how a more holistic and integrative approach would bring about better results. This is a hard lesson that has been shared by workers in other jurisdictions as well. There are also two central themes that most wetland scientists will identify with immediately: the universal importance of hydrologic regimes, and the negative impacts of inorganic fertilizer addition on wetland biodiversity, and these have been explored in several case studies. The book also points out in several places the need for further research to fill data gaps. An area that was not adequately addressed is the potential impact of sea-level rise resulting from global climate change over the next several decades.

To North American readers, the thought of restoring artificially created ecosystems such as wet grasslands that require human disturbance to maintain their existence and biodiversity may seem somewhat odd. But if one considers that these wet meadows are no less 'natural' than are wetlands behind beaver dams in Canada, then the desire to restore these landsdcape features may not seem such a strange notion. Perhaps the most surprising revelation to me was the realization that when humans live in and relate to, rather than dominate their landscape, ecological harmony can be achieved.

P. Chow-Fraser
Department of Biology,
McMaster University,
1280 Main St. West,
Hamilton, ON L8S4K1,
Canada