

**ECOSYSTEM MANAGEMENT:  
LESSONS FROM AROUND THE WORLD**

**A Guide for Development and Conservation Practitioners**

February 1998

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prepared for the World Bank  
by IUCN -- The World Conservation Union  
(Ecosystem Management Programme)

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## EXECUTIVE SUMMARY

The Guide aims to encourage a wider understanding of the concepts of ecosystem and natural habitat management through the practical experience gained from 24 different field projects. It is based on a review of the institutional, technical and operational profiles of a number of carefully selected projects from around the world. These case studies ranged from unspoiled to degraded ecosystems and were drawn from a range of project types and scales (Appendix 1). The methodology for commissioning and analysing the case studies (Appendix 2) provided an important basis for the Guide, Summaries of the case studies are provided throughout to illustrate the points being made.

The Guide falls into two parts. Chapters I-III introduce the concept of ecosystem management, its principles and their application. Chapters IV-VI provide more practical methods, tools and checklists for applying ecosystem management principles in development and conservation projects.

Chapter II describes the nature of ecosystems and the way in which they function. Ecosystem management recognises that ecosystems may be modified, but demands that they are transformed within the tolerance of the system as well as from the point of view of the human society concerned.

The application of the principles underlying ecosystem management is described in chapter III. One of the key roles of ecosystem management is to achieve sustainability and to maintain the functional integrity of the system and the processes which ensure the continuity of life. Other important facets include attention to

ecosystem boundaries, recognising that people are an integral part of the system, and that ecosystem management must adapt constantly to changes.

Chapter IV describes the components and tools required for ecosystem management. These include identification of the information required, and use of different tools. The components of an ecosystem management plan are provided, in which the participation of local communities and stakeholders is a key feature. Communication and education are also essential to success. Multi-sectoral and multi-partner collaboration are other important features of ecosystem management, and as a result clear coordination and institution-building are essential.

Chapter V highlights the importance of partnerships and the value of local participation. Local people are both the victims of environmental degradation and the main beneficiaries of successful ecosystem management. This chapter covers the development of partnerships, and provides methods for carrying out stakeholder analysis and environmental conflict management. Collaborative management represents a clear empowerment of local people to manage their own ecosystems more sustainably.

Chapter VI provides a series of checklists, which illustrate how the principles of ecosystem management can be applied to the project cycle. As well as going through the project cycle in detail, this chapter illustrates that project management must be responsive to changing conditions and needs. Much attention must also be paid to monitoring systems and indicators of success, and the institutional mechanisms for making adaptive decisions.

Chapter VII provides a conclusion to the guide, looking forward to the development of the approach and to bringing it into the mainstream of development and conservation. It is appreciated that these are necessarily generalised guidelines and that more specific ones will be needed for different types of ecosystem. Tools for diagnosing ecosystem degradation, economic valuation procedures, and monitoring and evaluation techniques need to be improved. The dissemination of the tools must be carried out through training of all those involved in project design and implementation.

## I. INTRODUCTION

Ecosystem and natural habitats management seeks to meet human requirements for the use of natural resources, whilst maintaining the biological richness and ecological processes necessary to sustain the composition, structure and function of the habitats or ecosystems concerned. Important within this process is the setting of explicit goals and practices, regularly updated in the light of the results of monitoring and research activities.

Humanity is part of the natural world that depends for its existence on ecological processes -- the cycling of water and the elements, the maintenance of stable atmospheric, climatic and hydrological conditions, and the continued production of foodstuffs and many other organic products on which human society depends. These ecological processes are controlled by the functioning of ecosystems -- assemblages of plants and animals interacting with each other and with the physical components of the environment.

**Ecosystem-based management aims to regulate human uses of ecological systems, and to modify the impacts of these uses, so as to retain defined and desired features and processes, and to meet human needs in an optimal and sustainable way.** Unless essential ecosystem functions are maintained, development will not be sustainable. There is a general failure of development and natural resource-use policies and programmes to halt the continuing loss of biodiversity and the degradation of the environment. The continuing degradation, at all scales and across many different social and political systems, emphasises the need for ecosystem-based management.

Ecosystem-based management is a tool for development optimization without undermining sustainability, as called for in Agenda 21. Ecosystem management:

- starts with a definition of the essential features of an environmental system,
- indicates the constraints imposed on its use, and,
- forces an evaluation of the alternative management approaches that may be used to generate different

products for human benefit, without jeopardising the functional integrity of the system concerned.

