

SPECIAL ISSUE

THE VALUES OF WETLANDS: LANDSCAPE AND INSTITUTIONAL
PERSPECTIVES

Ecological-economic analysis of wetlands: scientific
integration for management and policy

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Abstract

Wetlands all over the world have been lost or are threatened in spite of various international agreements and national policies. This is caused by: (1) the public nature of many wetlands products and services; (2) user externalities imposed on other stakeholders; and (3) policy intervention failures that are due to a lack of consistency among government policies in different areas (economics, environment, nature protection, physical planning, etc.). All three causes are related to information failures which in turn can be linked to the complexity and ‘invisibility’ of spatial relationships among groundwater, surface water and wetland vegetation. Integrated wetland research combining social and natural sciences can help in part to solve the information failure to achieve the required consistency across various government policies. An integrated wetland research framework suggests that a combination of economic valuation, integrated modelling, stakeholder analysis, and multi-criteria evaluation can provide complementary insights into sustainable and welfare-optimising wetland management and policy. Subsequently, each of the various

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components of such integrated wetland research is reviewed and related to wetland management policy. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Wetlands provide many important services to human society, but are at the same time ecologically sensitive and adaptive systems. This explains why in recent years much attention has been directed towards the formulation and operation of sustainable management strategies for wetlands. Both natural and social sciences can contribute to an increased understanding of relevant processes and problems associated with such strategies. This article examines the potential for systematic and formalised interdisciplinary research on wetlands. Such potential lies in the integration of insights, methods and data drawn from natural and social sciences, as highlighted in previous integrated modelling and assessment surveys (Bingham et al., 1995). The various components of integrated wetlands research will be reviewed here.

There is some disagreement among scientists on what constitutes a wetland, partly because of their highly dynamic character, and partly because of difficulties in defining their boundaries with any precision (Mitsch and Gosselink, 1993). For example, Dugan (1990) notes that there are more than 50 definitions in current use. Likewise, there is no universally agreed classification of wetland types. Classifications vary greatly in both form and nomenclature between regions; see Cowardin et al. (1979) for one influential classification system. Some features of wetlands, nonetheless, are clear. It is the predominance of water for some significant period of time and the qualitative and quantitative influence of the hydrological regime that characterise and underlie the development of wetlands. The Ramsar Convention definition, widely accepted by governments and NGO's world-wide, is as follows: *'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or*

salt including areas of marine water, the depth of which at low tide does not exceed 6 m'. While lacking scientific exactness, this definition conveys much of the essential character of wetlands, as well as implying the complexity involved. What it does not provide, however, is any guidance on the generic characteristics of wetlands that influence how wetlands actually function. Any integrated wetland research approach has somehow to make compatible the very different perceptions of what exactly is a wetland system, as seen from a range of disciplinary viewpoints (Maltby et al., 1994, 1996). In this article the main characteristics of wetland processes and systems are reviewed in a cross-disciplinary way.

Globally, wetlands are under heavy pressure. Despite the increasing recognition of the need to conserve wetlands, losses have continued. One main reason is that wetlands throughout the world are considered by many to be of little or no value, or even at times to be of negative value. This lack of awareness of the value of conserved wetlands and their subsequent low priority in the decision-making process has resulted in the destruction or substantial modification of wetlands, causing an unrecognised social cost.

The paper is organised as follows. Section 2 discusses the causes of wetland degradation and loss. Section 3 presents a framework for ecological-economic analysis of wetlands. Section 4 gives a classification of stakeholders in the context of wetlands functions and values. Section 5 discusses the use of valuation techniques and cost-benefit analysis for wetland analysis. Section 6 considers the application of multi-criteria evaluation techniques for decision-making in the context of wetland management. Section 7 reviews the possibilities for integrated ecological-economic modelling. Section 8 links integrated wetland analysis to policy issues ranging from local to global levels. A final Section 9 provides conclusions and suggestions for further research.

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