Based on a number of fundamental principles, **ecosystem-based management is as valid for large-scale infrastructure and other development projects as it is for the smaller-scale conservation and development-oriented projects used as case studies here.** The principles and example described provide guidelines for the design and implementation of projects involving ecosystem management, whatever the scale or orientation.

The present guide aims to encourage a wider understanding of the concepts of ecosystem and natural habitats management so that they can be used more effectively in Bank-supported projects, many of which are large-scale, long-term and complex. The Bank wants to encourage development practitioners to recognise that ecosystems are more than just biophysical systems. People are an intimate part of most ecosystems and development projects must involve them actively in the process of ecosystem management. The success of ecosystem and natural habitats management will depend as much on the management of social, economic and institutional factors as it will on the protection and management of the biophysical environment.

This guide was commissioned by the World Bank Environment Department and prepared by IUCN -- The World Conservation Union, to enable Bank and borrower country staff to benefit from the lessons learned by other development practitioners and conservation organisations. It coincides with recognition world-wide of the growing importance of an ecosystem-based approach to environmental management. This is reflected in the development of IUCN's own Commission on Ecosystem Management and its publication of the first Sibthorp Seminar *"The scientific basis of ecosystem management for the third millennium"* (Maltby et al., 1997). It also builds on the Bank's own publication *"Mainstreaming Biodiversity in Development: A World Bank Assistance Strategy for Implementing the Convention on Biological Diversity"* (World Bank, 1995).

The Guide is based on the practical experience of 24 projects of many different sizes, time-scales, ecosystem types, natural resource uses and community development activities from around the world. These projects were carried out by a variety of organisations -- government agencies, non-governmental organisations and local communities, and supported by many different international and national financing organisations. The case studies are drawn mainly from the conservation and development type. There is, to date, a notable lack of examples of large-scale development projects which have specifically used the ecosystem management approach in their design and implementation.

The particular lessons the case studies illuminate are summarized in boxes adjacent to the points being made. The need for an ecosystem-based approach is illustrated in the first box, which summarises what happened in the Senegal River Valley when a development project failed to take essential ecological constraints into account. The list of case studies and their authors is given in Appendix 1. The methodology used in the process of analysis is described in Appendix 2.

#### **Missed Opportunity- investment without ecosystem management in the Senegal River Valley**

In 1972, the governments of Mali, Mauritania and Senegal established the Organisation for the Development of the Senegal River Valley (OMVS) with a view to constructing two dams -- Manantali in Mali, for flood regulation and hydroelectricity, and Diama, in the estuary, to exclude saline water intrusion in the dry season. They were designed:

- for intensive rice production (Senegal: 240,000ha; Mauritania: 125,000ha; Mali. 10,000ha);
- for electricity production (800 Gwh per year);
- to ensure all round navigability on about 500km of the middle course of the river; and,
- to allow an artificial flood on 50-100,000ha of the former floodplain.

In the 1970s, socioeconomic parameters, community participation, environmental considerations and health aspects were not integrated into the original project. Progress has been slower than anticipated, and so far the key results are.

- 50% of the phased programme for irrigating 4,000 ha of perimeter lands per year has been completed, but rising costs will probably prevent its timely completion;
- rice production is considerably lower than the feasibility studies predicted, since soil salinisation prevents cultivation on 50% of the newly-created, irrigated fields;

- dam and dyke infrastructures have reduced traditional grazing lands from. 80,000ha to 4,000ha;
- 75% of the seasonal floodplain wetlands have been altered and fish production in the river and estuary has fallen by 90%;
- a floodplain forests and estuarine mangroves have been destroyed,
- a grain-eating pest birds have become significantly more abundant; and,
- stagnant waters have introduced or increased the prevalence of diseases, and pollution from pesticides and fertilizers is common.

These problems are caused by the lack of recognition of the linkages between the different ecological components of the river basin, and by poor integration of the social and economic features of the target groups into project planning. To resolve this, OMVS plans to implement a series of country master plans for further development of the river valley. To succeed these will need to:

- ensure participation of local communities at every stage in all the future projects;
- integrate traditional flood recession and grazing practices into the operation of the two darns;
- minimise further wetlands forest and land degradation and foster restoration, e.g. through valuation of the natural resources and improved management of protected areas;
- adapt existing water development strategies to minimise health hazards; and
- modify existing land ownership legislation to ensure that farmers have an interest in maintaining or restoring their soils.